Hearings Examiner Meeting Agenda
Wednesday, October 25, 2023, 5:00 PM
Council Chambers, 616 NE 4th AVE

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CALL TO ORDER

INTRODUCTIONS AND INSTRUCTIONS

HEARING ITEM

1. Georgia Pacific In-Water and Over-Water Structures Removal Project (SHOR23-01)
   Presenter: Lauren Hollenbeck, Senior Planner

CLOSE OF MEETING

LAND USE DECISION

STAFF REPORT

GEORGIA PACIFIC IN-WATER OVER-WATER REMOVAL PROJECT Shoreline Substantial Development Permit and Shoreline Conditional Use (SHOR23-01)

CONSOLIDATED FILES: CRITICAL AREAS REVIEW (CA23-04); ARCHAEOLOGICAL REVIEW (ARCH23-03); STATE ENVIRONMENTAL POLICY ACT (SEPA23-04)

Staff Report Date: October 20, 2023

TO	Hearings Examiner	**HEARING DATE**	October 25, 2023
PROPOSAL	Removal of in-water and over-water structures associated with the previous operations of the Georgia Pacific paper mill along the Columbia River and Camas Slough within the Aquatic, Medium Intensity and High Intensity shoreline areas.		
LOCATION	The project is located in Camas, Washington, within Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15 and 16 of the Willamette Meridian; and described as tax parcels 08370-0000, 09104-4013, 09104-4015, 09104-4027, 50090-1000, 50090-2000, 50090-3000, 50090-4000, 50081-4000, 50081-4001, 50081-7000 & 50081-8000.		
APPLICANT/ CONTACT	Georgia Pacific Camas Mill Sam McDowell 401 NE Adams Street Camas, WA 98607 (360) 834-8439		
APPLICATION SUBMITTED	March 30, 2023; Resubmitted June 1 and July 20, 2023	**APPLICATION COMPLETE**	July 27, 2023
SEPA	The City issued a SEPA Determination of Non-significance (DNS) August 3, 2023, with a comment period that ends on August 17, 2023. The SEPA DNS was mailed to property owners August 2, 2023, and published in the Post Record on August 3, 2023. Legal publication #825040.		
PUBLIC NOTICES	Notice of Application was mailed to property owners within 300 feet of the site on August 2, 2023, and published in the Post Record on August 3, 2023. Legal publication #825030. Notice of Public Hearing was mailed to property owners within 300 feet of the site on October 4, 2023, and published in the Post Record October 5, 2023. Legal publication #840210.		

APPLICABLE LAW: The application was submitted on March 30, 2023, and the applicable codes are those codes that were in effect at the date of application submittal. Camas Municipal Code (CMC) Title 16 Environment and the Camas Shoreline Master Program (Ord. 15-007) and the Shoreline Management Act (RCW 90-58) (WAC 173-27).

CONTENTS

SUMMARY 2

FINDINGS 3

SHORELINE MASTER PROGRAM (SHOR23-01) 3

Archaeological, Cultural and Historic Resources (ARCH23-03) 8

Critical Areas Protection (CA23-04) 8

Shoreline Conditional Use 16

State Environmental Policy Act (SEPA23-04) 18

PUBLIC COMMENTS 18

CONCLUSIONS 18

RECOMMENDATION 18

SUMMARY

The project proposal includes the abatement, removal and demolition of structures associated with prior operations at the Camas Paper Mill along the riverbank. Structures proposed for removal include a warehouse, five docks/piers, conveyor housings, an aboveground oil storage tank, the crane foundation and approximately 3,000 pilings that have been abandoned or serve as mooring dolphins for the structures proposed for removal. Associated project activities for the removal of these structures include sediment dredging and excavation/filling.

The project site lies within the regulated shoreline of the Columbia River and the Camas Slough where the project activities are located both above and below the ordinary high-water mark (OHWM). The Camas Shoreline Master Program (SMP) classifies the shorelines of the project area as “Aquatic”, “Medium Intensity” and “High Intensity” shoreline environments.

Under the Shoreline Master Program, “Development” does not include dismantling or removing structures if there is no other associated development or redevelopment per WAC 173-27-030(6). Although the removal of the structures themselves is not subject to the Shoreline Master Program, sediment dredging, and dredge material disposal activities are. ‘Non-maintenance Dredging’ in the “Aquatic” shoreline environment and ‘Dredge Material Disposal’ in the “Aquatic”, “Medium Intensity” and “High Intensity” shoreline environments are permitted subject to a Shoreline Conditional Use.

The development is subject to review and approval of the following permits: Shoreline Substantial Development Permit and Shoreline Conditional Use Permit; Critical Areas Review; SEPA Review and Archaeological Review. This report includes the criteria for review for these permit types including a recommendation of approval for the project proposal.

Please note: References to reports and documents included as exhibits are *italicized* throughout this report.

PROJECT DESCRIPTION

Per the *Project Narrative*, the in-water structures proposed for removal include dolphins and pilings, the dock warehouse piers, and the Berger crane foundation. Riverbed dredging is required for demolition barge access to the dock warehouse piers. Fill would be used to cover the retained lower columns of the Berger crane foundation, creating bottom contours that match the adjacent natural riverbed.

The over-water structures proposed for removal include the Truck Dock, Dock Warehouse and PECO Dock that require excavation/dredging and filling for demolition. The riverbank in this area will be graded to create shallower slopes that match existing grades.

The other shoreline activities include the demolition of the above ground oil storage tank down to its foundation, remove elevated conveyor housings and backfilling the South Wood Chip Areas to design grades.

Vegetation in the vicinity of the project site is sparse and the present vegetation is predominantly weedy and invasive species. Riparian vegetation adjacent to the action area is generally characterized as disturbed habitat. Riverbanks along the main Mill area consist of fill, are generally steep and armored with boulder sized riprap and support a variety of docks per the *Biological Assessment*.

FINDINGS
SHORELINE MASTER PROGRAM (SHOR23-01)

SMP Standards for Evaluation

- **Shoreline Substantial Development Permits** must be consistent with the approved Shoreline Master Program (SMP) element goals, objectives, and general policies of the designated environment; policy statements for shoreline use activities; and with use activity regulations.
- **Shoreline Conditional Use Permits.** These provisions shall apply only when it can be shown that the proposed use is compatible with existing surrounding uses and that the public interest and use of the shoreline is not negatively impacted. SMP Conditional Use Permits require final approval or disapproval from the Department of Ecology after final local action has been taken.

Master Program Goals and Policies SMP Chapter 3

At page 19 of the SMP, the general goals of the program are to use the full potential of the shorelines in accordance with the surrounding areas, the natural resource values, and the unique aesthetic qualities; and develop an ordered and diversified physical environment that integrates water and shoreline uses while achieving a net gain of ecological function. Primarily, the dredging and dredging material disposal supports the following shoreline goals:

SMP, Section 3.2 Shorelines of Statewide Significance, “Development should be focused in already pre-developed shoreline areas to reduce adverse environmental impacts and to preserve undeveloped shorelines.”

SMP, Section 3.9 Shoreline Modification and Stabilization, “The goal for shoreline modification and stabilization is to avoid or minimize the need for shoreline armoring along shorelines of the state, and when it is necessary, achieve it in a way that best protects ecosystem processes, shoreline functions, and downstream properties.”

SMP, Section 3.12 Views and Aesthetics, “The goal for views and aesthetics is to assure that the public’s opportunity to enjoy the physical and aesthetic qualities of shorelines of the state, including views of the water, is protected to the greatest extent feasible.”

SMP, Section 3.13 Water Quality and Quantity, “The goal for water quality and quantity is to protect and enhance the quality and quantity of the region’s water resources to ensure there is safe, clean water for the public’s needs and enjoyment; and protect wildlife habitat.”

FINDING: Staff finds that the project is consistent with the general policies of Chapter 3, given that the proposed location of project activity is within areas that are already developed and mitigated for in those areas that are impacted; modification to the shoreline does not necessitate shoreline armoring; promotes public views and aesthetic qualities of the shorelines and waters of the state; and implements best management practices to protect water quality and ensure no net loss of shoreline ecological functions.

Aquatic Shoreline Designation — SMP Chapter 4

The management policies of the Aquatic Shoreline Designation at SMP Section 4.3.1.4 are as follows:

1. **New water-over structures should be allowed only for water-dependent uses or ecological restoration.**

   FINDING: New over-water structures are not proposed and therefore this criterion is not applicable.

2. **Shoreline uses and modifications should be designed and managed to prevent degradation of water quality and natural hydrographic conditions.**

   FINDING: The applicant has prepared detailed specifications regarding the in-water work and their efforts to protect the environment.

3. **In-water uses should be allowed where impacts can be mitigated to ensure no net loss of ecological functions. Permitted in-water uses must be managed to avoid impacts to shoreline functions. Unavoidable impacts must be minimized and mitigated.**

   FINDING: Impacts cannot be avoided by demolishing and/or removing in-water structures. However, best management practices will be implemented to minimize project impacts per the *Project Narrative*. The in-water work includes reducing riverbed obstructions and over water shading, reshaping the riverbank to create near shore habitat, and removing piles containing creosote, which is expected to result in an increase of ecological functions.

4. **On navigable water or their beds, all uses, and development should be located and designed to: (a) minimize interference with surface navigation; (b) consider impacts to public views; and (c) allow for safe, unobstructed passage of fish and wildlife, particularly species depended on migration.**

   FINDING: Removal of structures will be self-mitigating as the removal of these structures will restore the project area to its natural conditions and thereby eliminating these impediments for potential species migration, any surface navigation, and public viewing of the water. Dredging will not interfere with navigation, including fish migration, and will not impact public views.

5. **Multiple or shared use of over-water and water access facilities should be encouraged to reduce the impacts of shoreline development and increase effective use of water resources.**

   FINDING: Over-water and water access facilities are not proposed and therefore this criterion is not applicable.

6. **Structures and activities permitted should be related in size, form, design, and intensity of use to those permitted in the immediately adjacent upland area. The size of new over-water structures should be limited to the minimum necessary to support the structure's intended use.**

FINDING: New over-water structures are not proposed. The project activities such as the excavation, grading, fill within the shoreline are similar in size, form, design, and intensity to existing activities permitted in the adjacent High Industrial zoned upland area.

7. **Natural light should be allowed to penetrate to the extent necessary to discourage salmonid predation and to support nearshore habitat unless other illumination is required by state or federal agencies.**

   FINDING: Removal of the structures along the riverbank will help in the restoration of natural light to support nearshore habitat.

8. **Aquaculture practices should be encouraged in those waters and beds most suitable for such use. Aquaculture should be discouraged where it should adversely affect the strength of viability of native stocks or unreasonably interfere with navigation.**

   FINDING: Aquaculture practices are not proposed and therefore this criterion is not applicable.

9. **Given that the aquatic designation is waterward of the OHWM, then when the proposed use, development, activity, or modification requires use of adjacent upland property, then it must be allowed within the upland shoreline designation.**

   FINDING: Dredging disposal of suitable materials to be disposed upland of the OHWM will occur at the existing approved disposal site on Lady Island.

Medium Intensity Shoreline Designation — SMP Chapter 4

The management policies of the Medium Intensity Shoreline Designation at SMP Section 4.3.4.4 are as follows:

1. **The scale and density of new uses and development should be compatible with sustaining shoreline ecological functions and processes, and the existing residential character of the area.**

   FINDING: The proposed project will improve ecological functions and processes by restoring the area to a more natural state and will be compatible with the existing residential character of the area.

2. **Public access and joint use (rather than individual) of recreational facilities should be promoted.**

   FINDING: Public access of recreational facilities is not proposed but removal of the proposed structures will increase safety for public accessing the waterway. The main Mill parcel is currently restricted to public access.

3. **Access, utilities, and public services to serve proposed development within shorelines should be constructed outside shorelines to the extent feasible and be the minimum necessary to adequately serve existing needs and planned future development.**

   FINDING: The development of new access, utilities, and public services are not proposed and therefore this criterion is not applicable.

4. **Public or private outdoor recreation facilities should be provided with proposal for subdivision development and encouraged with all shoreline development if compatible with the character of the area. Priority should be given first to water dependent and then to water-enjoyment recreation facilities.**

   FINDING: The proposal is not a subdivision and therefore this criterion is not applicable.

5. **Commercial development should be limited to water-oriented uses. Non-water oriented commercial uses should only be allowed as part of mixed-use developments where the primary use is residential and where there is a substantial public benefit with respect to the goals and policies of this Program such as providing public access or restoring degraded shorelines.**

   FINDING: Commercial development is not proposed and therefore this criterion is not applicable.

High Intensity Shoreline Designation — SMP Chapter 4

The management policies of the High Intensity Shoreline Designation at SMP Section 4.3.5.4 are as follows:

1. **Promote infill and redevelopment in developed shoreline areas with the goal of achieving full utilization of the shoreline, while encouraging environmental remediation and restoration of the shoreline, where applicable.**

   FINDING: The proposal does not include infill or redevelopment in the developed shoreline but rather include the removal of structures and dredging that implements best management practices, which will promote the environmental remediation and restoration of the shoreline.

2. **Encourage the transition of uses from non-water-oriented to water-oriented uses.**

   FINDING: Removing the structures along the riverbank will create a water-enjoyment use (i.e. water-oriented use) by furthering the public's ability to enjoy the aesthetic qualities of the shoreline.

3. **Water-oriented uses are encouraged, however new non-water-oriented uses may be allowed.**

   FINDING: Removing the structures along the riverbank will create a water-enjoyment use (i.e. water-oriented use) by furthering the public's ability to enjoy the aesthetic qualities of the shoreline.

4. **Visual or physical public access should be a priority. Where possible, industrial and commercial facilities should be designed to permit pedestrian waterfront activities.**

   FINDING: Visual public access is provided via the removal of structures that are no longer utilized with paper mill's operations.

General Shoreline Use and Development Regulations — SMP Chapter 5

The following general shoreline use and development regulations of Chapter 5 Section 5.1 are as follows:

1. **Shoreline uses and developments that are water-dependent shall be given priority.**

   FINDING: The removal of structures and the dredging/grading activities are not water-dependent.

2. **Shoreline uses and developments shall not cause impacts that require remedial action or loss of shoreline functions on other properties.**

   FINDING: The proposed work will not affect shoreline functions on other properties or require remedial action as Best Management Practices (i.e. erosion control, etc.) outlined in the *Project Narrative* will be implemented throughout project construction and conditioned as such.

3. **Shoreline uses, and developments shall be located and designed in a manner such that shoreline stabilization is not necessary at the time of development and will not be necessary in the future for the subject property or other nearby shoreline properties unless it can be demonstrated that stabilization is the only alternative to protecting public safety and existing primary structures.**

   FINDING: The proposed shoreline activity will not require shoreline stabilization at the time of the development or in the future.

4. **Land shall not be cleared, graded, filled, excavated, or otherwise altered prior to issuance of the necessary permits and approvals for a proposed shoreline use or development to determine if environmental impacts have been avoided, minimized, and mitigated to result in no net loss of ecological functions.**

   FINDING: The applicant has applied for proper permits and has not requested to begin work prior to receiving approvals.

5. **Single family residential development shall be allowed on all shorelines except the Aquatic and Natural shoreline designation, and shall be located, designed, and used in accordance with applicable policies and regulations of this Program.**

   FINDING: Single-family residential development is not proposed and therefore this criterion is not applicable.

6. **Unless otherwise stated, no development shall be constructed, located, extended, modified, converted, or altered or land divided without full compliance with CMC Title 17 Land Development and CMC Title 18 Zoning.**

   FINDING: The proposed development requires compliance with any applicable regulations from CMC Title 17 Land Development and CMC Title 18 Zoning.

7. **On navigable waters or their beds, all uses and developments should be located and designed to: (a) minimize interference with surface navigation; (b) consider impacts to public views; and (c) allow for the safe, unobstructed passage of fish and wildlife, particularly species dependent on migration.**

   FINDING: Removal of structures will be self-mitigating by restoring the project area to its natural condition. Eliminating these impediments allows for potential species migration, any surface navigation, and public viewing of the water. Dredging will not interfere with navigation, including fish migration, and will not impact public views.

8. **Hazardous materials shall be disposed of, and other steps be taken to protect the ecological integrity of the shoreline area in accordance with the other policies and regulations of this Program as amended and all other applicable federal, state, and local statutes, codes, and ordinances.**

   FINDING: Any hazardous materials determined to be present will be abated prior to structure demolition activity. The shoreline will also be protected by employing Best Management Practices to prevent sediments and other contaminants from discharging into the Camas Slough or Columbia River.

9. **In-water work shall be scheduled to protect biological productivity (including but not limited to fish runs, spawning, and benthic productivity). In-water work shall not occur in areas used for commercial fishing during a fishing season unless specifically addressed and mitigated for in the permit.**

FINDING: The in-water work schedule will occur during the approved federal and state regulatory in-water work windows as outlined in the *Project Narrative*. Implementation of Best Management Practices and mitigation measures will minimize impacts to aquatic species, habitats, and water quality.

10. **The applicant shall demonstrate all reasonable efforts have been taken to avoid, and where unavoidable, minimize and mitigate impacts such that no net loss of critical area and shoreline function is achieved. Applicants must comply with the provisions of Appendix C with a particular focus on mitigation sequencing per Appendix C, Section 16.51.160 Mitigation Sequencing. Mitigation Plans must comply with the requirements of Appendix C, Section 16.51.170 Mitigation Plan Requirements, to achieve no net loss of ecological functions.**

    FINDING: The application includes a *Critical Area Report* for the presence of wetlands, frequently flooded areas, geologically hazardous areas, and fish and wildlife habitat conservation areas within shoreline jurisdiction. Further discussion is provided in Section 5.3 below.

11. **The effect of proposed in-stream structures on bank margin habitat, channel migration, and floodplain processes should be evaluated during permit review.**

    FINDING: The proposal does not include new in-stream structures and therefore this criterion is not applicable.

12. **Within urban growth areas, Ecology may grant relief from use and development regulations in accordance with RCW 90.58.580 and requested with a shoreline permit application.**

    FINDING: The activity is within city limits and therefore this criterion is not applicable.

Archaeological, Cultural and Historic Resources (ARCH23-03) SMP Section 5.2

The application included an *Archaeological Resources Survey* report with recommendations sent to the Department of Archaeology and Historic Preservation (DAHP) and Tribal Representatives for review and comment. In accordance with the recommendation of the report, an *Inadvertent Discovery Plan* was prepared for the project in case archaeological artifacts are discovered during construction. The reports and findings are not subject to the open public records act and as such, the city cannot disclose the results.

FINDING: Staff recommends a condition of approval that if an item of possible archaeological interest is discovered on site, work should immediately cease, and notification of the find should be sent to the appropriate parties.

Critical Areas Protection (CA23-04) SMP Section 5.3

The project site includes the following critical areas and associated buffers located within the shoreline designation as regulated by the SMP: Wetlands, Frequently Flooded Areas, Geologically Hazardous Areas, and Fish and Wildlife Habitat Conservations Areas. Critical area regulations are located within the SMP, Appendix C.

Wetlands- SMP Appendix C, Chapter 16.53

Clark County GIS mapping identifies Wetlands adjacent to or within (300-feet) of the project site, which are identified as critical areas per SMP Appendix C Section 16.51.070. As such, the applicant submitted a *Critical Areas Report* dated August 2022, prepared by Kennedy Jenks, a *Biological Assessment* dated January 2023, and *Shoreline Report* dated February 2023, both prepared by Tetra Tech.

Seven (7) category II narrow fringe wetlands with 180-foot buffers were identified within the project vicinity along the riverbank of the Camas Slough and thus within the 200-ft shoreline area. The *Shoreline Report* indicated that the proposed project activities would avoid impacting these wetlands and their associated buffers.

However, Wetlands 4 and 5 as identified in the *Shoreline Report*, are located immediately upriver of the Truck Dock demolition area whose buffers encroach into the project area as shown on figure 5 of the *Shoreline Report*. Both wetland boundaries are described to consist of very steep, riprap riverbanks with limited vegetation. Following structural removal, a portion of the wetland buffers will be re-graded to match existing contours for the creation of new shallow nearshore habitat. Staff finds mitigation for temporary impacts should be focused on restoring vegetation to pre-project conditions along with implementing BMP's during construction and conditioned as such.

Frequently Flooded Areas- SMP Appendix C, Chapter 16.57
Clark County GIS mapping identifies Frequently Flooded Areas (i.e. Floodway, Floodway Fringe and 500-Year Area) within the project demolition activity area. Project activities include structural removal and associated riverbank regrading resulting in cut and fill within the Camas Slough. Structural flood hazard reduction measures are not proposed. As a result, a *No-rise Report for Removal of Structures along Camas Slough* dated February 2023 prepared by WSP concluded there was no increase in the 100-year regulatory flood elevations on the Camas Slough or the Columbia River, including the Washougal River due to the demolition activities.

Geologically Hazardous Areas- SMP Appendix C, Chapter 16.59
Clark County GIS mapping identifies Geologically Hazardous Areas (i.e. steep slopes and severe erosion hazard areas) within the project demolition activity area. The *Critical Areas Report* prepared by dated August 2022, prepared by Kennedy Jenks indicated that the severe erosion hazard area mapped within the project site (i.e. Woodyard areas) does not contain slopes to meet the definition of a severe erosion hazard area per SMP 16.59.020 and slope instability or landslide areas are not within the project site. However, best management practices such as erosion and sediment control, slope protection and soil stabilization will be utilized for project activities within sloped areas per the *Preliminary Stormwater Management Plan* prepared by Tetra Tech.

Fish and Wildlife Conservation Areas- SMP Appendix C, Chapter 16.61
Clark County GIS mapping identifies Fish and Wildlife Habitat Conservation Areas (i.e. Columbia River, Camas Slough, Riparian Habitats and ESA-listed fish species, etc.) adjacent to or within (300-feet) of the project site. As such, the applicant submitted a *Critical Areas Report* dated August 2022, prepared by Kennedy Jenks, a *Biological Assessment* dated January 2023 and *Shoreline Report* dated February 2023, both prepared by Tetra Tech. The *Critical Areas Report* identifies in more detail the presence of Fish and Wildlife Conservation Areas within the project vicinity. Collectively, the reports addressed the applicable regulations of SMP Appendix C Section 16.61.020(C).

Proposed activities within the Fish and Wildlife Conservation Areas include the removal of dolphins and piles, dredging for barge access to remove dock warehouse piers, excavation/fill for riverbank reshaping followed by riparian restoration to provide shallow nearshore habitat, and placement of fill to create bottom contours that match the natural riverbed. Shoreline buffer activities include demolition and excavation of the dock warehouse, truck and PECO docks including backfilling the wood chip storage areas. Given the in-water/over-water demolition project is within a habitat area, complete avoidance is not possible but minimized to the extent possible. Impacts due to these activities are temporary or permanent and discussed in further detail in the *Shoreline Report*.

The *Shoreline Report* and *Project Narrative* outlines detailed best management practices, minimization measures, and stormwater management actions that are designed to either avoid, minimize, or mitigate project impacts. In addition, the *Biological Assessment* specifically evaluated the threatened and endangered species and included recommendation measures to minimize potential adverse effects to fish habitat in general.

Overall, the project activities would reduce the number of riverbed obstructions, create shallower riverbank slopes, remove shade producing structures and piles containing creosote that will result in a net increase in available potential fish and wildlife habitat.

> **FINDING:** Impacts to critical areas will be mitigated with Best Management Practices for erosion control construction, stormwater management actions, and native re-vegetation measures to ensure no net loss of ecological functions to the shoreline area and maintain habitat connectivity to the shoreline. Staff finds the applicant will comply with the provisions of the Critical Areas regulations as conditioned.

Site Planning and Development — SMP Section 5.7

SMP Section 5.7.2 Clearing, Grading, Fill and Excavation:

1. **Clearing and grading shall be scheduled to minimize adverse impacts, including not limited to, damage to water quality and aquatic life.**

   FINDING: Implementation of best management practices and minimization measures to minimize impacts to aquatic species, habitats, and water quality would enable project related clearing and grading to occur within the approved construction in-work windows.

2. **Clearing and grading shall not result in substantial changes to surface water drainage pattern off the project site and onto adjacent properties.**

   FINDING: Grading and fill activities are designed to fit the existing topography and return the areas along the riverbank to a natural drainage pattern, which will not substantially change the surface water drainage pattern onto adjacent properties as discussed in the *Shoreline Report*. Further, stormwater discharges from the demolition area will be contained per the *Temporary Erosion and Sediment Control Plans* to protect properties and waterways downstream during construction.

3. **Developments shall include provisions to control erosion during construction and to ensure preservation of native vegetation for bank stability.**

   FINDING: A *Temporary Erosion and Sediment Control Plan* is included as Attachment A of the *Stormwater Management Plan* that includes provisions for construction erosion control measures. Existing riverbank vegetation is sparse. Temporary disturbance to the riverbank vegetation is limited to the minimum amount needed to access and remove structure. Native vegetation will be installed following riverbank grading activities.

4. **Grading and grubbed areas shall be planted with a cover crop of native grasses until construction activities are completed.**

   FINDING: Temporary straw or plastic covering will be used to stabilize exposed soil and protect against erosion. Final grade conditions will be planted with an approved seed mix per the approved *Stormwater Management Plan*.

5. **Clearing, filling, or excavation shall not be conducted where shoreline stabilization will be necessary to protect materials placed or removed. Disturbed areas shall be stabilized immediately and revegetated with native vegetation.**

   FINDING: The proposed filling and excavation activities will not result in shoreline stabilization. Disturbed areas will be immediately stabilized with best management practices per the *Stormwater Management Plan*, and graded slopes revegetated with native vegetation for erosion protection.

6. **Fills shall be permitted only in conjunction with a permitted use and shall be of the minimum size necessary to support that use. Speculative fills are prohibited.**

   FINDING: Fill is needed following the removal of riverbank structures at the minimum necessary to restore riverbed contours and reshape the riverbank to new shallower slopes. Also, the South Wood Chip Storage Area will be backfilled to design grades. Estimated fill quantities are provided in Tables 14 and 15 of the *Shoreline Report*. Clean fill material is proposed.

7. **Soil, gravel or another substrate transported to the site for fill shall be screened and documented that it is uncontaminated. Use of polluted dredge material or materials normally disposed of at a solid waste facility is prohibited.**

   FINDING: Fill material is anticipated to be from on-site and if material is from off-site it will be screened and documented that it is uncontaminated. If onsite fill material is not suitable for disposal, then the fill material will be disposed of at the Lady Island dredged materials area. Polluted dredge material or material disposed at a solid waste facility will not be used.

8. **Fills shall be designed and placed to allow surface water penetration into groundwater supplies where such conditions existed prior to filling.**

   FINDING: Proposed upland fill material will be verified for consistency with existing soil conditions and surface water permeability. The wood chip areas will be backfilled with clean materials to design grade consistent with existing conditions for permeability.

9. **Fills must protect shoreline ecological functions, including channel migration processes.**

   FINDING: The design and placement of fill would create shallow nearshore riverbed contours that allows for a more natural hydraulic flow and new riverbank vegetation and habitat, resulting in a no net loss of shoreline ecological functions and protection of channel migration processes.

10. **Fill waterward of the OHWM shall only be allowed as a conditional use (except for beach nourishment or enhancement projects) and then only when necessary for the following activities: to support a water-dependent or public access use; cleanup and disposal of contaminated sediments as part of an interagency environmental clean-up plan; expansion or alteration of transportation facilities of statewide significance under specific circumstances; mitigation action; and environmental restoration.**

    FINDING: Fill is proposed waterward of the OHWM for environmental restoration due to the removal of over-water structures. A conditional use is proposed and discussed in further detail below under the Shoreline Conditional Use section of this staff report.

11. **Fills for beach nourishment or enhancement projects are subject to a substantial development permit. In the Columbia River, fill shall be prohibited between the OHWM and minus fifteen (-15) feet CRD, unless shallow water habitat will be created as mitigation.**

FINDING: The project is not a beach nourishment or enhancement project. Fill is proposed up to minus thirteen (-13) feet CRD per the grading plans in the *Shoreline Report*. The design and placement of fill creates new areas of shallow nearshore habitat as mitigation for the removal of over-water structures.

12. **Excavation below the OHWM is considered dredging and subject to provisions under that section of Chapter 6.**

    FINDING: Dredging is proposed and discussed below under the Chapter 6 section of this staff report.

13. **Upon completion of construction, remaining cleared areas shall be replanted with native species as approved by the city. Replanted areas shall be maintained such that within three (3) years' time the vegetation is fully re-established.**

    FINDING: Native vegetation will be installed following riverbank grading activities. Staff finds a condition of approval is required that replanted areas should be maintained such that within three (3) years the vegetation is fully re-established.

14. **For the purposes of this Program, preparatory work associated with the conversion of land to non-forestry uses and/or development shall not be considered a forest practice and shall be reviewed in accordance with the provisions for the proposed non-forestry use, the general provisions of this Program, and shall be limited to the minimum necessary to accommodate an approved use.**

    FINDING: The project does not include the conversion of land to non-forestry uses and/or developments and therefore this criterion is not applicable.

Specific Shoreline Use Regulations — SMP Chapter 6

SMP Section 6.4.1 General Requirements:

1. **Structural shoreline modifications shall only be allowed where it can be demonstrated that the proposed activities are necessary to support or protect allowed legally existing shoreline use or primary structure that is in danger of loss or substantial damage or are necessary for reconfiguration of the shoreline of bed lands for an allowed water-dependent use of for shoreline mitigation or enhancement purposes.**

   FINDING: New structural shoreline modifications are not proposed; therefore, this criterion is not applicable.

2. **Modifications shall only be allowed when impacts are avoided, minimized, and mitigated to assure no net loss of shoreline ecological functions.**

   FINDING: Due to the location of some of the structures to be removed, complete avoidance of impacts is not practicable. However, minimization efforts include the implementation of best management practices outlined in the *Project Narrative*. The demolition and removal of the proposed structures and encumbrances followed by shoreline riverbank grading would create a more natural shoreline and result in a no net loss of shoreline ecological functions.

3. **In-water work shall be scheduled to protect biological productivity (including but not limited to fish runs, spawning, and benthic productivity.) In-water work shall not occur in areas used for commercial fishing during a fishing season unless specifically addressed and mitigated for in the permit.**

FINDING: In-water work will comply with the required regulatory in-water work window schedule, which will minimize impacts to biological productivity. In-water work is not occurring in an area used for commercial fishing.

SMP Section 6.4.2 Dredge and Dredge Material Disposal:

6.4.2.1 Dredging

1. **New dredging shall be permitted only where it is demonstrated by a qualified professional that the proposed water-dependent or water-related uses will not result in significant or ongoing adverse impacts to water quality, fish and wildlife habitat conservation areas and other critical areas, flood holding capacity, natural drainage and water circulation patterns, significant plant communities, prime agricultural land, and public access to shorelines. When such impacts are unavoidable, they shall be minimized and mitigated such that they result in no net loss of functions.**

   FINDING: Proposed dredging is beneath the dock warehouse piers to enable barge access for removal of the over-water structures and support pilings, which is expected to result in long term benefits to the shoreline habitats through the removal of shoreline impediments and shading as well as water quality through reduced sedimentation and turbidity. Removal of structures and creation of near shore habitat would result in a new increase in available potential fish and wildlife habitat per the *Shoreline Report*. Best Management Practices will be implemented to ensure no net loss of ecological functions.

2. **Maintenance dredging of established navigation channels and basins shall be restricted to management of previously dredged or existing authorized location, depth and width.**

   FINDING: Dredging is not proposed within established navigation channels or basins per the *Shoreline Report*.

3. **Dredging and dredge disposal shall be prohibited on or in archaeological sites that are listed on the National Register of Historic Places, the Washington Heritage Register, or the Clark County Historic Register until such time that they have been reviewed and approved by the city and the Department of Archaeological and Historic Preservation (DAHP).**

   FINDING: Dredging and dredge disposal will not occur on or in archaeological sites listed on the National Register or Historic Places, the Washington Heritage Register, or the Clark County Historic Register. However, an *Inadvertent Discovery Plan* was prepared in case of any unanticipated discoveries during construction.

4. **Dredging shall be prohibited between the OHWM and minus fifteen (-15) feet CRD, unless shallow water habitat will be created to mitigate for the dredging project.**

   FINDING: Dredging is proposed up to minus thirteen (-10) feet CRD of an 1,800 square foot area surrounding the Dock Warehouse piers to enable access for demolition barges per the *Shoreline Report*. Reshaping the riverbank following the removal of structures will create new areas of shallow nearshore habitat.

5. **New dredging activity is prohibited in the following locations:**
   a. **Along net positive drift sectors and where geohydraulic-hydraulic processes are active and accretion shore forms would be damaged, altered, or irretrievably lost;**
   b. **In shoreline areas with bottom materials that are prone to significant sloughing and refilling due to currents or tidal activity which result in the need for continual maintenance dredging;**

c. **In habitats identified as critical to the life cycle of officially designated or protected fish, shellfish, or wildlife.**

FINDING: Dredging is not proposed in active geohydraulic-hydraulic areas where significant sloughing due to currents or tidal activity will occur, or in a habitat critical to the life cycle of fish, shellfish or wildlife.

6. **Dredging and dredge disposal shall be scheduled to protect biological productivity (including but not limited to, fish runs, spawning, and benthic productivity) and to minimize interference with fishing activities. Dredging activities shall not occur in areas used for commercial fishing (including but not limited to, drift netting and crabbing) during a fishing season unless specifically addressed and mitigated for in the permit.**

FINDING: Dredging will occur within the required regulatory in-water work window schedule, which will minimize impacts to biological productivity. Dredging is not occurring in an area used for commercial fishing.

7. **Dredging techniques that cause minimum dispersal and broadcast of bottom material shall be used, and only the amount of dredging necessary shall be permitted.**

FINDING: Best Management Practices for dredging will be implemented to minimize sediment loss and turbidity per the *Project Narrative*. Dredging is limited to the amount required to provide access for demolition removal. The dredging technique will be using a clamshell to minimize the broadcast of bottom materials.

8. **Dredging waterward of the OHWM shall be permitted only:**
   a. **For navigation or navigational access;**
   b. **In conjunction with a water-dependent use of water bodies or adjacent shorelands;**
   c. **As part of an approved habitat improvement project;**
   d. **To improve water flow or water quality, provided that all dredged material shall be contained and managed so as to prevent it from reentering the water;**
   e. **In conjunction with a bridge, navigational structure or wastewater treatment facility for which there is a documented public need and where other feasible sites or routes do not exist.**

FINDING: Per the *Project Narrative*, the purpose of the project includes the removal of structures from state aquatic lands and termination/reduction of State Aquatic Lands Lease and easements.

6.4.2.2 Dredge Material Disposal

1. **Dredge material disposal shall be avoided. Dredge disposal shall be permitted only where it is demonstrated by a qualified professional that the proposed water-dependent or water-related uses will not result in significant or ongoing adverse impact to water quality, fish and wildlife habitat conservation areas and other critical areas, flood holding capacity, natural drainage and water circulation patterns, significant plant communities, prime agricultural land, and public access to shorelines. When such impacts are unavoidable, they shall be minimized and mitigated such that they result in no net loss of ecological functions.**

FINDING: Dredge material disposal will follow a Dredged Materials Management Program to ensure materials are properly disposed of and result in a no net loss of ecological functions through the implementation of best management practices.

2. **Near shore or landside disposal of dredge materials shall not be located upon, adversely affect, or diminish:**
   a. **Stream mouths, wetlands, or significant plant communities (approved mitigation plans may justify exceptions);**
   b. **Prime agricultural land except as enhancement;**
   c. **Natural resources including but not limited to sand and gravel deposits, timber, or natural recreational beaches and water except for enhancement purposes;**
   d. **Designated or officially recognized wildlife habitat and conservation areas;**
   e. **Water quality, quantity, and drainage characteristics; and**
   f. **Public access to shorelines and water bodies.**

   FINDING: Per the *Project Narrative*, dredged materials not suitable for in-water reuse, but suitable for land disposal, will be disposed at the Lady Island Dredged Materials Area (LI DMA) located on Lady Island where clean dredged materials have been stored for many years under agreement with the Washington Department of Natural Resources (DNR).

3. **Dredged material shall be disposed of on land only at sites reviewed and approved by the USACOE and the Shoreline Administrator. Applicants shall demonstrate that the proposed site will ultimately be suitable for a use permitted by this Program. Disposal shall be undertaken such that:**
   a. **The smallest possible land area is affected, unless dispersed disposal is authorized as a condition of permit approval for soil enhancement or other purposes;**
   b. **Shoreline ecological functions and processes will be preserved, including protection of surface and ground water;**
   c. **Erosion, sedimentation, floodwaters or runoff will not increase adverse impacts to shoreline ecological functions and processes or property; and**
   d. **Sites will be adequately screened from view of local residents or passerby on public rights-of-way to the maximum extent practicable (e.g. combination of fencing and vegetation).**

   FINDING: The approved existing Lady Island Dredged Materials Area (LI DMA) would serve as the upland disposal of suitable dredged materials that are not reused. Per the *Revised Tier 1 Evaluation for Dredged Materials Management*, proposed dredging activity and dredged materials are covered under the license agreement with DNR. Best management practices will be implemented during transportation and placement of dredged materials to ensure no net loss of shoreline ecological functions.

4. **The following conditions shall apply to land disposal sites:**
   a. **Underground springs and aquifers shall be identified and protected.**
   b. **Containment dikes and adequate settling basins shall be built and maintained so that the water discharged from the site carries a minimum of suspended sediment. Required basins shall be designed to maintain at least one foot of standing water at all times to encourage property setting.**
   c. **Proper diversion of surface discharge shall be provided to maintain the integrity of the natural streams, wetlands, and drainage ways.**
   d. **There shall be a single point of ingress and egress for removal of the de-watered material.**
   e. **Runoff shall be directed through grassy swales or other treatment features that assures protection of water quality and a location that maximizes circulation and fishing.**

f. **Sites shall be revegetated with appropriate native species as soon as possible to retard erosion and restore wildlife habitat and other critical areas functions;**
g. **Vegetation shall be maintained to ensure continued existence by the property owner; and**
h. **Dredge materials deposited upland and not part of a permitted dike or levee shall constitute fill, and when deposited within the jurisdiction of this Program, shall comply with the fill regulations.**

FINDING: Best Management Practices will be implemented during transportation and placement, so the material does not wash from barges during transfer to the site or from Lady Island after placement. Dredged materials are tested by Georgia Pacific for sediment quality for suitability for reuse or disposal at Lady Island per the *Sampling and Analysis Plan*. The fill regulations of the shoreline master program are addressed above in this staff report.

5. **Dredged material shall be disposed of in water only at sites approved by the USACOE and the Administrator. Disposal techniques that cause minimum dispersal and broadcast of bottom material shall be used, and only if:**
    a. **Land disposal is infeasible, less consistent with this Program, or prohibited by law;**
    b. **Nearshore disposal as part of a program to restore or enhance shoreline ecological functions and processes is not feasible;**
    c. **Offshore habitat will be protected, restored or enhanced;**
    d. **Adverse effects on water quality or biologic resources from contaminated materials will be mitigated;**
    e. **Shifting dispersal of soil will be minimal; and**
    f. **Water quality will not be adversely affected.**

    FINDING: Per the *Project Narrative*, the Dredged Materials Management Program will evaluate sediment quality and determine suitability for in-water disposal. Best management practices will be implemented that will minimize dispersal and impacts to water quality. Prior to in-water work disposal, approval will be required from the City and applicable agencies include USACOE.

6. **The deposition of dredged materials in water or wetlands shall be permitted only:**
    a. **To improve wildlife habitat;**
    b. **To correct material distribution problems adversely affecting fish habitat;**
    c. **To create, expand, rehabilitate, or enhance a beach when permitted under this Program and any required state or federal permit;**
    d. **When land deposition is demonstrated to be more detrimental to shoreline resources than water deposition; or**
    e. **In approved, open-water disposal sites.**

    FINDING: Any approved dredged material disposal within wetland buffer areas would result in restored shallow, nearshore river habitat. In-water disposal will be in accordance with the Dredged Materials Management Plan.

Shoreline Conditional Use — SMP Appendix B Section IX

As discussed throughout this report, the project activities include the removal of riverbank structures, sediment dredging and excavation/filling in the “Aquatic”, “Medium Intensity”, and “High Intensity” shoreline environments.

Non-maintenance dredging is allowed as a conditional use in the "Aquatic" shoreline environment per Table 6-1 *Shoreline Use, Modification and Development Standards* of the SMP. The proposed riverbed dredging is needed to enable demolition barge access to the Dock Warehouse piers as the riverbed at the piers have filled in with river sediment, which is not a maintenance dredging activity.

Dredge material disposal is allowed as a conditional use in the "Aquatic", "Medium Intensity", and "High Intensity" shoreline environments per Table 6-1 *Shoreline Use, Modification and Development Standards* of the SMP. The proposed dredge material will be used as fill in areas of removed underwater structures and/or upland area fills if found suitable.

Pursuant to SMP, Appendix B, "*Conditional use approval may be granted only if the applicant can demonstrate all of the following":*

1. **The proposed use is consistent with the Program, and the policies of the Act (RCW 90.58.020);**

   FINDING: The project supports the policies of the State and is consistent with the Camas Shoreline Master Program as the removal of structures supports the natural character and ecological functions of the shoreline including the continued public access use of the shoreline. The required dredging, fill and grading activities associated with the removal of the shoreline impediments are designed to minimize ecological impact through the implementation of best management practices.

2. **The proposed use will not interfere with normal public use of public shorelines;**

   FINDING: There currently are no public access points to the Camas Slough from the main Mill parcel or Lady Island. However, no interference with the normal public use of the shoreline will occur as the project activities include the removal of structures and associated temporary dredging/grading.

3. **The proposed use of the site and design of the development will be compatible with the surrounding authorized uses, the Program, and the comprehensive plan;**

   FINDING: The proposed project is located within a major industrial area due to the operation of the mill. The existing mill structures along the riverbank are no longer in operation and no new structures are proposed. Therefore, the removal of the structures and associated dredging/grading will be compatible with the existing surrounding authorized uses. The dredging associated with the removal of structures and grading/fill for the creation of new nearshore habitat supports the ecological functions of the shoreline per the shoreline master program, including the natural environment goals of the comprehensive plan.

4. **The proposed use will cause no significant adverse effects on the shoreline environment or other uses; and**

   FINDING: The proposed project will cause no adverse effect on the shoreline environment or other uses but rather provide a benefit as in-water and over-water structural obstructions will be removed, resulting in the reduction of over-water shading, improved water quality with the removal of creosote pilings, and creation of new shallow nearshore habitat. Although sediment disturbance will occur because of structural removal and reestablishing grading contours, the impact will be temporary and mitigated with best management practices. Also, suitable dredged materials to be disposed upland will be at the approved Lady Island Dredged Materials Area. The long-term benefit will return the shoreline to its natural condition.

5. **That the public interest would suffer no substantial detrimental effect;**

FINDING: The public interest would suffer no substantial detrimental effect as the removal of the unused in-water and over-water structures will increase the public's enjoyment of a healthier shoreline.

TITLE 16 ENVIRONMENT

State Environmental Policy Act (SEPA23-04)	CMC Chapter 16.07

A SEPA checklist was submitted, and a Determination of Non-Significance (DNS) was issued August 3, 2023, as the proposed development contains critical areas per CMC 16.07.020.C. The comment period ended August 17, 2023. SEPA comments were received from the Department of Ecology concerning the demolition of hazardous materials and cleanup work.

FINDING: Staff finds the Department of Ecology SEPA comments should be complied with and conditioned as such.

PUBLIC COMMENTS

As of the writing of this staff report, city staff has not received any public comments.

CONCLUSIONS

1. Based upon the submitted plans and reports, staff finds that the project is consistent with the general goals and policies of the Camas Shoreline Master Program (SMP) pursuant to Chapter 3 Goals and Policies, SMP Chapter 4 Shoreline Designation management policies, and Chapter 5 General Use & Development Regulations.
2. As proposed, the project is consistent with the SMP Chapter 6 Specific Shoreline Use Regulations, at SMP Section 6.4.2.1 Dredging and Section 6.4.2.2 Dredge Material Disposal.
3. As conditioned, the proposed project can comply with the Conditional Use regulations of SMP Appendix B and the Critical Area regulations of SMP Appendix C.

RECOMMENDATION

Staff recommends **APPROVAL** of Georgia Pacific In-Water Over-Water Removal Project (File# SHOR23-01) as conditioned below:

Proposed Conditions of Approval:

1. The shoreline decision is valid for a period of two (2) years per SMP Appendix B Section XII.D.
2. The applicant shall comply with the Department of Ecology SEPA comments.
3. In the event any item of archaeological interest is uncovered during the course of a permitted ground disturbing action or activity, all ground disturbing activities shall immediately cease, and the applicant shall notify the appropriate parties.
4. Best Management Practices (i.e., erosion control measures, etc.) shall be implemented throughout project construction.
5. Upon construction completion, areas of temporary disturbance shall be revegetated with native vegetation to pre-disturbance conditions.
6. Replanted areas shall be maintained such that within three (3) years the vegetation is fully re-established.

City of Camas WASHINGTON

Community Development Department | Planning
616 NE Fourth Avenue | Camas, WA 98607
(360) 817-1568
communitydevelopment@cityofcamas.us

General Application Form — Georgia Pacific IWOW Structures Removal Project — **Case Number:** SHOR23-01 PA22-47 (See Attachment 1-PreApp Notes)

Applicant Information

Applicant/Contact:: Caleigh Belkoff, Georgia-Pacific (GP) — Phone: (360) 834-8485

Samantha.McDowell@gapac.com

Address: 401 NE Adams Street — CALEIGH.BELKOFF@ GAPAC.COM
Street Address — *E-mail Address*

Camas — WA — 98607
City — *State* — *ZIP Code*

Property Information

Property Address: 08370-0000; 09104-4013; 09104-4015; 09104-4027; 50090-1000;
Street Address — *County Assessor # / Parcel #*

SAME AS ABOVE — 50090-2000, 3000, & 4000; and 50081-4000, 4001, 7000, & 8000
City — *State* — *ZIP Code*

Zoning District: Heavy Industrial — Site Size: Includes removal of a number of structures, dock, piers, and pilings.

Description of Project

Brief description: GP is planning to remove and/or demolish several structures associated with prior operations at the Camas Mill. The strcutures to be removed are located in-water and overwater on the Columbia River and Camas Slough, and are located within the Shoreline Management Zone of the City of Camas and within unincorporated Clark County, WA

Are you requesting a consolidated review per CMC 18.55.020(B)? YES [X] NO [ ]

Permits Requested: [ ] Type I [ ] Type II [ ] Type III [X] Type IV, BOA, Other

Property Owner or Contract Purchaser

Owner's Name: Georgia-Pacific Consumer Operations LLC (GP) — Phone: (360) 834-8485
Last *First*

401 NE Adams Street
Street Address — *Apartment/Unit #*

E mail Address: Camas — WA — 98607
City — *State* — *Zip*

Signature

I authorize the applicant to make this application. Further, I grant permission for city staff to conduct site inspections of the property.

Signature: [signature] Date: 3/28/2023

Note. If multiple property owners are party to the application, an additional application form must be signed by each owner. If it is impractical to obtain a property owner signature, then a letter of authorization from the owner is required

Date Submitted: 3/28/23 — Pre-Application Date:

Staff: Lauren Hollenbeck — Related Cases #: PA22-47, CA23-04, SEPA23-04, ARCH23-03 — Electronic Copy Submitted

$3,192.00
Receipt #745420
Date 3/28/23
by CK

Validation of Fees

Application Checklist and Fees [updated on January 1, 2023]

◊ Annexation	$944 - 10% petition; $4,013 - 60% petition	001-00-345-890-00		$	
◊ Appeal Fee		001-00-345-810-00	$436.00	$	
◊ Archaeological Review		001-00-345-810-00	$150.00	$	150.00 ARCH23-03
◊ Binding Site Plan	$2,055 + $24 per unit	001-00-345-810-00		$	
◊ Boundary Line Adjustment		001-00-345-810-00	$113.00	$	
◊ Comprehensive Plan Amendment		001-00-345-810-00	$6,373.00	$	
◊ Conditional Use Permit					
Residential	$3,738 + $105 per unit	001-00-345-810-00		$	
Non-Residential		001-00-345-810-00	$4,734.00	$	
◊ Continuance of Public Hearing		001-00-345-810-00	$573.00	$	
◊ Critical or Sensitive Areas (fee per type)		001-00-345-810-00	$848.00	$	848.00 CA23-04
(wetlands, steep slopes or potentially unstable soils, streams and watercourses, vegetation removal, wildlife habitat)					
◊ Design Review					
Minor		001-00-345-810-00	$474.00	$	
Committee		001-00-345-810-00	$2,598.00	$	
◊ Development Agreement	$959 first hearing, $590 ea. add'l hearing/continuance	001-00-345-810-00		$	
◊ Director's Intrepretation			$350.00	$	
◊ Engineering Department Review - ***Fees Collected at Time of Engineering Plan Approval***					
Construction Plan Review & Inspection	*(3% of approved estimated construction costs)*				
Modification to Approved Construction Plan Review	*(Fee shown for information only)*		$459.00		
Single Family Residence (SFR) - Stormwater Plan Review	*(Fee shown for information only)*		$228.00		
Gates/Barrier on Private Street Plan Review	*(Fee shown for information only)*		$1,139.00		
◊ Fire Department Review					
Short Plat or other Development Construction Plan Review & Insp.		115-09-345-830-10	$308.00	$	
Subdivision or PRD Construction Plan Review & Inspection		115-09-345-830-10	$384.00	$	
Commercial Construction Plan Review & Inspection		115-09-345-830-10	$460.00	$	
◊ Franchise Agreement Administrative Fee			$5,696.00	$	
◊ Home Occupation					
Minor - Notification (No fee)			$0.00		
Major		001-00-321-900-00	$75.00	$	
◊ LI/BP Development	$4,734 + $41.00 per 1000 sf of GFA	001-00-345-810-00		$	
◊ Minor Modifications to approved development		001-00-345-810-00	$378.00	$	
◊ Planned Residential Development	$38 per unit + subdivision fees	001-00-345-810-00		$	
◊ Plat, Preliminary					
Short Plat	4 lots or less: $2,118 per lot	001-00-345-810-00		$	
Short Plat	5 lots or more: $7,848 + $250 per lot	001-00-345-810-00		$	
Subdivision	$7,848 + $250 per lot	001-00-345-810-00		$	
◊ Plat, Final:					
Short Plat		001-00-345-810-00	$219.00	$	
Subdivision		001-00-345-810-00	$2,598.00	$	
◊ Plat Modification/Alteration		001-00-345-810-00	$1,308.00	$	
◊ Pre-Application (Type III or IV Permits)					
No fee for Type I or II					
General		001-00-345-810-00	$387.00	$	
Subdivision (Type III or IV)		001-00-345-810-00	$996.00	$	
◊ SEPA		001-00-345-890-00	$886.00	$	886.00 SEPA23-04
◊ Shoreline Permit		001-00-345-890-00	$1,308.00	$	1,308.00 SHOR23-01
◊ Sign Permit					
General Sign Permit	(Exempt if building permit is required)	001.00.322.400.00	$45.00	$	
Master Sign Permit		001.00.322.400.00	$138.00	$	
◊ Site Plan Review					
Residential	$1,259 + $34 per unit	001-00-345-810-00		$	
Non-Residential	$3,146 + $68 per 1000 sf of GFA	001-00-345-810-00		$	
Mixed Residential/Non Residential	(see below)	001-00-345-810-00		$	
	$4,435 + $34 per res unit + $68 per 1000 sf of GFA				
◊ Temporary Use Permit		001-00-321-990-00	$88.00	$	
◊ Variance (Minor)		001-00-345-810-00	$760.00	$	
◊ Variance (Major)		001-00-345-810-00	$1,417.00	$	
◊ Zone Change (single tract)		001-00-345-810-00	$3,659.00	$	

Fees reviewed & approved by Planner: _____

Initial *Date*

Total Fees Due: $ 3,192.00

PRE-APPLICATION MEETING NOTES
Georgia Pacific In-Water Over-Water Removal Project
PA22-47

Thursday, December 1, 2022
1:30pm (meeting via Zoom)

Applicant:	Caleigh Belkoff Georgia Pacific Consumer Operations LLC
City of Camas:	Lauren Hollenbeck, Senior Planner Eric Dugger, Engineering Brian Smith, Building Official Randy Miller, Fire Marshall
Location:	401 NE Adams Street Camas, WA 98607
Zoning:	Heavy Industrial (HI)
Description:	The applicant proposes to remove several structures and buildings at the Camas Mill located in-water and/or overwater on the Columbia River and Camas slough

NOTICE: Notwithstanding any representation by City staff at a pre-application conference, staff is not authorized to waive any requirement of the City Code. Any omission or failure by staff to recite to an applicant all relevant applicable code requirements shall not constitute a waiver by the City of any standard or requirement. [CMC 18.55.060 (C)] This pre-application conference shall be valid for a period of 180 days from the date it is held. If no application is filed within 180 days of the conference or meeting, the applicant must schedule and attend another conference before the City will accept a permit application. [CMC 18.55.060 (D)] Any changes to the code or other applicable laws, which take effect between the pre-application conference and submittal of an application, shall be applicable. [CMC 18.55.060 (D)]. A link to the Camas Municipal Code (CMC) can be found on the City of Camas website, http://www.cityofcamas.us/ on the main page under "City Codes".

PLANNING DIVISION **LAUREN HOLLENBECK (360) 817-7253**

Applicable codes for development include Title 16 Environment, Title 17 Land Development and Title 18 Zoning of the Camas Municipal Code (CMC), which can be found on the city website. Please note it remains the **applicant's responsibility** to review the CMC and address all applicable provisions. The following pre-application notes are based on application materials and site plan submitted to the City on November 6, 2022:

Application Requirements
Your proposal will need to comply with the general application requirements per **CMC Section 18.55.110** as follows:

A. A completed city application form and required fee(s);

Fees will be based on the adopted fees at the time of land use application submittal. The current 2022 fees include the following:	
1. Shoreline Review	$1,196.00
2. Critical Areas Review *(for each type)*	$775.00
3. SEPA	$810.00
4. Archaeological Review	$137.00
5. Building Permit and Plan Review	based on the valuation of the project
6. Engineering Review	3% of estimated construction costs

B. A complete list of the permit approvals sought by the applicant;
C. A current (within thirty days prior to application) mailing list and mailing labels of owners of real property within three hundred feet of the subject parcel, certified as based on the records of Clark County assessor;
D. A complete and detailed narrative description that describes the proposed development, existing site conditions, existing buildings, public facilities and services, and other natural features. The **narrative shall also explain how the criteria are or can be met**, and address any other information indicated by staff at the preapplication conference as being required;
E. Necessary drawings- three sets and an electronic copy (send as a PDF by email or on a disc). Each report must be a separate pdf.
F. Copy of the preapplication meeting notes (Type II and Type III);

Shoreline Substantial Development Permit and Shoreline Conditional Use Permit
The proposed project is located within the "High Intensity" and "Aquatic" shoreline environment designations. The applicant's narrative indicated that removal of some of the structures will require bank stabilization and dredging. Per Table 6-1 of the Camas Shoreline Master Program (SMP), structural shoreline bank stabilization and dredge material disposal within the "High Intensity" and "Aquatic" shorelines are permitted subject to a shoreline conditional use permit. Activities not specifically listed may be considered as unclassified uses per the SMP and also would require conditional use approval.

The shoreline application submittal requirements for a complete application can be found in SMP, Appendix B Section VI.B *Application* and VII.B *Sign*. The required narrative shall demonstrate compliance with the applicable Shoreline Master Program policies and regulations of the SMP in addition to the Shoreline Conditional Use criteria outlined in SMP, Appendix B Section IX.

A Shoreline Conditional Use Permit is subject to a public hearing before the hearings examiner and the decision is then forwarded to Ecology for final permit approval per SMP, Appendix III.

Critical Areas Review (SMP Section 5.3 and Appendix C)
The regulations for all critical areas within the shoreline management area on site are controlled by the SMP, Appendix C. Per GIS mapping, the subject property is located within a fish and wildlife habitat conservation area (i.e. Columbia River), frequently flooded areas, wetlands and geologically hazardous areas (i.e. steep slopes) which are designated as critical areas per SMP Appendix C 16.51.070. Per SMP Appendix C Section 16.51.130, a critical area report is required if a proposed development is within, adjacent to, or likely impact a critical area. The general requirements for a critical areas report is found in SMP Appendix C Section 16.51.140. The City's SMP Appendix C contains additional requirements for each type of critical area to be addressed in the critical area reports.

1) Fish and Wildlife Habitat Conservation Areas are addressed in SMP Appendix C Section 16.61.020. Shorelines of Statewide Significance (i.e. Columbia River) is located within the project area.

2) Frequently flooded areas are addressed in CMC Chapter 16.57 per SMP Appendix C Section 5.3.3. The floodplain and floodway is identified within the project boundaries in the pre-application materials. A floodplain development permit application is required.
3) Wetlands are addressed in SMP Appendix C Section 16.53.030.
4) Geologically Hazardous Areas are addressed in SMP Appendix C Section 16.59.060.

Vegetation removal permit
Any vegetation removal within a critical area will require a Vegetation Removal permit pursuant to SMP Appendix C Section 16.51.125, which includes a critical areas report and mitigation plan. A tree survey shall be prepared by a certified arborist or professional forester per CMC 18.13.045.A. The contents of the tree survey shall contain the information outlined in CMC 18.13.045.B.

SEPA
Your proposal is not categorically exempt from the requirements of the State Environmental Policy Act (SEPA) per CMC Section 16.07.020.C as the proposed property for development contains critical areas. A SEPA checklist is required.

Archaeological Review
The site is located in an area of high probability for the presence of archaeological objects. Therefore, an archaeological predetermination report is required consistent with the requirements of CMC 16.31.080 and shall be submitted to the City, DAHP and the tribes. Surveys shall also be submitted to DAHP, the tribes and the City per CMC 16.31.130. Proof of sending to the tribes with the application submittal is required per CMC 16.31.160.

Clearing and Grading Permit
Excavation and fill are proposed around the some of the structures proposed for removal. As such, a Clearing and Grading permit is required pursuant to CMC 15.50.040. Application submittal requirements for a Clearing and Grading permit is found in CMC 15.50.080 and shall include a narrative addressing the applicable clearing and grading standards in CMC 15.50.090.

ENGINEERING DIVISION **ANITA ASHTON (360) 817-7231 aashton@cityofcamas.us**
ERIC DUGGER (360) 817-7977 edugger@cityofcamas.us

General Requirements:

1. The applicant is required to submit clearing, grading, and erosion control plans.
2. Civil site plans shall be prepared by a licensed Washington State Engineer in accordance with the *Camas Design Standards Manual (CDSM)* and CMC 17.19.040.
3. Civil site plans are to be submitted to Community Development (CDev) Engineering Dept. for review and approval.
4. The CDev Dept. is responsible for plan review (PR) and construction inspection (CI).
5. A 3% PR&CI fee is collected by CDev for all improvements.
    a. A stamped preliminary engineer's estimate shall be submitted to the CDEV Engineering Dept prior to or with submittal of plans for first review.
    b. Payment of the 1% plan review (PR) fee shall be due prior to start of first review.
    c. Payment of the 2% construction inspection (CI) fee shall be due prior to construction plan approval and release of approved plans to the applicant's consultant.

Traffic/Transportation: Not applicable

Streets: Not applicable

Erosion Control

- The applicant will be responsible for all erosion and sediment control measures to ensure that neither sediment laden water nor construction debris leaves the site or impacts the Columbia Slough or other adjacent parcels.
- Neither mud tracking nor other construction debris is to impact public road surfaces. Any mud/other construction debris impacting the public road surfaces is to be cleaned up immediately.

Water, Sewer, Parks & Trails: Not applicable

Impact Fees & System Development Charges (SDCs): Not applicable

BUILDING DIVISION **BRIAN SMITH (360) 817-7243 bsmith@cityofcamas.us**

1. The building department did not provide any notes for this pre-application meeting.

FIRE DEPARTMENT **RANDY MILLER (360) 834-6191 rmiller@cityofcamas.us**

1. Contact the Fire Marshal's Office if there is a need to utilize controlled explosives for any of the demo projects.

Biological Assessment

In-Water and Overwater Structures Removal Project Camas Mill, Camas, WA

January 2023

Prepared for

Georgia-Pacific

Georgia-Pacific Consumer Operations, LLC
Camas, WA

Prepared by

TETRA TECH

19803 North Creek Pkwy
Bothell, WA 98011

EXECUTIVE SUMMARY

Georgia-Pacific Consumer Operations LLC (GP) is planning to abate, remove, and demolish several structures associated with prior operations of Camas Mill in the city of Camas and in unincorporated areas of Clark County, Washington. The structures to be removed are located in and/or overwater on the Columbia River and Camas Slough and are located within the City of Camas or Clark County Shoreline Management Zones.

Wood Environment and Infrastructure Solutions, Inc. (Wood) prepared the Draft Biological Assessment (BA) in January 12, 2021, which addressed the In-Water and Overwater Structures Removal Project (Project) as proposed at that time; this report has been updated by Tetra Tech to reflect the current planned Project.

The purpose of this report is to provide a biological and habitat assessment for the proposed Project and identify any potential effects of the Project on threated and endangered species. The proposed activities include placement of fill within waters of the U.S. that are known to provide habitat to fish species listed under the Endangered Species Act.

This report provides the following:

- An analysis of available site information;
- The results of a field investigation to determine the presence of suitable habitat for listed species; and
- A habitat assessment to determine the effects of the action on species listed as Priority Species by the Washington Department of Fish and Wildlife and species protected under the Endangered Species Act.

This report also includes an analysis of potential effects of the proposed activities.

The proposed Project will result in unavoidable impacts on six protected species and their critical habitat. The six listed species with potential to occur or be affected by the Project are: bull trout (*Salvelinus confluentus*), Chinook salmon (*Oncorhynchus tshawytscha*), chum salmon (*O. keta*), coho salmon (*O. kisutch*), steelhead (*O. mykiss*), and Pacific eulachon (*Thaleichthys pacificus*). All six species have critical habitat identified within the action area.

Impacts during removals are expected to be temporary and transient and primarily result in behavioral effects and are not likely to result in mortality. Because the Project removes riverbed obstructions, creosote-treated piles, and structures shading the river, the effects would be beneficial to habitats and species.

Based on this conclusion and the implementation of best management and conservation measures during Project construction, and assuming compliance with all other permit conditions, it is anticipated that the proposed Project is unlikely to have adverse effects on listed species, designated critical habitat, or Essential Fish Habitat. Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1966, an Essential Fish Habitat evaluation of impacts is included in **Appendix A**.

Effects determinations are summarized by species in **Table ES-1**.

Table ES-1. Summary of Effect Determinations

Species	Listing Status	Effect Determination
Bull trout (*Salvelinus confluentus*) Critical habitat; in action area	Threatened	May affect, but not likely to adversely affect.
Chinook salmon (*Oncorhynchus tshawytscha*) Lower Columbia River ESU Critical habitat; in action area	Threatened	May affect, but not likely to adversely affect.
Chum Salmon (*Oncorhynchus keta*) Columbia River ESU Critical habitat; in action area	Threatened	May affect, but not likely to adversely affect.
Coho Salmon (*Oncorhynchus kisutch*) Lower Columbia River ESU Critical habitat; in action area	Threatened	May affect, but not likely to adversely affect.
Pacific Eulachon (*Thaleichthys pacificus*) Southern DPS Critical habitat; in action area	Threatened	May affect, but not likely to adversely affect.

Abbreviations:
DPS = Distinct Population Segment
ESU = Evolutionarily Significant Unit

Appropriate minimization measures and best management practices (BMPs) for this Project are designed to avoid, minimize, and mitigate Project impacts on listed species during Project activities.

Such measures may include:

- Conducting riverbank demolition activities during low river stages so that the work site will likely be under dry conditions ("in the dry");
- Conducting in-water work only during approved in-water work windows that are ultimately approved for this Project;
- Identifying appropriate numbers and locations of stockpiling and staging areas prior to demolition;
- Containing and protecting all stockpile and staging areas with best mangment approaches, for example, implementing erosion control measures, such as silt fencing or straw bales, or requiring stockpiles be covered if inclement weather is forecasted;
- Peforming all mechanical fueling and servicing at approved and proected locations at least 150 feet from surface waters, and inspecting all vehicles daily for fluid leaks. Spill response equipment will be on-site for potential fluid leakage;
- Using only vegetable-based oils in hydraulic lines for equipment operating in water to the greatest extent possible; and
- Performing routine inspections of erosion control and sediment control and other best practices, as well as implementing any maintenance needed.

Exhibit 3 SHOR23-01

Table of Contents

1.0 INTRODUCTION 1-1

2.0 PROJECT LOCATION AND DESCRIPTION 2-1

2.1 Project Location 2-1

2.2 Project Purpose and Need 2-1

2.3 River Hydrograph and Project Timing 2-2

2.4 Work Schedule 2-3

2.5 Structures to be Removed 2-4

2.5.1 Dolphins and Piles 2-5

2.5.2 Dock Warehouse Piers 2-6

2.5.3 Berger Crane Foundation 2-6

2.5.4 Riverbank Structures 2-7

2.5.5 Truck Dock 2-7

2.5.6 Dock Warehouse 2-7

2.5.7 PECO Dock 2-7

2.5.8 Aboveground Oil Storage Tank 2-8

2.5.9 South Wood Chip Storage Area and Wood Chip Conveyor Housings 2-8

2.6 Dredging and Material Reuse 2-8

2.7 Impact Avoidance and Minimization Measures 2-8

2.7.1 General Conditions 2-9

2.7.2 Overwater Demolition 2-10

2.7.3 Piling Removal 2-10

2.7.4 Barge Use 2-11

2.7.5 Dredging and Dredged Material Management 2-11

2.7.6 Riverbank Reshaping 2-12

3.0 ACTION AREA DEFINITION 3-1

3.1 Construction-Related Noise 3-1

3.1.1 Terrestrial Noise 3-1

3.1.2 Underwater Noise 3-1

3.2 Water Quality 3-4

Exhibit 3 SHOR23-01

3.2.1 Temporary Turbidity due to Upland Disturbance 3-5
3.2.2 Temporary Turbidity due to In-water and Overwater Activities 3-5
3.3 Alteration of Aquatic Environments 3-6
3.4 Human Disturbance 3-7
3.5 Action Area Summary 3-7
4.0 LISTED SPECIES AND HABITAT INFORMATION 4-1
4.1 Species and Critical Habitats Addressed 4-1
4.2 Species Descriptions and Critical Habitat Occurrence 4-4
4.2.1 Bull Trout – Threatened 4-7
4.2.2 Chinook Salmon – Threatened 4-8
4.2.3 Chum Salmon – Threatened 4-10
4.2.4 Coho Salmon – Threatened 4-11
4.2.5 Steelhead – Threatened 4-12
4.2.6 Pacific Eulachon – Threatened 4-12
5.0 ENVIRONMENTAL BASELINE 5-1
5.1 General Setting 5-1
5.2 Field Investigation 5-2
5.3 Aquatic Habitat 5-2
5.3.1 Columbia River and Camas Slough 5-2
5.3.2 Wetland Habitat 5-4
5.3.3 Water Quality 5-4
5.4 Vegetation and Soils Adjacent to the Action Area 5-5
5.5 Timing of Species Presence 5-6
6.0 ANALYSIS OF EFFECTS 6-1
6.1 Direct Effects 6-1
6.1.1 Hydroacoustic Impacts 6-2
6.1.2 Water Quality 6-3
6.1.3 Chemical Contamination 6-6
6.1.4 Human Disturbance 6-8
6.1.5 Aquatic Predation 6-8

Exhibit 3 SHOR23-01

6.1.6 Avian Predation 6-9
6.1.7 Alteration of Aquatic Environments 6-9
6.2 Indirect Effects 6-10
6.2.1 Water Quality 6-10
6.2.2 Altered Predator-Prey Relationships 6-10
6.2.3 Washougal River Migration 6-10
6.2.4 Human Disturbance 6-11
6.3 Critical Habitat Effects 6-11
6.4 Summary of Effects on Habitat Pathways and Indicators 6-12
6.5 Cumulative Effects 6-13
6.6 Effects from Interrelated and Interdependent Activities 6-13
7.0 CONCLUSIONS AND EFFECT DETERMINATIONS 7-1
7.1 Bull Trout 7-2
7.1.1 Bull Trout Species 7-2
7.1.2 Bull Trout Critical Habitat 7-3
7.2 Chinook Salmon 7-3
7.2.1 Chinook Salmon Species 7-3
7.2.2 Chinook Salmon Critical Habitat 7-4
7.3 Chum Salmon 7-4
7.3.1 Chum Salmon Species 7-4
7.3.2 Chum Salmon Critical Habitat 7-5
7.4 Coho Salmon 7-6
7.4.1 Coho Salmon Species 7-6
7.4.2 Coho Salmon Critical Habitat 7-7
7.5 Steelhead 7-7
7.5.1 Steelhead Species 7-7
7.5.2 Steelhead Critical Habitat 7-8
7.6 Pacific Eulachon 7-9
7.6.1 Pacific Eulachon Species 7-9
7.6.2 Pacific Eulachon Critical Habitat 7-9

Exhibit 3 SHOR23-01

8.0 REFERENCES 8-1

List of Figures

Figure 1. Project Location
Figure 2A. Structures to Be Removed and Study Area Map Overview
Figure 2B. Structures to Be Removed and Study Area Map – Inset Map 2B
Figure 2C. Structures to Be Removed and Study Area Map – Inset Map 2C
Figure 2D. Structures to Be Removed and Study Area Map – Inset Map 2D
Figure 2E. Structures to Be Removed and Study Area Map – Inset Map 2E
Figure 3. Grading Plan, Berger Crane Foundation
Figure 4. Berger Crane Foundation River Bottom Restoration
Figure 5. Grading Plan—PECO Dock, Dock Warehouse, and Dock Warehouse Piers
Figure 6. Wetland Map

List of Tables

Table 1. Parcels Included in the Project Area 2-1
Table 2. Proposed Open Work Windows 2-3
Table 3. Proposed Demolition Methods by Structure Type 2-5
Table 4. Locations of Dolphins and Piles for Removal 2-6
Table 5. Fish Injury and Disturbance Thresholds for Underwater Construction Activity 3-2
Table 6. Underwater Distance-to-Noise Thresholds for Pilings and Concrete Removal 3-3
Table 7. Potential Sources of Turbidity from In-water and Overwater Activities 3-5
Table 8. ESA-listed Species that May Occur in the Action Area 4-1
Table 9. Listed Species Not Known to Occur in the Action Area Excluded from Further Evaluation 4-2
Table 10. Fish Run Timing in Lower Columbia River 4-5
Table 11. Adult Upstream Migration Through Action Area 5-6
Table 12. Juvenile Downstream Migration Through Action Area 5-6
Table 13. Potential Effects of the Action 6-1
Table 14. Summary of Potential Project Effects for all ESA Listed Species' Habitat 6-12
Table 15. Effect Determinations for Listed Species in the Action Area 7-1

List of Appendices

Appendix A Essential Fish Habitat Evaluation
Appendix B Species Descriptions and Life Histories
Appendix C Summary of Habitat Pathways and Indicators

Exhibit 3 SHOR23-01

List of Acronyms and Abbreviations

°C	degrees Centigrade
°F	degrees Fahrenheit
BMP	best management practice
dB	decibel
CFR	Code of Federal Regulations
COC	constituent of concern
CRD	Columbia River Datum
DMA	dredged materials management area
DNR	Washington Department of Natural Resources
DPS	distinct population segment
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FR	*Federal Register*
IPaC	Information for Planning and Consultation
LCR	Lower Columbia River
mg/L	milligrams per liter
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OHWM	ordinary high water mark
OHW	ordinary high water
PAH	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	primary constituent element
PHS	Priority Habitats and Species
Project	In-Water and Overwater Structures Removal
RM	river mile
RMS	root mean square
SF	square foot/feet

Exhibit 3 SHOR23-01

SMS	Sediment Management Standards
SPCC	spill prevention, control, and countermeasures
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
Wood	Wood Environment & Infrastructure Solutions, Inc.
WSDOT	Washington State Department of Transportation

1.0 INTRODUCTION

Georgia-Pacific Consumer Operations LLC (GP) plans to abate, remove, and demolish several structures that are located in and/or over water on the Columbia River and Camas Slough. The In-Water and Overwater Structures Removal Project (Project) footprint includes areas along the shoreline within the main Mill site, and several other locations in the Camas Slough and extending approximately 3 miles downriver from the Mill.

The in-water and overwater structures to be removed include:

- A warehouse,
- Five docks/piers,
- Conveyor housings,
- An aboveground storage tank,
- A crane foundation, and
- Approximately 3,000 dolphins and pilings.

Dredging will occur, as needed, to remove overburden, to allow access to piers.

A detailed Project description has been developed as a separate document that contains:

- Photographs of structures,
- Details on demolition methods, and
- Other Project details.

This Draft Biological Assessment (BA) provides a discussion of the Project, focusing on activities that may have potential to affect species or habitats present. Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1966, an Essential Fish Habitat evaluation of impacts is included in **Appendix A**. Structures to be removed are located adjacent to the riverbank or entirely or partly below the ordinary high water mark[1] (OHWM) of the Camas Slough or lower Columbia River. They are located within either the City of Camas Shoreline Management Zone or Clark County's Shoreline Management Zone. Many of the structures (dolphins and pilings) to be removed are located on State-owned land leased by GP through the Washington Department of Natural Resources (DNR).

GP is the sole organization responsible for maintaining, developing, and removing structures and all actions described here.

1. Identification of the ordinary high water mark location in the Project area is described in the In-water/Overwater Removals Project Shoreline Report (Wood 2020; Tetra Tech 2023).

2.0 PROJECT LOCATION AND DESCRIPTION

2.1 Project Location

Camas Mill is located in Camas, Washington. The Project footprint includes areas along the shoreline and several other locations in the Camas Slough, on the riverbank area of Lady Island, and extending approximately 3 miles downriver from the Camas Mill. **Figure 1** shows the Project location along the lower Columbia River. **Figures 2A through 2E** provide detailed aerial views of the structures proposed for removal within the Action Area. Note that figures are presented following the text in this BA.

The Project area lies within Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16 Willamette Meridian.

The proposed Project would occur on property owned or leased by GP, and on property controlled by Clark County and the State of Washington (**Table 1**). The Project area lies within the City of Camas, Washington, except one dolphin to be removed on the Columbia River is within unincorporated Clark County, Washington. Lady Island lies between the Camas Slough and Columbia River main channel and is owned in its entirety by GP. As stated, GP has an established State aquatic lands lease and several easements from the DNR in Camas Slough and the Columbia River.

Table 1. Parcels Included in the Project Area

Assessor Parcel Number	Owner[1]	Tax Parcel Type Description/Zoning/location
08370-0000	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/ Lady Island
09104-4013	Georgia-Pacific Corporation	Manufacturing—lumber and wood products/ Heavy Industrial
09104-4015	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/ Main Mill Parcel
09104-4027	Specialty Minerals Inc.[2] (GP)	Storage warehouse/Heavy Industrial
50090-1000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-2000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-3000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4001	Fort James Camas, LLC (GP)	Tidelands/Water
50081-7000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-8000	Fort James Camas, LLC (GP)	Tidelands/Water

Notes:
The previous corporate name, Fort James Camas LLC, is shown on the County's tax parcel information.
Specialty Minerals was a part of Fort James Camas.

2.2 Project Purpose and Need

GP plans to abate, remove, and demolish structures that are located in-water and/or overwater on the Columbia River and Camas Slough and located within the city of Camas and in unincorporated areas of Clark County, Washington. The structures were associated with prior pulp and paper mill

Exhibit 3 SHOR23-01

operations and are no longer used. No new structures of any type are proposed by this Project. The need for the Project is to reduce liability associated with unused structures and remove structures from state lands enabling termination of a State Aquatic Lands lease and several State Aquatic Lands easements.

As stated in the introduction, the In-water and Overwater Structures Removals Project will remove one building, five unused docks/piers, conveyor housings, an aboveground storage tank, a crane foundation, and approximately 3,000 dolphins and pilings, and some of the associated utilities.

It should be noted that GP is still working to determine which structures will be needed for the future operation of the site. As those decisions are still being made, GP is working to permit the removal of all structures. If certain structures are determined to be needed for future operations, those structures will not be removed from the site, and GP will continue to maintain leases and easements where necessary. Work activities would occur during the approved in-water work windows for the Camas Slough and Columbia River. Agencies with jurisdiction over in-water and overwater work activities would provide approved work windows.

The currently published federal in-water work window for this reach of the lower Columbia River is November 1 to February 28, in any year (USACE 2010). The Washington Department of Fish and Wildlife (WDFW) provides information on when protected fish species are most likely to be present in the reach and indicated the period of August 1 to August 31 in any year, which aligns with species accessing the Washougal River (WDFW 2018).

2.3 River Hydrograph and Project Timing

The Columbia River, and thus the Project location, experiences an annual river hydrologic cycle driven by snowpack melt and precipitation patterns with peak flows, or about 60% of the natural runoff, occurring in May through June (NRCS 2020; FWEE 2020). Low river stages occur in the drier summer and early fall months. River stage fluctuates from approximately +2.0 feet (Columbia River Datum; CRD) or lower at low stages, with ordinary high water (OHW) at approximately +16.5 feet CRD. Camas Slough is a side-channel of the Columbia River. The Washougal River's confluence is at the Slough's eastern extent and receives all the Washougal River discharge, where flows regularly exceed 1,000 cubic feet per second from November to April, and typically fall below 100 cubic feet per second in late summer (LCFRB 2010).

The river is tidal in the Project area. However, the tidal prism is narrow, with an average annual diurnal tidal prism of about 1.5 feet. Diurnal tidal influence can be observed at low river stages but is masked during the six to eight months of high river stages (generally October through June) in most years. Though tidal, the river waters are fresh due to the lack of salinity at this location 120 river miles (RM) upriver of the Pacific Ocean. Further details on the aquatic setting are presented in Section 5.0, Environmental Baseline.

Due to the numbers of structures to be removed, the Project is anticipated to likely span three or more open in-water work periods. Actual work timing would depend on weather conditions, river flows, contractor logistics, equipment availability, and potentially other regulatory constraints. Timing of the different aspects of the Project would be sensitive to river stage. Proposed activities along the

Exhibit 3 SHOR23-01

riverbanks may be conducted when river stage elevations are low, thus enabling activities to occur "in the dry."

In-water work that would require use of river barges and other vessels to access structures for removal would most effectively occur when river stages are at elevations deep enough to prevent vessel grounding. Upland Project work would be independent of river stage and so will occur year-round. Upland work activities include establishment of on-site staging areas and construction access, demolition of other structures not over water within the Project footprint, and maintenance of general stormwater control measures.

2.4 Work Schedule

Work activities below OHWM would occur during the approved construction work window for the Camas Slough and Columbia River. Input from agencies with jurisdiction will be incorporated from the permitting process into Project requirements.

The published in-water work window for this reach of the Columbia River is November 1 to February 28, in any year. However, regulatory agencies (WDFW, U.S. Fish and Wildlife Service [USFWS], and National Oceanic and Atmospheric Administration [NOAA], National Marine Fisheries Service [NOAA Fisheries]) will coordinate to establish the allowed in-water and overwater work windows.

The work windows proposed for this Project are shown in **Table 2**.

Table 2. Proposed Open Work Windows

Proposed In-Water Work Windows	Allowed Activity during the Work Window
Year-round, provided work does not violate water quality standards	
	Extract pilings using vibratory equipment or direct pulling, except for concrete piles.
	Structure demolition conducted overwater or below the OHWM, but outside the wetted perimeter of the river (in-the-dry).
	Excavation/dredging for riverbank reshaping, but outside the wetted perimeter of the river (in-the-dry).
	Fill placement for riverbank/riverbed shaping, but outside the wetted perimeter of the river (in-the-dry).
	Fill placed at upland locations (e.g., North and South Wood Chip Area)
	Above OHWM miscellaneous debris removal activities
August 1 to February 28	
	Extraction of concrete piles at the Dock Warehouse piers
	Riverbed dredging
	Below OHWM miscellaneous debris removal activities
	Riverbank fill placement in the wet
	Berger Crane foundation demolition
November 1 to February 28	
	Riverbed filling—new riverbed at Berger Crane foundation

Abbreviations:
OWHM = ordinary high-water mark

Exhibit 3 SHOR23-01

These work windows would reduce repeated reentry while accomplishing removals and simultaneously would be cognizant of biologically sensitive periods for given activities. In-water work to remove piles will use vibratory pile removal, which is known to not cause injurious levels of underwater noise. Therefore, pile removal activities are proposed to be conducted year-round. Work conducted below the OHWM, but outside the wetted perimeter of the river (i.e., "in the dry"), is not expected to result in significant impacts on aquatic species or resources, and as such these activities would be conducted year-round.

The proposed dredging window is designed to begin early enough in the season to allow these removal activities to begin on schedule, while avoiding the bulk of the peak juvenile salmonid outmigration in the spring/summer, and the peak run timing for Pacific eulachon in the late winter/early spring. This window also allows for river access prior to the time when the lowest river stages are reached at the end of the summer.

A structure removal window starting as early as August will minimize the need for these activities to be extended into the late winter/early spring timeframe. For this reason, an early start timeframe for structure removals below the OWHM will not result in adverse effects to any fish or other aquatic species.

Ultimately construction crews and methods will be influenced by weather, river stage, timing, and available equipment, as well as the regulatory allowable timeframe. Implementation of BMPs and minimization measures (see Section 2.7) to minimize impacts to aquatic species, habitats, and water quality would enable Project activities to occur within the proposed work windows.

With these allowances, Project duration to complete the removals is anticipated to span a minimum of three years. At the time of this document development, demolition was expected to begin in summer 2022 following receipt of all Project permits and approvals.

2.5 Structures to be Removed

Removal of the in-water and overwater structures would occur in a manner that is not disruptive to ongoing operations at the Mill. Demolition of in-water and overwater structures is anticipated to occur in approximately the following order:

1. In-water piles and dolphin removals
2. Dredging for access to, and demolition of Dock Warehouse piers
3. Berger Crane Foundation demolition and riverbed shaping
4. Dock warehouse upper stories demolition
5. PECO Dock and Dock Warehouse lower floor and foundation demolition
6. Truck Dock demolition
7. Riverbank shaping to final grades and placement of stable final riverbed and riverbank surfaces

Exhibit 3 SHOR23-01

Table 3 provides details regarding proposed removal methods for structures that will be in-water or below the OWHM only, and Sections 2.5.1 through 2.5.9 describe the structures to be removed.

Table 3. Proposed Demolition Methods by Structure Type

Structure to be Removed	Work Description
Piles and dolphins	• Demolition would be accessed from river barges. • Piles would be removed following best management practices for derelict piling removals (DNR 2017; EPA 2016) • Extracted piles and attached sediment would be contained on the barge deck until off-loaded to an upland location, per state requirements for creosote pile and best management practices. • All tire bumpers would be removed to the barges and disposed of at an approved upland location.
Dock Warehouse Piers	• Demolition would be conducted from river barges for most of the removal. • Riverbed dredging would be required to enable demolition barge access to the piers. • All utilities and miscellaneous supporting materials from the piers would be removed. • Pier decking would be cut, rigged, and removed, then piling caps would then be rigged and removed, followed by pile removal.
Berger Crane foundation	• Due to the massive nature of this strong foundation, demolition may require more than a single method. • Methods may include a mechanical approach using demolition claws and/or expanding demolition grouts, for example. • Access would be either from land or from barge or both and would be up to the contractor to determine best approach. • Demolition is planned to reduce structure down to the extant river water stage level at the time of demolition, which is estimated to be at approximately +2 feet CRD. • Every effort will be made to ensure that demolition debris is confined to the foundation removal location and removed from the site. • Retaining the foundation's lower columns in place would avoid excessive disturbance to riverbed sediment. • Fill would be used to cover the retained lower columns, creating bottom contours that match the adjacent natural riverbed in this previously dredged location. • Clean fill materials will be specified at the minimum size, coarse enough to be stable for this location.
Three Adjacent Riverbank Structures: Truck Dock, Dock Warehouse, and PECO Dock	• Demolition would be staged primarily from the riverbank, but some pilings at the westernmost extent may be removed using by barge access. • Miscellaneous materials would be removed prior to beginning structure demolition: • For the Truck and PECO Dock, asphalt and concrete decking would be cut or broken and removed, followed by removing piling caps. • Support beams would then be rigged and lifted for removal. • For the Dock Warehouse, demolition would occur starting from the upland-facing side toward the riverbank, leaving the riverside wall to last to reduce the risk of materials falling toward the river. • Pilings below and between structures along the riverbank would be removed by access from the riverbank. • The riverbank would be reshaped to shallower slopes (5 to 1 and 4 to 1 H:V), grading to steeper slopes to match existing grades. • Final surfacing materials would be specified as the finest materials, coarse enough to remain stable in this location. • Final surfaces would be sampled and analyzed for compliance with the State of Washington's anti-degradation standards.

Abbreviations:
BMP = best management practice
CRD = Columbia River Datum
OHWM = Ordinary high water mark
H:V = Horizontal:Vertical

2.5.1 Dolphins and Piles

Approximately 3,000 piles and dolphins made of wood and carbon steel pipe would be removed from locations in the Camas Slough and extending approximately 3 miles downriver from the Mill to RM 117 (**Figures 2A–2E**). These features were previously used for log rafting.

Exhibit 3 SHOR23-01

Dolphins are groups of 3, 5, 7, or 9 piles individually installed at an angle and all bound together to create a sturdy structure for mooring or providing protection to an adjacent structure from potential impacts.

Table 4 lists the locations and approximate number of dolphins and piles proposed for removal.

Table 4. Locations of Dolphins and Piles for Removal

Location	In-water or Overwater	Approximate Number of Pilings[1/]
Open-water dolphins and pilings	In-water	250
One downriver dolphin in unincorporated Clark County	In-water	9
Pilings at riverbank associated with in-water structures[2/]	In-water	200
Pilings associated with overwater structure foundations[3/]	Overwater	2,500
Estimated Total Numbers of Piling		**Approximately 3,000**

Notes:
1/ Numbers of pilings are estimates and the total estimated number has been rounded up.
2/ In-water pilings include pilings associated with mooring dolphins, remnant riverbank pilings, sheet pilings, pilings supporting the Dock Warehouse Piers.
3/ Overwater pilings include pilings along the riverbank associated with the foundations supporting the Dock Warehouse, PECO Dock, and Truck Dock.

2.5.2 Dock Warehouse Piers

Three piers servicing the warehouse extend approximately 175 feet from the warehouse into the Camas Slough (**Figure 2E**). The piers are decked with concrete and are supported by 54 octagonal, solid concrete piles, along with 21 concrete-filled carbon steel pipe piles with concrete pile caps. Most of the piles are protected with truck tires that function as bumpers. Dredging of sediments in the vicinity of the piers will be required to enable a demolition crane barge to access the piers for removal.

2.5.3 Berger Crane Foundation

The Berger crane foundation is located approximately 1,000 feet west of the PECO Dock in Camas Slough (**Figure 2E, 3, and 4**). The foundation is a remnant from a previously demolished dock initially built in 1948. This 90-foot-long, concrete foundation stands completely within the river approximately 40 feet from the top of the riverbank.

This wall-like structure previously supported a large crane that lifted logs from the river to a wood mill. The dock and wood mill were demolished in 2002 or shortly thereafter, but the large foundation was retained. Several concrete piers are pocketed into the bedrock below the riverbed to provide stability for the foundation.

The approximately 300-square-foot (SF) foundation would be demolished down to river stage. Approved clean suitable fill material would be used to cover the retained lower columns, create bottom contours that match the natural riverbed in this previously dredged location, and create river habitat.

Exhibit 3 SHOR23-01

2.5.4 Riverbank Structures

Together the Truck Dock, Dock Warehouse, and PECO Dock cover approximately 1,055 continuous feet of riverbank with about 12,100 SF of total area currently perched overwater. Following removal, approximately 40,450 SF of riverbank would no longer have structures.

Following removals, the riverbank would be reshaped to 5 to 1 and 4 to 1 slopes transitioning to about 2 to 1 and slightly steeper to match existing grades. The final riverbank surface would be covered with the finest material that is coarse enough to be stable for the location. The eastern extent of this location is largely behind a small peninsula and is known to be an area of river deposition, while the western extent protrudes into the river and would be subject to more river currents than the eastern extent and require coarser material.

A portion of the completed riverbank above OHW would be revegetated with native plant species.

2.5.5 Truck Dock

This approximately 3,700 SF flat, asphalt- and concrete-covered area provides truck access to the loading bays on the east end of the Dock Warehouse (**Figure 2E**). This dock is supported by approximately 320 pilings constructed from wood and pipe along approximately 350 feet of the riverbank. The dock is protected by a 100-foot-long marginal sheet-pile bulkhead at the water's edge. Following removal, approximately 1,140 SF of overwater area would be uncovered.

Elevated conveyors formerly conveyed materials between buildings. The product conveyor housings in the vicinity of the Dock Warehouse would be removed, starting from the building and moving to a support at an inland location that allows for the remaining portions of the housing to be retained.

2.5.6 Dock Warehouse

Situated between the Truck Dock and the PECO Dock on the Riverbank (**Figure 2E**), the Dock Warehouse is a 23,500 SF, three-story (lower/loading dock, first, and second floors) concrete and wooden structure. The Dock Warehouse covers approximately 400 lineal feet of riverbank. It is supported by approximately 1,020 pilings, with cement pier foundations along the upper riverbank and upland side.

Originally constructed in 1934 at the site of a previous dock, the building was used to house paper shipped through the Mill. The concrete and wooden building was covered with exterior sheet metal siding in 1980. Following demolition, approximately 7,041 SF of overwater shading will have been removed.

2.5.7 PECO Dock

The PECO Dock is located west of the Dock Warehouse and was constructed in 1983 (**Figure 2E**). This 305-foot-long marginal dock structure was built largely overwater to support a 9-ton crane (manufactured by PECO) and used to offload wood chips from river barges. The dock is approximately 13,200 SF in area and supported by approximately 170 carbon steel H-pilings. Approximately 450 dilapidated wood pilings from a previous structure are also beneath the dock. An additional 200

to 300 wood and steel pipe pilings along the riverbank between and around the PECO Dock and Dock Warehouse would also be removed.

2.5.8 Aboveground Oil Storage Tank

A decommissioned 40,000-gallon steel aboveground oil storage tank located approximately 100 feet east of the Truck Dock and 150 feet north of the shoreline would be deconstructed and removed down to slab level. The tank was decommissioned and cleaned in 2015. The tank and its associated pipes and utilities would be removed, while the slab and earthen containment berm would be retained.

2.5.9 South Wood Chip Storage Area and Wood Chip Conveyor Housings

There are two distinct previously used wood chip storage areas, the South Wood Chip Storage Area and the North Wood Chip Storage Area. The South Wood Chip Storage Area was previously used to store wood chips for pulping at the Mill. Currently most of the wood chips have been removed with only minor amounts remaining. The removal resulted in a depression that would be backfilled to design grades with clean structural materials. Work activities include demolition of the overhead conveyor housing, removal of remaining chips, and filling the resulting depression to design grade. Elevated conveyors formerly conveyed wood chips from the PECO Dock to the South Wood Chip Storage area. The conveyor housings would be removed and the foundations for the supports would remain.

The North Wood Chip Storage Area was also previously used to store wood chips for pulping at the Mill. This area is located outside of the shoreline zone but would be part of the overall grading and reclamation plan that will include the entire wood chip storage area (i.e., north and south). As this area will no longer be considered a location at the mill with industrial activity, this area will be designed to allow drainage to naturally flow back to Camas Slough.

2.6 Dredging and Material Reuse

As stated, as part of this Project, dredging will be required and includes:

- Reshaping the Camas Slough riverbank following the removal of overwater structures.
- Deepening an 1,800 SF area surrounding the Dock Warehouse Piers to -10 feet (CRD) to enable access for demolition barges.

Dredge prisms will not be refilled following removals. In-water reuse and other upland reuse of dredge materials is preferred by GP for any material determined to be suitable. Dredged materials not suitable for in-water reuse or otherwise reused would be disposed at the Lady Island dredged materials management area (DMA) located at the western extent of Lady Island (**Figure 1**). Dredged materials have routinely been disposed of at the Lady Island DMA.

2.7 Impact Avoidance and Minimization Measures

To minimize risks of potential impacts on the Columbia River during construction, GP will follow relevant BMPs included in the Washington Department of Ecology (Ecology) *2019 Stormwater*

Exhibit 3 SHOR23-01

Management Manual for Western Washington (Ecology 2019). In addition, BMPs for pile removal and disposal (DNR 2017) and BMPs for Piling Removal and Placement in Washington State (EPA 2016) will be used as additional guidance.

The BMPs and minimization measures listed in this section are designed to avoid, minimize, and mitigate Project impacts on listed species.

2.7.1 General Conditions

The Project will adhere to the following general BMPs:

- In-water work will be conducted during the approved in-water work windows.
- Appropriate debris management areas and general staging areas will be identified and approved prior to construction.
- Established staging areas used for fueling, servicing, construction and demolition, and temporary equipment storage will be located in a manner that will prevent contaminants from entering aquatic areas.
- Limits of work will be clearly established.
- Disturbance to riverbank vegetation will be limited to the minimum amount needed to remove infrastructure.
- Drive mechanisms of equipment operated waterward of the OHWM will be prevented from entering water .
- Appropriate stormwater and temporary erosion and sediment control plans will be developed and will comply with the City of Camas erosion-control standards and state requirements.
- Erosion-control measures, such as silt fencing, will be utilized where appropriate to protect aquatic areas from sedimentation.
- Project activities will be completed in compliance with Washington State Water Quality Standards (Washington Administrative Code [WAC] 173-201A), including those listed below:
  - Petroleum products, fresh cement, chemicals, or other toxic or deleterious materials will be prevented from entering surface waters .
  - Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc., will be checked regularly for leaks, and materials will be maintained and stored properly to prevent spills.
- A site-specific or activity-specific spill prevention, control, and countermeasures (SPCC) plan appropriate for the Project activities will be developed.
- Routine inspections and maintenance of erosion-control and sediment-control BMPs will be performed.

Exhibit 3 SHOR23-01

2.7.2 Overwater Demolition

Overwater demolition activities will adhere to the following BMPs:

- Excess or waste materials will not be disposed of or abandoned waterward of the OHWM or allowed to enter waters of the state. Waste materials will be disposed of in an appropriate manner consistent with applicable local, state, and federal regulations.

2.7.3 Piling Removal

Pilings will be removed in adherence to the following BMPs:

- Pilings will be removed following BMPs that primarily use a vibratory driver to loosen piles initially. Pilings to be removed in this Project are made from one or more materials including: round steel pipe, H-pile steel, reinforced concrete, concrete-filled steel pipe, untreated wood, or treated wood.
- Prior to commencement of work, the contractor will assess the condition and location of the piling and identify whether the piling will be removed with access from a barge or using upland equipment accessed from the riverbank.
- Where river currents allow, the contractor will surround the structure to be removed with a floating surface boom to capture floating surface debris.
- The contractor's work plan will include procedures for extracting and handling pilings that break off during removal. In general, complete extraction of pilings is always preferable to partial removal.
- When possible, removal of treated wood pilings will occur in the dry or during low water conditions. Doing so increases the chances that the piling will not be broken (greater visibility by the operator) and increases the chances of retrieval in the event that pilings are broken.
- The crane operator will remove the piling slowly to minimize turbidity as well as sediment disturbance.
- The contractor will minimize overall damage to pilings during removal. In particular, treated wood pilings must not be broken off intentionally by twisting, bending, or other deformation. This practice will help reduce the release of wood-treating compounds and wood debris to the water columns and sediments.
- Upon removal from the substrate and water column, the piling shall be moved into the containment area for processing.
- The piling shall not be shaken, hosed-off, stripped or scraped off, left hanging to drip, or subjected to any other action intended to clean or remove adhering material from the piling. Any sediment associated with the removed piling must not be returned to the river.
- The operator shall make multiple attempts to remove a pile before resorting to cutting off the pile.
- If the pile is intractable or breaks, the pile will be cut off below the mudline, with consideration given to the mudline elevation, slope, and stability of the site.

Exhibit 3 SHOR23-01

- Debris, splintered wood, or sediment removed during pile removal must be placed in a containment area.
- Keep all equipment (e.g., bucket, steel cable, vibratory hammer) out of the water, grip piles above the waterline, and complete all work during low water and low current conditions.

2.7.4 Barge Use

Work from barges will adhere to the following BMPs:

- Any barge used as a work platform to support construction will be:
  - Large enough to remain stable under foreseeable loads and adverse conditions;
  - Inspected by the contractor before arrival to ensure the vessel and ballast are free of invasive species; and
  - Secured, stabilized, and maintained as necessary to ensure no loss of balance, stability, anchorage, or other condition that can result in the release of a contaminant or construction debris.
- The work surface on the barge deck will include a containment basin for all treated materials and any sediment removed during piling removal so that creosote is prevented from draining to the river. Uncontaminated river water runoff can return to the river.
- Barge operations will focus on areas where water depths are sufficient to avoid groundings and minimize prop-wash and resulting turbidity.
- Vegetable-based oils will be used in hydraulic lines for equipment operating in the water, to the greatest extent possible.

2.7.5 Dredging and Dredged Material Management

Dredging will be conducted to prevent impingement of juvenile salmonids by dredging equipment. Regular observation of sediment aboard the barge or at the placement areas will be conducted. If impingement occurs, equipment will be adjusted (slowed) or modified to increase the opportunity for juveniles to escape the area. For example, if a hydraulic dredge is used, it will be lowered deeper into the sediment to reduce water entrainment.

Appropriate BMPs will be employed to minimize sediment loss and turbidity generation during dredging. BMPs may include, but are not limited to, the following:

- Smooth closure of the bucket when at the riverbed,
- Maintaining suction head of any hydraulic dredge in the riverbed to the extent practicable,
- Using a buffer plate or other means to reduce flow energy of the hydraulic dredge at the placement area, and
- Other conditions, as specified in the Project's Water Quality Certification or other approvals.

When dredged material is placed on a barge for delivery to the placement area, no spill of sediment back to the water from the barge will be allowed. The barge will be managed such that the dredged

Exhibit 3 SHOR23-01

sediment load does not exceed the capacity of the barge. The load will be placed in the barge to maintain an even keel and avoid listing.

A *Dredging and Dredged Materials Management Plan* will be developed prior to the start of dredging and will likely include the following BMPs:

- Hay bales and/or filter fabric may be placed over the barge scuppers to help filter suspended sediment from the barge effluent if needed based on sediment testing results.
- The contractor will use a tightly sealing bucket and monitor for spillage during transfer operations.
- Visual water quality monitoring and, if necessary, follow-up measurements will be conducted around the barge to confirm that material is not being released.
- BMPs will be employed as appropriate to control runoff and erosion at the stockpiling area and would likely include:
  - Installing silt fences, straw bales, and/or containment berms;
  - Managing runoff water; and
  - Routine inspection of the off-load and stockpile areas to verify that BMPs are functioning properly.

2.7.6 Riverbank Reshaping

Riverbank reshaping activities would adhere to the following BMPs:

- Minimize the size of disturbed areas in access routes, staging areas, and during operations to avoid unnecessary impacts to soils and vegetation.
- Use only approved materials for fill.
- Use native seed mixes and plants for replanting.
- Riverbank shaping will be limited to the extent shown on approved grading plans.

Exhibit 3 SHOR23-01

3.0 ACTION AREA DEFINITION

"Action area" means all areas that will be affected either directly or indirectly by the action, and not merely the immediate area involved in the action (Title 50 of the Code of Federal Regulations [CFR] Part 402.02). The action area is typically considered to be the farthest potential reach of the mechanisms that may lead to impacts on listed species (**Figures 2A to Figure 2E**).

Project activities that could affect endangered and threatened species and designated critical habitat include in-water and terrestrial construction activities that result in increased noise levels, and/or turbidity. Thus, the action area includes:

- The Project footprint (i.e., the physical envelope of Project disturbance including, but not limited to, demolition, dredging, staging areas, and other temporary disturbances);
- Parts of the Columbia River and Camas Slough subject to temporary water quality effects from in-water construction-related activities that may cause turbidity or have the potential to spill contaminants; and
- Parts of the Columbia River and Camas Slough subject to temporary underwater noise during removal of concrete and pilings.

Of the construction activities described above, the associated impacts that typically carry beyond the construction footprint are demolition noise, water quality effects, alteration of terrestrial and aquatic environments, and human disturbance. These elements are briefly discussed in the following sections to help define the action area for this evaluation.

3.1 Construction-Related Noise

3.1.1 Terrestrial Noise

A terrestrial noise action area was not calculated for this Project because terrestrial species listed under the Endangered Species Act (ESA) or terrestrial state-listed or sensitive species are known to not be present within the vicinity of the Project site (Section 4).

3.1.2 Underwater Noise

The proposed construction will involve steel, pipe, and timber pile removal using vibratory hammers, and concrete foundation and pile removal using hoe-rams and concrete saw cutting. These activities produce noise levels exceeding thresholds for fish disturbance and injury (**Table 5**).

Additionally, noise produced by demolition activities would have an impact on marine mammals such as sea lions and seals. However, these species are not ESA listed and are transient through the action area and would likely avoid the area entirely during demolition. Therefore, the Project will adhere to the Marine Mammal Protection Act to prevent any take of marine mammals unless authorization is approved.

Exhibit 3 SHOR23-01

Table 5. Fish Injury and Disturbance Thresholds for Underwater Construction Activity

Functional Group	Underwater Noise Threshold	
	Injury Threshold	Disturbance Threshold
Fish less than are equal to 2 grams	187 dB cumulative SEL	150 dB RMS
Fish greater than 2 grams	183 dB cumulative SEL	
Fish All Sizes	206 dB peak	

Abbreviations:
SEL = sound exposure level
RMS = root mean square
dB = decibel

The Washington State Department of Transportation (WSDOT) guidance and calculator were used to estimate the distances away from each of the construction activities to be used during the Project where noise levels would attenuate to the noise threshold levels (WSDOT 2019).

Equation (1) was used to estimate the extent of construction-related noise:

$$D = Do\ x\ 10^{\left(\frac{construction\ noise - background\ noise}{\alpha}\right)} \quad (1)$$

Where:
D = the distance from the noise source, in meters
D_o = the reference measurement distance (10 meters in this case), and
α = 15 for transmission loss underwater. This alpha (α) constant value assumes 4.5-decibel reduction per doubling distance.

Background sound levels were determined by WSDOT guidance (WSDOT 2019):

- Assumed to be 150 decibels, which was determined to be the "effective quiet;"
- The level at which a single strike would attenuate underwater; and
- Established based on the limit of the maximum distance from which injury to fish is expected.

Both vibratory pile removal, hoe-ram operation, and concrete saw cutting would create elevated noise levels in the Columbia River and Camas Slough (**Table 6**).

Exhibit 3 SHOR23-01

Table 6. Underwater Distance-to-Noise Thresholds for Pilings and Concrete Removal

Pile Size/Material and Action		Fish Injury Threshold			Fish Disturbance Threshold (RMS)
		Peak	Cumulative SEL		
		206 dB	Fish less than or equal to 2 grams, 187 dB	Fish greater than 2 grams, 183 dB	150 dB
		Distance (m) From Action			
	Concrete Removal by Hoe-Ram Operation	206 dB	171 dB	171 dB	186 dB
	No attenuation	10 m	125 m	230 m	2,512 m
	Concrete Removal by Saw cutting	159 dB	152 dB	152 dB	140 dB
	No attenuation	0 m	0 m	0 m	2 m
12” timber	Vibratory Pile Removal				150 dB
	No Attenuation	-	-	-	10 m
12” steel pipe	Vibratory Pile Removal				155 dB
	No Attenuation	-	-	-	22 m
24” steel pipe	Vibratory Pile Removal				164 dB
	No Attenuation	-	-	-	86 m
12” steel H-pile	Vibratory Pile Removal				153 dB
	No Attenuation	-	-	-	16 m
24” sheet pile	Vibratory Pile Removal				165 dB
	No Attenuation	-	-	-	100 m

Source: All received level values taken from or estimated using Table 7-16, Table 7-17, and Table 7-19 from WSDOT guidance document (WSDOT 2019).
Abbreviations:
dB = decibel
m = meters
RMS = root mean square
SEL = sound exposure level

The data in **Table 6** were used to determine the Project action area based on the distance from specific Project activities where noise levels would attenuate to levels below the fish injury and disturbance thresholds cited in **Table 5**.

A vibratory hammer would be used to remove pilings throughout the Project area and would result in various noise levels, depending on the type of piling to be removed, as shown in **Table 6**. Maximum sound levels would be below the injury threshold for all types of pilings. However, the vibratory hammer activities would exceed the fish disturbance threshold (150 decibels [dB] root mean square [RMS]) for all types of piles. Most of the pilings to be removed are made of wood or steel, and therefore for most of the Project the disturbance noise threshold would be exceeded for a maximum distance of 86 meters (282 feet) (**Table 6**).

However, a small number of sheet piling structures are to be removed, and vibratory hammer extraction for these types of pilings produce noise levels of 165 dB RMS, which would create noise levels above the disturbance threshold for a maximum distance of 100 meters (328 feet) (**Table 6**). As

Exhibit 3 SHOR23-01

such, given the uncertainty in the specific equipment that would be used, it is assumed that the maximum potential for fish disturbance due to noise from vibratory extraction of pilings would be 100 meters (as shown on **Figures 2B through 2E**).

Removal of 54 concrete piers associated with the dock warehouse would be accomplished by directly pulling the concrete piers from the bedrock, if possible. However, if the pier were to break during this process or if they cannot be removed by direct pull, then a concrete saw cutting blade would be used to cut the pilings below the mudline as determined by mudline elevation, slope, and stability of the site.

Both the peak (159 dB) and cumulative sound exposure level (152 dB) for underwater saw cutting of concrete are below the threshold for risk of injury to fish (**Tables 5 and 6**). As such, the only possible risk that could occur due to saw cutting would be fish disturbance, which would occur a maximum of 2 meters (6 feet) from the pier (**Table 6 and Figure 2E**).

Hoe-ram operations would be limited to the area where concrete exists near the Berger crane foundation and dock warehouse piers. Part of the Berger crane foundation lies below +2 feet CRD, which is below the OHWM, and therefore some demolition activities may be conducted in-water, below the OHWM. Use of hoe-ram operations with no attenuation for the concrete removal would result in noise levels that exceed the disturbance threshold for fish up to a distance of 2,512 meters (8,241 feet) away from the concrete removal activity (**Table 6 and Figure 2E**).

As such, the action area (**Figure 2A to Figure 2E**) related to underwater noise was defined as an area radiating out from the Berger crane foundation and dock warehouse concrete piers for a distance of 2,512 meters or to the nearest shoreline, whichever is closer (**Figure 2E**). Because the majority of the action area is located within the Camas Slough near Lady Island, shorelines are encountered prior to 2,512 meters in nearly all directions. However, some of the action area resides outside of Camas Slough, and within the Columbia River; therefore, in those cases where pilings are to be removed, the area of noise effect would extend the maximum 100 meters possible.

Other potential sources of underwater noise that could occur as a part of this Project include dredging activities and barge use. However, mechanical and hydraulic dredges produce underwater sounds that are strongest at low frequencies, and these frequencies rapidly attenuate in shallow water. Although the noise levels from large vessels may exceed those from dredging, single vessels usually do not produce strong noise in one area for a prolonged time (Richardson et al. 1995). Additionally, fish respond to lower frequency sounds by displaying an avoidance response, not by habituating to the sound despite repeated exposure (Dolat 1997; Knudsen et al. 1997). These findings, combined with the requirement that work be conducted only during specific in-water work windows to avoid sensitive life stages as determined by the agencies, these activities would have no significant effect on aquatic species.

3.2 Water Quality

The action area also includes those portions of Camas Slough and the Columbia River upstream and downstream of the demolition area that could be affected by increased suspended sediment and turbidity from demolition activities.

The temporary turbidity mixing zone standards of WAC 173-201A-400 were used to estimate the potential zone of sediment/turbidity impacts during the Project. As outlined in WAC 173-201A-400(7)(a), the maximum size for mixing zones in rivers and streams is 300 feet downstream and 100 feet upstream from the point of discharge.

3.2.1 Temporary Turbidity due to Upland Disturbance

Upland demolition and vegetation removal could lead to erosion causing indirect temporary and localized turbidity that potentially could reach levels that adversely affect fish. However, upland sources of erosion would be limited since very little below surface disturbance is proposed. Potential sediment from upland sources would be contained using the erosion control and sediment detention BMPs described in the Project's *Temporary Erosion and Sediment Control (TESC) Plan*. Erosion control measures would be inspected frequently to maintain a continuous barrier between ground-disturbing activities and Camas Slough and Columbia River. Therefore, the indirect turbidity effects due to the upland demolition would not extend the action area within the aquatic zones of the Project.

3.2.2 Temporary Turbidity due to In-water and Overwater Activities

In-water activities could generate localized and short-duration turbidity events associated with disturbance of the riverbed. **Table 7** summarizes sources and extent of potential turbidity in Camas Slough and the Columbia River.

Table 7. Potential Sources of Turbidity from In-water and Overwater Activities

Activity	Likely greatest extent of downstream turbidity	Approximate Duration of Effect (hours per workday)	Approximate Number of Proposed Workdays
Operate stationary and moving barges	Less than 300 feet	Varies	Up to 98 days per year
Remove piles	Less than 25 feet	8 to 10 hours	300
Demolish in-water structures, including pier removal	Less than 25 feet	8 to 10 hours	30
Demolish overwater structures, below OHWM	Less than 25 feet	8 to 10 hours	235
Dredging (sediment removal)	300 feet	10 to 16 hours	180
Riverbank reshaping, below OWHM (in the wet)	300 feet	8 to 10 hours	30

It is anticipated that most of the in-water structure removal work expected is to use vibratory hammers for pile removal, and it can be assumed that turbidity caused by these activities would be minimal. This has been documented by other studies that showed the magnitude or extent of turbidity resulting from pile removal. Examples included water quality monitoring performed by Washington State Ferries for:

1. Pile removal at Friday Harbor Ferry Terminal in 2004, which showed that turbidity levels did not exceed 1 Nephelometric turbidity unit above background levels, and

Exhibit 3 SHOR23-01

2. Pile removal of steel and creosote timber piles at Eagle Harbor Maintenance Facility in 2005, which showed turbidity levels of no more than 0.2 nephelometric turbidity unit above background levels (WSF 2019).

Given that the Columbia River has a very high dilution capacity due to large water volumes and high current, along with coarse sediment materials (approximately 80 percent sand) it is expected that turbidity generated by removal of piles will localized to about a 25-foot radius around the pile.

Sediment removal by dredging and placing fill material are the aspects of in-water work likely to generate the most turbidity. As stated, dredging would occur within Camas Slough. Dredging would likely generate elevated turbidity up to about 300 feet of the Project site. The Project area comprises coarse-grained materials that do not remain in suspension due to their size and settle out quickly, limiting both the extent and duration of turbidity when disturbed. Dredging would be performed using a mechanical dredge and at a slow, controlled pace to minimize turbidity.

Barges and other vessels operating in shallow water have the potential to produce turbidity in the Columbia River and Camas Slough. Shallow water operations could occur in some cases in Camas Slough due to low water levels, especially in the late summer and fall. Shallow water operations are limited to the near-shore locations in the Columbia River.

Barges generally have a draft depth of about 10 to 12 feet. Draft of other vessels varies. Where drafts are shallow, propellers on tugboats moving barges may produce turbulence causing sediments to become suspended. In addition to the equipment barge, one or two barges would be used to transport removed structures and dredged materials. These barges would make trips as needed. However, compared to the existing energy generated by high-velocity flow in the action area, turbidity due to disturbance of sediment by tugboat propellers is expected completely settle to background within 300 feet downstream of the initial disturbance. Therefore, it is assumed that activities including piling removal, pier removal, in-water demolition, and demolition below the OHWM of the action area would have a 25-foot downstream extent where water quality could be impacted. The exception would be that when dredging, fill, or barge activities are occurring then a 300-foot downstream extent is likely to occur. Additionally, impact avoidance and minimization measures described in Section 2.7 would also be utilized to prevent extensive turbidity from dispersing into the wider environment. In any case, turbidity would not exceed the levels, distance, or duration specified by the permits.

3.3 Alteration of Aquatic Environments

Temporary alteration of areas aquatic environments would occur because of demolition and dredging of sediment. Anticipated impacts on aquatic habitat would be limited to the area immediately adjacent to the Project site, along the shoreline of Lady Island, and within the immediate surrounding area of the piles that would be removed along the northern shoreline. Anticipated impacts on terrestrial habitat would be limited to the upland vegetation located within the Project area where demolition is to occur above OHWM. The zone of influence for environmental alteration is restricted to the Project limits (footprint) of demolition and dredging activities.

Exhibit 3 SHOR23-01

3.4 Human Disturbance

During demolition, dredging and riverbank reshaping an increase in human activity, traffic, and equipment would cause associated temporary increases in noise, automobile emissions, and dust. These temporary construction-related effects would be minimized by adhering to appropriate erosion control BMPs and conservation measures implemented during soil-disturbing activities. While there would be a temporary increase in the level of human activity or traffic in the Project area, it would not extend the action area that is defined in Section 3.5. Additionally, human activity or traffic would not increase the Project area following demolition activities and actually would diminish the human footprint within the environment due to the reduction in riverfront industrial activities.

3.5 Action Area Summary

The impacts with the largest associated areas for this Project are temporary increase in underwater noise disturbance and water quality effects due to a temporary increase in turbidity. Therefore, the action area for this Project comprises the underwater noise and water quality impacts extents and is depicted in **Figure 2A to Figure 2E**. The Action Area does not include terrestrial portions of the Project as stated in Section 3.1.1.

The action area for this Project includes all of the following:

- The Project's aquatic footprint.
  - The underwater extent, starting from the activity location and extending outward up to the underwater noise maximum propagation distance, for the following:
    - 2,512 meters (8,241 feet) during hoe-ram operation with no attenuation, for concrete removals.
    - 100 meters (328 feet) during removal of pilings and dolphins that are wood or steel using a vibratory impact hammer, which would be the case during most of the demolition.
    - 2 meters (6 feet) for saw cutting, where needed, when a piling breaks during extraction.
  - The maximum extent at which water quality could be affected: up to 300 feet during dredging and fill activities.
- Indirect effects during activities in the Project's terrestrial footprint.
  - The terrestrial extent includes access roads, staging areas, and upland demolition areas. The area is almost entirely paved and located on GP property. Except for riverbank shaping, very little below ground disturbance would occur in the terrestrial footprint since demolition is to the slab level.

Exhibit 3 SHOR23-01

4.0 LISTED SPECIES AND HABITAT INFORMATION

Information on species listed under Section 7 of the ESA that are potentially present in the action area was obtained from the USFWS Information for Planning and Consultation (IPaC) online tool (USFWS 2020a, 2022) and from NOAA Fisheries list of ESA threatened and endangered species (NOAA Fisheries 2020). The WDFW Priority Habitats and Species (PHS) website and SalmonScape interactive mapper were also searched for priority habitats and ESA-listed species potentially occurring in the Project action area (WDFW 2020a, 2020b).[2]

4.1 Species and Critical Habitats Addressed

Most of the Project work includes in-water and overwater work that is primarily located within Camas Slough and the Columbia River; therefore, most of the species listed under the ESA are aquatic which includes five species identified by NOAA fisheries and one species identified by USFWS (**Table 8**).

Eleven additional ESA-listed species were identified by USFWS (2020a, 2020b, 2022) as potentially present within the Project area are not expected to occur and thus are not evaluated further in this report. These species and their reason for exclusion from further evaluation are listed and summarized in **Table 9**. Other species of potential concern that have no ESA listing status or have no critical habitat in the Project area are further described in **Appendix B**.

In the Columbia River, NOAA Fisheries has listed 14 fish populations as threatened or endangered under the ESA. In the lower Columbia River reach, five ESA-listed fish species may occur in the action area (NOAA Fisheries 2020). These five species are: Chinook salmon (*Oncorhynchus tshawytscha*), chum salmon (*O. keta*), coho salmon (*O. kisutch*), steelhead (*O. mykiss*), and Pacific eulachon (*Thaleichthys pacificus*) (**Table 8**). While the other nine listed NOAA salmonid species could potentially migrate through the action area, it is unlikely they would use Camas Slough as a navigational channel and would primarily use the main channel to migrate upstream to other subbasins within the middle and upper Columbia River outside of the action area. Therefore, these species are not addressed specifically, but these species are similar to the those are addressed within this report. Additionally, the USFWS IPaC indicated the presence of bull trout (*Salvelinus confluentus*) in the action area (USFWS 2022). No other listed species including birds, fish, mammals, reptiles, amphibians, or plants were determined to be likely present within the action area.

Designated Critical Habitat for each of the ESA-listed species is present in the action area.

Table 8. ESA-listed Species that May Occur in the Action Area

Species	Listing Status[1]	Critical Habitat	Spawning Habitat	Comments
Bull Trout (*Salvelinus confluentus*)	Threatened	Designated; within the action area	Specific spawning requirements not	Critical habitat located within the Columbia River and Camas Slough; sea-run populations could migrate through the area.

2 The PHS database was queried again in 2022 by Tetra Tech, and no additional species were found in the area beyond those found in the 2020 query conducted by Wood. The 2020 PHS query conducted by Wood can be found in Appendix F of the Shoreline Report (Tetra Tech 2023).

Species	Listing Status[1]	Critical Habitat	Spawning Habitat	Comments
			met within action area.	
Chinook Salmon (*Oncorhynchus tshawytscha*) Lower Columbia River ESU	Threatened	Designated; within the action area	Specific spawning requirements not met within action area.	Documented as occurring within the action area. Migrate through the area during spawning migration. Critical habitat located within the Columbia River and Camas Slough.
Chum Salmon (*Oncorhynchus keta*) Columbia River ESU	Threatened	Designated; within the action area	Specific spawning requirements not met within action area.	Documented as occurring within the action area. Migrate through the area during spawning migration. Critical habitat located within the Columbia River and Camas Slough.
Coho Salmon (*Oncorhynchus kisutch*) Lower Columbia River ESU	Threatened	Designated; within the action area	Specific spawning requirements not met within action area.	Documented as occurring within the action area. Migrate through the area during spawning migration. Critical habitat located within the Columbia River and Camas Slough.
Steelhead (*Oncorhynchus mykiss*) Lower Columbia River DPS	Threatened	Designated; within the action area	Specific spawning requirements not met within action area.	Documented as occurring within the action area. Migrate through the area during spawning migration. Critical habitat located within the Columbia River and Camas Slough.
Pacific Eulachon (*Thaleichthys pacificus*) Southern DPS	Threatened	Designated; within the action area	Specific spawning requirements not met within action area.	Documented as occurring within the action area. Migrate through the area during spawning migration. Critical habitat located within the Columbia River and Camas Slough.

Notes:
ESA Listing status and critical habitat obtained from USFWS (2020a) and NOAA Fisheries (2020).
Abbreviations:
ESU = Evolutionarily Significant Unit
DPS = Distinct Population Segment

Table 9. Listed Species Not Known to Occur in the Action Area Excluded from Further Evaluation

Species	Listing Status[1]	Critical Habitat[1/]	Rationale for Exclusion Comments
Columbian White-tailed Deer (*Odocoileus virginianus)*	Threatened	None	The action area is outside the known distribution of the species, which is limited to a series of river islands located in Clatsop and Columbia Counties in Oregon and Cowlitz, Wahkiakum, Clark Counties in WA downstream of the Project (Azerrad 2016).
Gray Wolf (*Canis lupus*)	Endangered	None	The action area is outside of known pack or pack use areas (USFWS 2020c; WDFW et al. 2019).
Northern Spotted Owl (*Strix occidentalis caurina*)	Threatened	Designated; outside the action area	Northern spotted owls live in forests characterized by the dense canopy of mature and old-growth trees, abundant logs, standing snags, and live trees with broken tops (USFWS 2020c). Nearly all spotted owls are currently found in the Cascade Range and on the Olympic Peninsula (Buchanan 2016). Because the action area does not reside within the Cascade Range or on the Olympic Peninsula or within an old-growth forest, the northern spotted owl is known to not occur within the action area.

Exhibit 3 SHOR23-01

Species	Listing Status[1]	Critical Habitat[1/]	Rationale for Exclusion Comments
Streaked Horn Lark (*Eremophila alpestris strigata*)	Threatened	Designated; outside the action area	This ground-nesting bird is migratory within the same breeding region (USFWS 2020a). The WDFW PHS data do not indicate presence of streaked horned lark in the action area (WDFW 2020a). The species is currently restricted to areas of sparsely vegetated shorelines, agricultural fields, drying seasonal wetland mudflats, sparsely vegetated edges of grass fields, grazed pastures, gravel roads, or airports (Pearson and Altman 2005; WDFW 2020c). Nesting habitat generally requires 300 acres or more of preferred habitat (USFWS 2020d). Given the lack of suitable habitats present in the action area; this species is not expected to occur in the action area.
Yellow-billed Cuckoo (*Coccyzus americanus*)	Threatened	Proposed; outside the action area	A migratory bird with the last confirmed breeding records in Washington dating from 1923; other recent observation records are from eastern Washington in Walla, Stevens, and Okanogan Counties. Nesting habitat requires large (usually exceeding 40 hectares in size), wide (over 100 meters) patches of shrubby/forested riparian vegetation with high canopy closure and density, typically dominated by cottonwoods (*Populus* spp.) and willows (*Salix* spp.), which may be mixed with ash (*Fraxinus* spp.), walnut (*Juglans* spp.), mesquite (*Prosopis* spp.), tamarisk (*Tamarix* spp.) and others (Wiles and Kalasz 2017). Given the lack of observations in the action area, this species is not expected to occur in the action area. Further, no Project activities will occur in forested, riparian habitats.
Bradshaw's Desert-parsley (*Lomatium bradshawii*)	Endangered	None	Once believed to be endemic only to Oregon, two populations of the species were discovered in Clark County, Washington in 1994 (USFWS 2010). The species is restricted to wet prairie habitats inundated during the winter months. The action area does not include the preferred habitat for Bradshaw's desert-parsley.
Golden Paintbrush (*Castilleja levisecta*)	Threatened	None	Golden paintbrush does not tolerate shade from nearby trees, shrubs, or even tall nonnative grasses. This species is considered extirpated in most areas and only 11 known populations are currently known to exist in Washington and British Columbia, none of which occur in Clark County (USFWS 2020e). The action area does not include the preferred habitat for golden paintbrush, nor are there any known populations within the action area.
Kincaid's Lupine (*Lupinus sulphureus spp. Kincaidii*)	Threatened	Designated; outside the action area	Kincaid's lupine is typically found in native upland prairie with the dominant species being red fescue (*Festuca rubra*) and/or Idaho fescue (*Festuca idahoensis*) but is occasionally found on steep, south-facing slopes and barren rocky cliffs (65 FR 3875). The action area does not include the preferred habitat for Kincaid's lupine.
Nelson's Checker-mallow (*Sidalcea nelsoniana*)	Threatened	None	Nelson's checker-mallow occurs in various sunny habitats, including margins of sloughs, drainage ditches, stream-sides, roadside ditches, fence rows, swales, and wetter portions of native prairie remnants. It is often found where prairie remnants or disturbed grasslands meet woodland habitats (NRCS 2010). Although occasionally occurring in the understory of Oregon ash (*Fraxinus latifolia*) woodlands or among woody shrubs, it usually occupies open habitats supporting early seral plant species (USFWS 2010). The action area does not include the preferred habitat of Nelson's checker-mallow.

Species	Listing Status[1]	Critical Habitat[1/]	Rationale for Exclusion Comments
Water Howellia (*Howellia aquatilis*)	Threatened	None	Water howellia is an aquatic plant species that generally grows in shallow (less than 3 feet) stagnant waters, freshwater wetlands, ephemeral glacial pothole ponds, or former river oxbows, in sites that dry out in summer months (USFWS 2020f; 59 FR 34860). These wetland habitats are typically filled by spring rains and snowmelt run-off. Plants typically root in bottom sediments of firm consolidated clay and organic sediments that occur in wetlands associated with ephemeral glacial pothole ponds and former river oxbows, and most of the individual plant is submerged below the water surface. The action area is located within and along active channels of Columbia River and Camas Slough, with no oxbows or ponded water areas present. Wetland habitats within the action area are limited to small areas where natural riverbank conditions occur, at which shallow slopes below OHW are generally comprised of sand, silt, and fine gravel. Wetland habitats occur in these areas where some organic deposition has occurred. Given the action area lacks areas of ephemeral wetlands, glacial pothole, or river oxbow habitats underlain by firm consolidated clay and organic sediments; and the historic dredging activities and hydrologic influence of the Bonneville Dam, the action area does not provide suitable habitat for water howellia. Additionally, the only known occurrences of the species within Clark County is located within the Ridgefield National Wildlife Refuge (USFWS 1996) located at RM 90.
Willamette Daisy (*Erigeron decumbens*)	Endangered	Designated; outside the action area	The primary constituent element of critical habitat is early seral upland prairie, wet prairie, or oak savanna habitat with a mosaic of low-growing grasses, forbs, and spaces to establish seedlings or new vegetative growth; absence of dense canopy vegetation; and undisturbed subsoils (USFWS 2010). The action area does not include the preferred habitat for Willamette daisy.

Note:
1/ ESA Listing status and critical habitat obtained from USFWS (2020a, 2020b, 2022).
Abbreviation:
FR = Federal Register
RM = river mile

4.2 Species Descriptions and Critical Habitat Occurrence

Of the federally protected species identified by the USFWS and NOAA Fisheries (see **Appendix C**), the following species and their critical habitat may occur in the action area:

- Bull trout (*Salvelinus confluentus*),
- Chinook salmon (*Oncorhynchus tshawytscha*),
- Chum salmon (*Oncorhynchus keta*),
- Coho salmon (*Oncorhynchus kisutch*),
- Steelhead (*Oncorhynchus mykiss*), and
- Pacific eulachon (*Thaleichthys pacificus*).

Fish use of the Columbia River represents a continuum based on run timing as upstream or downstream movement occurs during migration. Adult fish would be found at upstream reaches later than downstream reaches as they migrate upstream, and the opposite would be true for juvenile fish migrating downstream. In addition, juveniles may be found in the Columbia River estuary

(downstream of the action area) for a significant portion of the year, as estuarine areas represent important rearing habitat for juveniles making the physiological transition from freshwater to saltwater.

ESA-listed fish at all life stages may be present in the action area in every month of the year and at all river stages, although specific salmonid fish stocks and life stages occur in runs at specific seasons. The timing of ESA-listed fish runs that may occur in the action area vary by species and life-stage, as shown in **Table 10**.

Table 10. Fish Run Timing in Lower Columbia River

Fish Run	Fish Run Timing[1/]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fall Chinook Salmon												
Adults upstream migration												
Spawning												
Egg incubation												
Fry emergence/early rearing												
Fry migration/rearing												
Ocean entry												
Chum Salmon												
Adults upstream migration												
Spawning												
Egg incubation												
Fry emergence/early rearing												
Fry migration/rearing												
Coho Salmon												
Adults upstream migration												
Spawning												
Egg incubation												
Fry emergence/early rearing												
Fry migration/rearing				Outmigration								
Ocean entry												
Winter Steelhead												
Adults upstream migration												
Spawning												
Egg incubation												
Fry emergence/early rearing												
Fry migration/rearing			Outmigration									
Ocean Entry												
Summer Steelhead												
Adults upstream migration												
Spawning												
Egg incubation												

Fish Run	Fish Run Timing[1/]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fry emergence/early rearing												
Fry migration/rearing			Outmigration									
Ocean Entry												
Bull Trout												
Adults upstream migration												
Spawning												
Egg incubation												
Fry emergence/early rearing												
Rearing	1–3 years prior to outmigration											
Outmigration												
Pacific Eulachon												
Adult upstream migration												
Larval downstream migration												

Note:
1/ ESA-listed fish run timings obtained from NOAA Fisheries (2020) and the Lower Columbia Fish Recovery Board (LCFRB 2010).

The river hydrology within the action area has been altered by development and includes altered water level fluctuations, altered seasonal and daily flow regimes, reduced water velocities, and reduced discharge volumes. Overall, these effects have had a major impact on juvenile salmonid migration behavior and potentially strand juveniles during their downstream migration (NOAA Fisheries 2000).

Altered flow regimes can affect the spawning success of mainstem Columbia River spawners salmonids such as chum salmon or fall chinook salmon. For example, fish may spawn in areas that are dewatered during the winter or spring, potentially resulting in complete egg mortality (NOAA Fisheries 2000). Additionally, low flow may also decrease the delivery of nutrients and dissolved oxygen to incubating eggs, thereby decreasing survival (LCFRB 2010).

Other factors that limit the possibility for spawning habitat to exist include increased temperatures. The Columbia River mainstem water temperatures at Washougal, Washington, range from approximately 6 degrees Centigrade (°C; 43 degrees Fahrenheit [°F]) in early spring to approximately 22°C (72°F) in late summer (USGS 2019). Most salmonids spawning occurs at temperatures between 39.2°F (4°C) and 57.2°F (14°C) (Reiser and Bjornn 1979; Spence et al. 1996). While temperatures may be viable in the mainstem, it is assumed that Camas Slough temperatures are likely as high as or higher than the main stem; therefore, it is unlikely that salmon would use it for spawning purposes. Especially as increased water temperatures can create migrational blockages for salmonids when water temperatures exceed 69.8°F (21°C) (ODEQ 1995).

In the last 120 years, the mainstem Lower Columbia River has (including Camas Slough) experienced floodplain loss and side channel loss due to diking and channelization associated with industrial, transportation, residential, mining, and agricultural activities. Additionally, activities such as maintenance dredging and filling have also reduced the habitat parameters that are required for successful spawning in these areas.

Exhibit 3 SHOR23-01

Additionally, fall Chinook, coho, chum, winter and summer steelhead are produced at two hatcheries in the vicinity: 1) the Washougal Hatchery and 2) Skamania Hatchery. These hatcheries currently release approximately 4.6 million fall Chinook, coho, and steelhead per year to the Washougal subbasin and another approximately 2.8 million chum, coho, and steelhead per year to other lower Columbia River subbasins (LCRFB 2010). Therefore, most adult fish migrating upstream through the action area are likely of hatchery-origin fish returning to the natal streams near these hatcheries. The only exception are chum which are all natural spawners in the Washougal River.

4.2.1 Bull Trout – Threatened

The PHS database (WDFW 2020a) and IPaC database (USFWS 2020a, 2022) indicate that bull trout are present throughout the lower Columbia River watershed. Bull trout exhibit resident, freshwater migratory (fluvial and adfluvial forms), and anadromous life history patterns (Rieman and McIntyre 1993). In the lower Columbia River, bull trout may exhibit resident or freshwater migratory life history patterns; anadromous bull trout have not been documented. Additionally, prior to hydroelectric facilities being built, the fluvial form was largely supported within the Columbia River, but now with many of the core areas in the watershed being fragmented or isolated, the adfluvial form is more commonly found. Bull trout have more specific habitat requirements than other salmonids, especially regarding spawning and rearing substrate and water temperatures. Cold-water temperature is one key specific requirement, and for bull trout habitat is generally considered to include water temperatures below 15°C or 59°F, particularly for spawning and rearing. Spawning and rearing habitat is not present within the action area.

Data regarding the extent to which bull trout use the mainstem lower Columbia River during various life history phases is generally lacking, but it is assumed that they would use the mainstem for overwintering and feeding (USFWS 2015). The Washougal River subbasin near the action area is not designated as being used by bull trout (LCFRB 2010).

Thus bull trout are assumed to be migratory through the action area, spawning in upriver tributary streams and migrating through the action area as juveniles or adults. Bull trout adult upstream migration generally occurs between April and September and juvenile outmigration is likely to occur between April to November, but could occur at any time as they spend about one to three years in their natal streams prior to emigration (LCFRB 2010).

Designated critical habitat for bull trout species has been established in the Mainstem Lower Columbia River Critical Habitat Unit, which extends from the mouth of the Columbia River to John Day Dam below the OHWM (75 *Federal Register* [FR] 63897). The designated habitat includes all of the mainstem Columbia River, including the action area. The primary use of the action area is for upstream and downstream migration.

Bull trout are opportunistic feeders that prey upon other organisms, feeding on terrestrial and aquatic insects, microzooplankton, and forage fish. Bull trout prefer complex forms of cover such as large woody debris, undercut banks, boulders, and pools. These cover elements are limited in the action area as riverbanks on the main mill parcel are built-up and covered by structures. Also the Columbia River is used as a navigation channel and is routinely dredged.

Exhibit 3 SHOR23-01

The USFWS identified nine primary constituent elements (PCEs) for bull trout critical habitat (75 FR 63897).

The action area contains features of four of these PCEs:

- Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
- Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
- Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

The remaining five PCEs for bull trout critical habitat are related to nearshore and marine habitats that do not occur within the action area:

- Water temperatures ranging from 2 to 15°C (36 to 59°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
- In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.
- A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
- Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

4.2.2 Chinook Salmon – Threatened

The Lower Columbia River (LCR) Chinook salmon evolutionarily significant unit (ESU) was listed as threatened on March 24, 1999 (64 FR 14308). This status was reaffirmed on June 28, 2005 (70 FR 37160) and upheld in the five-year review on August 15, 2011 (76 FR 50448). Chinook are anadromous fish;

Exhibit 3 SHOR23-01

they are migratory in the action area and are present primarily as upstream migration of adults and downstream migration of juveniles. On their journey to marine habitats, juvenile salmonids may spend from a few days to several weeks in the mainstem Columbia River foraging prior to making their way to the estuary to acclimate to saline environments (70 FR 52630).

Recent spawning surveys indicate fall Chinook spawning in the Columbia River mainstem below Bonneville Dam; however, these fish are expected to be hatchery strays and the NOAA Fisheries does not consider them to be part of the lower Columbia River fall Chinook ESU (LCFRB 2010). Therefore, spawning habitat is likely not available in the action area; most spawning occurs in upstream portions of the Washougal River subbasin, or in other upriver subbasins such as the Lower Gorge, Wind, Little White Salmon, and Upper Gorge (LCFRB 2010).

This ESU exhibits spring-run, fall (tule), and late-fall (bright) life-history strategies. Spring stocks generally run from March through May, fall (tule) stocks generally run between August to September, and late-fall (bright) stocks run from August through October.

However, only the fall stock is the primary concern in the action area, because the Washougal River is immediately adjacent to the action area, and thus fall Chinook could use the action area to migrate to the Washougal River to spawn or return to upstream fish hatcheries (LCFRB 2010). This stock would result in peak adult migration occurring between August and October and peak juvenile outmigration between May to mid-August. While only the fall stock is the primary concern within the action area, all three stocks occur in the Columbia River and this would result in other potentially threatened ESUs to use the action area as they migrate upstream as adults to upper reaches of the Columbia River.

Designated critical habitat for the ESU has been established in the Lower Columbia River, which includes the mainstem Columbia River and major tributaries below the OHWM (70 FR 52630). The designated habitat includes the mainstem Columbia River, including the action area. The primary use of the action area is for upstream and downstream migration.

Chinook are opportunistic feeders that prey upon other organisms, feeding on terrestrial and aquatic insects, microzooplankton, and forage fish. Chinook require stream cover such as large woody debris, undercut banks, boulders, pools and side channels, or off-channel areas. However, these cover elements can be found upstream in the Washougal River, which provides spawning and rearing habitat.

Six PCEs for LCR Chinook critical habitat were identified (70 FR 52630). The action area contains features of two of these PCEs:

- Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural covers such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival. These features are essential to conservation because without them juveniles cannot use the variety of habitats that allow them to avoid high flows, avoid predators, successfully compete, begin the behavioral and physiological changes needed for life in the ocean, and reach the ocean promptly. Similarly, these features are essential for adults

Exhibit 3 SHOR23-01

because they allow fish in a non-feeding condition to successfully swim upstream, avoid predators, and reach spawning areas on limited energy stores.

- Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover.

The remaining four PCEs for LCR Chinook critical habitat are related to freshwater, nearshore and marine habitats that do not occur within the action area:

- Nearshore marine areas free of obstruction with water quality and quantity conditions and forage supporting growth and maturation, and natural cover.
- Freshwater spawning sites with water quantity and quality conditions and substrate supportive of spawning, incubation, and larval development.
- Estuarine areas free of obstruction with water quality, water quantity and salinity conditions supporting juvenile and adult physiological transitions between fresh and salt water and natural cover.
- Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

4.2.3 Chum Salmon – Threatened

The Columbia River chum salmon ESU was listed as threatened on March 25, 1999 (64 FR 14508). This status was reaffirmed on June 28, 2005 (70 FR 37160) and upheld in the five-year status review on August 15, 2011 (76 FR 50448). Chum are anadromous fish. They are migratory in the action area and are present primarily as upstream migration of adults and downstream migration of juveniles. While similar to other salmonids in many ways, chum salmon are different in that they spend more of their life history in marine waters and they usually spawn in the lower reaches of coastal river systems. This allows the juveniles to migrate to the ocean almost immediately after emerging from the redds, rather than spend months or years rearing in freshwater (63 FR 11774). Peak adult migration occurs between mid-October to November and peak juvenile migration occurs March through May.

Spawning and outmigration surveys have documented successful chum spawning in the lower mainstem Columbia River along the north bank near the I-205 bridge approximately 7 miles downriver of the Project action area. However, spawning habitat is likely not available in the action area, as run sizes in the Washougal subbasin area include only approximately 1,000 fish. It appears most natural spawning occurs in upstream portions of the Washougal River subbasin or in other subbasins which include Lower Gorge, Wind, and Upper Gorge further upstream (LCFRB 2010).

Designated critical habitat for this species has been established in the Lower Columbia River, which includes the mainstem Columbia River and major tributaries below the OHWM (70 FR 52630). The designated habitat includes all the mainstem Columbia River, including the action area. The primary use of the action area is for upstream and downstream migration.

Chum salmon are opportunistic feeders that prey upon other organisms, feeding on terrestrial and aquatic insects, microzooplankton, and forage fish. Chum salmon require stream cover such as large

Exhibit 3 SHOR23-01

woody debris, undercut banks, boulders, pools and side channels, or off-channel areas; these elements are limited in the action area. Additionally, unlike other salmonids that rely on favorable freshwater conditions, juvenile chum salmon rely more on favorable estuarine and marine conditions for growth and development (63 FR 11774).

The same six PCEs for as for Chinook salmon apply to Columbia River chum salmon critical habitat (70 FR 52630). The two PCEs with features that occur within the action area and the four that do not apply to Chum, as they do for Chinook salmon.

4.2.4 Coho Salmon – Threatened

LCR coho salmon were identified as a separate ESU, which was listed as threatened on June 28, 2005 (70 FR 37160). Coho are anadromous fish; they are migratory in the action area and are present primarily as upstream migration of adults and downstream migration of juveniles. Prior to making the journey to marine habitats, juvenile Coho salmonids may spend upwards to a year or more in the mainstem Columbia River and its tributaries before rapidly entering the estuary to venture seaward (Sandercock 2001).

Coho salmon are known to spawn and rear in small tributaries associated with the lower Columbia River. Therefore, spawning habitat is not available in the action area; most spawning occurs in upstream portions of the Washougal River subbasin or in other smaller tributary subbasins (LCFRB 2010).

LCR coho are typically categorized into Early and Late-returning stocks. Early returning (Type S) coho enter the Columbia River in mid-August and begin entering tributaries in early September, with peak spawning from mid-October to early November. Late-returning (Type N) coho pass through the lower Columbia from late September through December and enter tributaries from October through January (LCRFB 2010). Most spawning occurs from November to January, but some spawning ranges to February and as late as March. Peak adult migration occurs between August to December and peak juvenile outmigration occurs between April to June.

Designated critical habitat for this species has been established in the Lower Columbia River, which includes the mainstem Columbia River and major tributaries below the OHWM (81 FR 9251). The designated habitat includes the mainstem Columbia River, including the action area. The primary use of the action area is for upstream and downstream migration.

Coho salmon are opportunistic feeders that prey upon other organisms, feeding on terrestrial and aquatic insects, microzooplankton, and forage fish. Coho salmon require stream cover such as large woody debris, undercut banks, boulders, pools and side channels, or off-channel areas; these elements are limited in the action area.

The six PCEs for LCR coho salmon critical habitat are identical to that of the Chinook salmon. The two PCEs with features that occur within the action area and the four that do not are identical to those for Chinook salmon.

Exhibit 3 SHOR23-01

4.2.5 Steelhead – Threatened

The LCR steelhead Distinct Population Segment (DPS) was listed as threatened on March 19, 1998 (63 FR 13347). This status was reaffirmed on January 5, 2006 (71 FR 833) and upheld in the five-year review on August 15, 2011 (76 FR 50448). Steelhead are known to spawn and rear in numerous small tributaries associated with the lower Columbia River. Spawning habitat is not available in the action area. Spawning may occur in upstream portions of the Washougal River subbasin or in other watersheds further upstream of the lower Columbia River (LCFRB 2010). Steelhead are present primarily as upstream migrating adults and downstream migrating juveniles.

Steelhead are iteroparous (capable of spawning more than once before death) however, it is rare, especially for females, to spawn more than once before dying (Nickelson et al. 1992). Prior to making the journey to marine habitats, juveniles may spend upwards of a year or more in the mainstem Columbia River and its tributaries before rapidly entering the estuary.

Both winter and summer steelhead stocks have been identified in the Columbia River watershed (NOAA Fisheries 2016). Summer steelhead stock runs generally occur from May through October, whereas winter stocks generally time runs from November through May (LCFRB 2010). Adult migration through the action area could occur anytime of the year, due to both winter and summer stocks run being identified in the Columbia River and Camas Slough and migrating through the action area at different times to reach the nearby Washougal River. However, it is most likely that for both stocks peak juvenile out migration occurs between March to June on the rising leg of the hydrograph.

Spawning habitat is not available in the action area; the nearest spawning is believed to occur in the nearby Washougal River subbasin due to fish being released by upstream fish hatcheries or in other subbasins further upstream (LCFRB 2010).

Designated critical habitat for this species has been established in the Lower Columbia River, and areas below the OHWM in the mainstem Columbia River and major tributaries (70 FR 52630). The designated habitat includes the mainstem Columbia River, including the action area.

Steelhead are opportunistic feeders that prey upon other organisms, feeding on terrestrial and aquatic insects, microzooplankton, and forage fish. Steelhead require stream cover such as large woody debris, undercut banks, boulders, pools and side channels, or off-channel areas; these elements are limited in the action area.

The six PCEs for LCR steelhead critical habitat are as for Chinook salmon (70 FR 52630). Both the two PCEs with features that occur within the action area and the four that do not are identical to those for Chinook salmon.

4.2.6 Pacific Eulachon – Threatened

The Southern DPS of Pacific eulachon was listed as threatened on March 18, 2010 (75 FR 13012). Pacific eulachon, also known as Columbia River Smelt or Hooligan. They are present from northern California to southwest Alaska and into the southeastern Bering Sea in the Northern Pacific Ocean. Pacific eulachon are an anadromous species, typically spending three to five years in saltwater before returning to freshwater to spawn in late winter through mid-spring (LCFRB 2010). Within the

Exhibit 3 SHOR23-01

continental U.S., most Pacific eulachon production originates in the Columbia River basin. Most of the spawning occurs within the segment of the river influenced by tidal variations. Peak adult migration through the action area could occur anytime during February and March, but overall migration could occur between December and May (WDFW and ODFW 2001).

Pacific eulachon are broadcast spawners, releasing eggs over pea-sized gravel and coarse sand. Pacific eulachon prefer water temperature between 4°C and 10°C in the Columbia River for spawning (WDFW and ODFW 2001). High water temperatures are anticipated to lead to adult mortality and spawning failure (Blahm and McConnell 1971). Shortly after hatching, the larvae are carried downstream and dispersed by estuarine and ocean currents. Juveniles are reported to rear in nearshore marine waters (WDFW and ODFW 2001).

Designated critical habitat for this species has been established in the Lower Columbia River, which includes the mainstem Columbia River and major tributaries below the OHWM (76 FR 65324). The designated habitat includes the mainstem Columbia River, including the action area, up to the Bonneville Dam. The primary use of the action area is for upstream and downstream migration.

Pacific Eulachon are a cold-water species and are adapted to feed on a northern assemblage of copepods in the ocean during the critical transition period from larvae to juvenile (75 FR 13012). Pacific eulachon are an essential food source for a variety of predator species including salmon, sturgeon, dogfish sharks, halibut, whales, porpoises, seals, sea lions, and various marine birds (WDFW and ODFW 2001).

Three PCEs for Pacific eulachon critical habitat have been identified (76 FR 65324). The action area contains features of one:

- Freshwater and estuarine migration corridors free of obstruction and with water flow, quality and temperature conditions supporting larval and adult mobility, and with abundant prey items supporting larval feeding after the yolk sac is depleted.

The remaining two PCEs for Pacific eulachon critical habitat for nearshore and marine habitats that do not occur within the action area:

- Freshwater spawning and incubation sites with water flow, quality and temperature conditions and substrate supporting spawning and incubation.
- Nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival.

Exhibit 3 SHOR23-01

5.0 ENVIRONMENTAL BASELINE

This section presents an analysis of the effects of past and on-going human and natural factors leading to the current status of listed species and their habitat (including designated critical habitat) within the action area.

5.1 General Setting

The Project area lies along a portion of the Columbia River and in Camas Slough, which runs between Lady Island and the City of Camas, Washington. Currently in the action area, the river is known to fluctuate across roughly 15 feet of elevation during the annual river hydrologic cycle. There are no river dikes adjacent to the action area.

Historically, the Lower Columbia River subbasin, including the action area, experienced frequent flooding, which contributed flow to side channels and deposited woody debris, ultimately leading to habitat diversity. These areas provided feeding and resting habitat for juvenile salmonids in the form of low-velocity marshland and tidal channel habitats (Bottom et al. 2005). However, between the 1930s and 1970s, dams were built upriver of the action area on the Columbia River and its tributaries, significantly altered the timing and velocity of hydrologic flow and reducing peak season discharges. The change in hydrograph resulted in a decline of available aquatic habitat for native fish, particularly those that rely heavily on low-velocity side channel habitat for holding, feeding, and rearing.

Also, navigation management was implemented which has resulted in channelization of the of the Columbia River. Major irrigation withdraw upriver has also influenced flows. Many extents of the river's banks have been diked to provide flood protection. Due to these changes, several other aspects of aquatic habitat components have been affected including the amount and distribution of woody debris, rates and amounts of sediment transport, temperature patterns, the complexity and species composition of the food web, the distribution and abundance of salmonid predators, and the complexity and extent of tidal marsh vegetation and salinity in the estuary.

The river historically had annual spring freshet flows that averaged 75–100 percent higher than current spring freshet flows. In addition, historical winter flows (October through March) were approximately 35–50 percent lower than current flows. Importantly, these greater historical peaks encouraged greater sediment transport (ISAB 2000).

Historically, terrestrial habitat in the surrounding area was characterized by closed-canopy upland forest/woodland with patches of prairie (Hulse et al. 2002). Forest types in the region included coniferous forest with Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*), various deciduous forest including riparian black cottonwood (*Populus trichocarpa*) forest, and a variety of wetland types (Omernik 1987). Upland adjacent to the action area on the main Mill parcel along with a portion of Lady Island has been developed for industrial purposes. Residential parcels line on the north bank of the Columbia River in the action area portion downriver of Camas Slough.

Exhibit 3 SHOR23-01

5.2 Field Investigation

Biologists from Wood Environment & Infrastructure Solutions, Inc. (Wood), performed an initial field investigation of the Project area on July 16 and 17, 2019, to characterize the environment and fish and wildlife habitat, as well as to document the presence and extent of wetlands. A subsequent field investigation was performed by Wood biologists on July 22, 2020, including shoreline areas of Lady Island and Camas Slough that were not previously reviewed. Detailed information on the field effort and results is provided in the revised *In-water Overwater Removals Project Shoreline Report* (Tetra Tech 2023).

5.3 Aquatic Habitat

As stated, aquatic resources in the Project area consist of the Columbia River, including Camas Slough and wetlands along the riverbanks. The Washougal River flows into the Camas Slough at the Slough's eastern extent. The Washougal River is outside of the action area. An overview of the location of the aquatic resources identified in the Project area is provided in **Figure 2A**; additional detail is provided in **Figures 2B through 2E**. Further baseline conditions are considered for the listed species as a whole in **Appendix C**, such as subpopulation, water quality, habitat quality, channel conditions, hydrology, and watershed conditions.

5.3.1 Columbia River and Camas Slough

The Columbia River is the fourth largest river in North America. It is approximately 1,249 miles in length, draining approximately 258,000 square miles into the Pacific Ocean along the border of Washington and Oregon (Kammerer 1990). The Columbia River basin drainage consists of numerous sub-basins formed by tributaries to the mainstem river; the major tributaries consist of the Kootenai, the Flathead/Pend Oreille, the Snake, and the Willamette (BPA 2001). The lower Columbia River, in which the Project area is located, is approximately 146 miles long extending from the Bonneville Dam to the Pacific Ocean and the mouth of the Columbia River.

Camas Slough is an approximately 2.4-mile-long side channel of the Columbia River and branches from the mainstem at the tip of Lady Island forming the northern extent of Lady Island and the southern shoreline of the city of Camas. The confluence with the Washougal River occurs at the upriver end of the Camas Slough. In the Project vicinity, State Route 14 crosses the Slough twice on bridges, near the head of the Slough from Parker's Landing onto Lady Island, then travels back to the north riverbank at the Slough's midpoint (see **Figures 2A-2E**).

In the action area, the Columbia River and Camas Slough are tidal, with a mean daily tidal range of approximately 1.19 feet, and a diurnal range of 1.85 feet (NOAA Fisheries 2019). Tidal influence extends approximately 20 river miles farther upstream from the action area to head of tide at the Bonneville Dam. In general, tidal influence decreases as the volume of water increases in this system. At low water levels, the diurnal tidal fluctuation is readily observed in the action area and is not readily observed at high river stages.

Exhibit 3 SHOR23-01

Although tidal, the water in the action area is fresh as the saline wedge does not extend to influence water salinity at this location. Columbia River and Camas Slough are listed on Ecology's 303d Water Quality list of impaired waters for temperature and low oxygen.

5.3.1.1 Columbia River Sediment Quality

A *Sediment Quality Evaluation Report* by the U.S. Army Corps of Engineers (USACE 2019) for a reach of approximately 85 miles on the Columbia River Federal Navigation Channel reported that sediment grab samples taken at approximately RM 119 and 124, locations immediately adjacent and 4 miles upriver respectively to this Project, consisted of 98.0 percent coarse-grained sediment (sands and gravels) with a very low total organic content at 0.16 percent.

A sediment sampling and analysis event was performed by GP at operating Outfall 001 in 2017-2018 to comply with National Pollutant Discharge Elimination System (NPDES) monitoring requirements (ESA 2018). Sampling was designed to evaluate sediments 100 feet upriver and up to 500 feet downriver of the outfall. Sediment samples to depths of 8 inches below the surface were successfully collected.

Sediment characterization included conventional parameters (ammonia, sulfide, total organic carbon, percent total solids, total volatile solids, grain size), metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), semivolatile organic compounds, organotins, total polycyclic aromatic hydrocarbons (PAHs), organochloride pesticides, total petroleum hydrocarbons, polychlorinated biphenyls (PCBs), and dioxins/furans. No other constituents of concern (COCs) were identified as requiring analysis for this outfall.

Analysis of sediments for conventional parameters and chemical data showed that no parameter exceeded any of the Sediment Management Standards (SMS)—Freshwater Sediment Cleanup Objectives (WAC 173-204-563; Ecology 2013). Sediments consisted of sand (range: 87 to 100 percent) with up to 4 percent gravels (two samples). Total organic carbon was generally very low, with one exception with moderate organic carbon (1,300 milligrams per kilogram).

5.3.1.2 Camas Slough Sediment Quality

Sediment sampling in the Camas Slough was performed in 2009 to support dredging disposal determination, and more recent sampling was done for NPDES compliance. Sediment characterization included conventional parameters (ammonia, sulfide, total organic carbon, percent total solids, total volatile solids, grain size), metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), semivolatile organic compounds, organotins, total PAHs, organochloride pesticides, total petroleum hydrocarbons, PCBs, and dioxins/furans. No other COCs were identified as requiring analysis for this outfall. Analysis of sediments for conventional parameters and chemical data showed that no parameter exceeded any of the SMS—Freshwater Sediment Cleanup Objectives (WAC 173-204-563).

5.3.2 Wetland Habitat

Wetland habitat within the action area occurs at the river margin along Lady Island and the Mill parcel riverbanks. Within the action area, seven wetland areas were delineated and classified in July 2019 and July 2020 and additional details on each of the wetlands are provided in the revised *In-water Overwater Removals Project Shoreline Report* (Tetra Tech 2023). **Figure 6** shows the locations of each of the wetlands.

None of the wetland areas were inundated during the low flow/low tide conditions present during the 2019 field investigation. Wetland areas were partially inundated during the July 2020 field investigation due to the later timing of snowmelt that year. These wetland areas are seasonally inundated for long durations from November to May in most years, with the timing, duration, and depths dependent on weather patterns. Wetlands were categorized as *tidal riverine emergent wetlands* using the Cowardin Classification, and as *Tidal Riverine* using the Hydrogeomorphic Classification system. By definition, riverine wetlands extend waterward to the point where deep water prevents persistent rooted vegetation, and the area transitions to unconsolidated aquatic bed, usually at about 6 feet of water depth.

Wetland plant communities were characterized mainly with emergent sedge species (principally *Carex aquatilis*) at the lower shoreline, transitioning up bank to the invasive shrub species, indigo bush (*Amorpha fruticosa*) and, in some areas, reed canarygrass (*Phalaris arundinacea*).

Indigo bush, which is a facultative wetland plant, was also common above the wetland boundaries throughout the riverbank, where the plant appears able to grow well from the limited spaces between riprap. These riprap areas supporting indigo bush were determined to not have wetland soils due to the preponderance of rock and were not considered to be wetland areas.

Long stretches of unvegetated gravel bar and naturally rock riverbank separate the wetlands from each other. While these rocky locations met the definition for wetland hydrologic conditions, they were determined to not have hydric soils and not support hydrophytic vegetation.

5.3.3 Water Quality

The Columbia River mainstem water temperatures at Washougal, Washington, range from approximately 6°C (43°F) in early spring to approximately 22°C (72°F) in late summer (USGS 2019). Temperatures in the action area are assumed to be comparable to or higher than those within Camas Slough. For at least some of the year, water temperatures exceed the Matrix of Pathways and Indicators standards of 48°F for spawning, 54°F for rearing, and 41°F for incubation (see **Appendix C**).

Additionally, the Columbia River (Friendly Reach) is on Ecology's 303(d) list for temperature and the mainstem Columbia River in water resource inventory area 28 is listed for temperature (Ecology 2020). The U.S. Environmental Protection Agency has approved total maximum daily loads for dioxin and total dissolved gas in the Columbia River (ODEQ 1991; Ecology and ODEQ 2002). Chemical contamination of river systems in the action area occurs mostly through stormwater runoff from upland areas, industrial and agricultural areas, and urban development.

5.4 Vegetation and Soils Adjacent to the Action Area

The analysis area consists primarily of riparian habitat associated with the Columbia River. Vegetation in the vicinity of the mill is generally sparse to absent around the structures to be removed. Wherever plant communities are present, they are generally composed of predominantly weedy and invasive species.

Large portions of the action area consist of an aquatic bed with waters deep enough to lack a vegetation community. Riparian vegetation adjacent to the action area is generally characterized as disturbed habitat. Riverbanks along main Mill area consist of fill, are generally steep, support a variety of docks, and are generally armored with boulder-sized riprap.

Where vegetation is present, the areas support nonnative plants with few native plant species including non-native Himalayan blackberry (*Rubus armeniacus*) with indigo bush (*Amorpha fruticosa*) starting near the OHWM and extending to native and weedy herbaceous vegetation at the lower shore in some locations. Along portions of the riverbank, the lower shore consists of rocks with minimal to no vegetation or fine sediment. Vegetation growing along riverbanks adjacent to in-water removals includes Oregon ash (*Fraxinus latifolia*), Douglas-fir, western redcedar (*Thuja plicata*), various willows (*Salix* spp.), big-leaf maple (*Acer macrophyllum*) and cottonwoods (*Populus* spp.), along with some native understory trees and shrubs such as snowberry (*Symphoricarpos albus*) and red-osier dogwood (*Cornus stolonifera*).

Soils and sediments in riverbeds are not mapped by NRCS, but soil on the riverbank within the main Mill area are mapped as Fill Land representing areas developed with non-native soil materials (NRCS 2019). Other riverbank portions adjacent to the action area were mapped as either Newburg silt loam or Sauvie silt loam series. The north bank and the Lady Island riverbank were mapped as Newburg silt loam series, while the western extent of Lady Island and the area in the vicinity of the Riverbank Pumphouse were mapped as Sauvie silt loam series (maps are provided in the revised *In-water Overwater Removals Project Shoreline Report* [Tetra Tech 2023]).

Newberg silt loam series soils are somewhat excessively drained and located on floodplains with slopes of 3 to 8 percent. They are formed in loamy and sandy alluvium derived from mixed sedimentary and basic volcanic rocks. The soils are subject to frequent to occasional flooding from December through March.

Deep, poorly drained Sauvie silt loam series soils are also mapped on floodplains. This hydric soil is saturated to the surface in most years from December to March and subject to overflow tidal flooding. Sauvie soils form in mixed alluvium with volcanic ash on flat to 3 percent slopes. When artificially drained and protected from flooding, both soils are used for agriculture. Mapping of Sauvie series soils on Lady Island by NRCS largely coincides with provisional identification of wetland areas by the City of Camas.

Ecology has assigned soils on the main Mill parcel as Site No. 15156 for potential presence of hazardous substances regulated under Washington State's Model Toxics Control Act. The presence of contaminants on the parcel has not been evaluated at this time and no other contaminated or potentially contaminated sites are listed in the Project action area.

Exhibit 3 SHOR23-01

5.5 Timing of Species Presence

As stated, all six listed fish species retained for further evaluation (bull trout; Chinook, chum, and coho salmon; steelhead; and Pacific eulachon) are migratory through the action area, as a result one or more ESA-listed species would be likely present in any month (**Table 11 and Table 12**).

Table 11. Adult Upstream Migration Through Action Area

Fish Run	Fish Run Timing[1/]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fall Chinook Salmon												
Chum Salmon												
Coho Salmon												
Winter Steelhead												
Summer Steelhead												
Bull Trout												
Pacific Eulachon												

Note
1/ ESA listed fish run timings obtained from NOAA Fisheries (2020) and the Lower Columbia Fish Recovery Board (LCFRB 2010).

In summary, for adult migration, bull trout migrate through the action area to upstream spawning areas in summer to fall, usually around April to September. Peak Chinook adult migration occurs from August to October, while peak adult chum migration occurs from mid-October to November, and peak adult coho migration occurs from August to January. Steelhead are migratory in the action area and include both summer and winter stocks, running generally November through May and May through October, respectively. Because both winter and summer steelhead stocks occur in the action area, upstream migration of adults occurs throughout the year. In addition to salmon, adult Pacific eulachon are migratory in the action area between December and May.

Table 12. Juvenile Downstream Migration Through Action Area

Fish Run	Fish Run Timing[1/]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fall Chinook Salmon												
Chum Salmon												
Coho Salmon												
Winter Steelhead												
Summer Steelhead												
Bull Trout												
Pacific Eulachon												

Note
1. ESA listed fish run timings obtained from NOAA Fisheries (2020) and the Lower Columbia Fish Recovery Board (LCFRB 2010).

In addition to adult migration through the action area, one or more outmigrating juveniles may be present in all months except December, with most of the juveniles migrating downriver with and following the spring freshet. Bull trout juvenile outmigration is likely to occur between April to

November but could occur at any time as they spend about one to three years in their natal streams prior to emigration. Peak Chinook juvenile outmigration occurs from May to mid-August, peak juvenile chum outmigration occurs from March to May, and peak juvenile coho outmigration occurs from April to June. Steelhead include both summer and winter stocks, however, they spend about one to three years in freshwater prior to emigration. Therefore, steelhead juveniles could occur throughout the year, but peak juvenile outmigration is likely to occur between March to June. Pacific eulachon larval outmigration occurs between January to June.

Note that as stated earlier, there is no spawning habitat for any of the ESA-listed fish species in the action area.

Exhibit 3 SHOR23-01

6.0 ANALYSIS OF EFFECTS

This section identifies and analyzes the reasonably foreseeable direct, indirect, and cumulative effects of the proposed activity on listed species or designated critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline (50 CFR 402.02). Proposed activities would result in direct effects on the action area that may affect listed species. Indirect effects are those that are caused by the proposed action and occur later but still are reasonably certain to occur, or that may result from effects on a prey species or an important habitat element. Indirect effects are likely to result from the proposed Project and may affect listed species.

Cumulative effects are future state, tribal, local, and private activities that are reasonably certain to occur within the action area and are likely to affect the species. An interrelated action is one that is part of a larger action and depends on the larger action for its justification. An interdependent action is one that has no independent utility apart from the proposed action.

Potential Project-related effects are similar to all ESA-listed fish species and involve potential temporary impacts that result from in-water work and other demolition-related disturbances in the action area. Potential long-term beneficial effects result from the Project due to a reduction in riverbed obstructions, reduced artificial shading by structures, reduced artificial avian perches, reduced predator refugia, riverbank reshaping, and removal of potentially hazardous materials from the aquatic environment.

6.1 Direct Effects

Environmental stressors may occur as an intense, short-lived event of destruction, also known as a disturbance. This is caused by the act of demolition, dredging, reshaping of the shoreline, and barge traffic. The potential effects of these stressors can include injury and/or mortality, temporarily being startled, disruption, and temporary change of habitat used by the ESA-listed species. However, the effect of the action can also have permanent direct effects that lasting effects post demolition. These effects were determined by a variety of factors including assessing the species use of the habitat and their sensitivity to such factors such are noise, turbidity, and predation by predators. Potential direct effects on all listed species would occur due to the Project activities are summarized in **Table 13**.

Table 13. Potential Effects of the Action

Environmental Stressor	Potential Effect
Noise	Injury and/or mortality, startle, disruption of behavior, temporary change of habitat for all listed species.
Water Quality	Injury and/or mortality, startle, disruption of behavior, temporary change of habitat for all listed species.
Chemical Contamination	Temporary disruption of behavior and change of habitat for all listed species. Permanent reduction in creosote timbers from the aquatic environment.
Human Disturbance	Temporary disruption of behavior and change of habitat for all listed species.
Aquatic and Avian Predation	Permanent reduction in refugia for aquatic predators and perches for avian predators.
Alteration of Aquatic Environment	Temporary disruption of behavior and change of habitat for all listed species. Followed by permanent reduction of shading and rubber tires. Overall improvement of existing habitat.

Exhibit 3 SHOR23-01

6.1.1 Hydroacoustic Impacts

This section of the BA uses metric distances for noise, consistent with industry practices. NOAA Fisheries has used sound threshold levels for fish since 2005, and these criteria were revised in 2008 (FHWG 2008).

Table 5 provides the current thresholds for underwater noise levels by functional group for fish. These thresholds represent levels of noise that produce either a behavioral disturbance (e.g., disruption of migration or foraging) or injury (e.g., internal tissue damage, hearing loss, or death) to fish within the threshold radius (Hastings and Popper 2005).

Direct injury to, mortality of, or behavioral disturbance in fish species may result from sound levels produced by impact pile driving (hoe-ram operation), vibratory pile driving, and other in-water demolition techniques used for the removal of in-water structures in Camas Slough and the Columbia River. Impacts associated with impact pile driving (hoe-ram operation) may include physical injury (particularly to air-filled spaces such as swim bladders), auditory tissue damage, temporary or permanent hearing loss, behavioral effects, and immediate and delayed mortality. The amount of energy and the resulting sound pressure from this activity depends on the size and type of pile, energy of the hammer, depth of the water column, and substrate. Impacts on individual fish depend on sound pressure levels, fish species, fish size, fish condition, and depth of the water column (Popper et al. 2006).

During in-water demolition activities. fish would be subject to disturbance as a result of machinery, as described in Section 3.1.2. Depending on the size of the pile, vibratory hammers produce a disturbance effect at a maximum distance of up to 100 meters (328 feet) from the pile. Removal of piles via vibratory hammer would result in fish disturbance, but not in fish injury. No attenuation would be used for vibratory hammer pile removal.

Fish would be subject to noise impacts from vibratory removal activities frequently during the removal of piles. Vibratory hammer operation for removals of piles could occur up to approximately 8 to 10 hours per workday and could occur during any hour of the day. All of the fish species and life stages of salmon, steelhead, and Pacific eulachon (see **Table 11 and Table 12**) could be exposed to this effect when they are present in the action area. However, because fish kills attributed to the use of a vibratory hammer have not been documented, this activity is unlikely to injure fish, and is not expected to significantly interfere with behaviors such as migration, rearing, or foraging. Thus, vibratory pile removal is not likely to adversely affect any of these species.

In-water demolition activities also include the removal of the Berger crane foundation and the Dock Warehouse Piers. A hoe-ram operation would be limited to the area where concrete exists and cannot be successfully removed by other methods. A worst-case estimate shows that if the operation of the hoe-ram were to be utilized for all cement demolition, it would occur over approximately 30 workdays, be generally used above the waterline. No attenuation would be utilized, as the sound would be stopped primarily by nearby land.

Exhibit 3 SHOR23-01

Use of hoe-ram operations with no attenuation for the Berger crane foundation removal would result in maximum noise impacts estimated to include:

- Fish injury to all sizes of fish at peak (instantaneous) sound levels up to 10 meters (33 feet) from the activity,
- Cumulative injury to fish greater than or equal to 2 grams in size, up to 125 meters (410 feet) from concrete removal activity,
- Cumulative injury to fish less than 2 grams in size up to 230 meters (755 feet) from removal activity, and
- Disturbance to all fish regardless of size up to 2,512 meters (8,241 feet) from removal activity.

Fish would be subject to noise impacts from hoe-ram operation activities for approximately 8 to 10 hours per workday, spread over approximately 30 days of work (not necessarily consecutive). These impacts would be minimized by using the hoe-ram operation only where concrete removal is required, and where no other removal alternative for removal exists, and would be limited to occurring during the in-water work window as set by the agencies.

The use of the hoe-ram is likely to adversely affect individuals of all listed salmon, steelhead, and Pacific eulachon present in the areas exposed to noise above the injury threshold and disturbance guidance during these activities. See **Tables 11 and 12** for the species and life stages that occur throughout the year in the action area that could be exposed to this effect.

Due to the extremely limited numbers of bull trout present in the action area, the risk of exposure is discountable. Thus, both the vibratory hammer and hoe-ram operation are not likely to adversely affect bull trout.

Saw cutting would be utilized if concrete pilings accidentally break while being removed from the water. Additional sources of noise that could permeate underwater include dredging and the use of barges. However, these activities would be limited by an in-water work window when the migration of adults and juveniles is least likely to occur. Therefore, these activities are not likely to adversely affect any of these species.

6.1.2 Water Quality

The proposed activities include temporary disturbance of soils and sediments during removal of piles and demolition of structures, and restoration of shoreline at and above the OHWM. The movement of these materials could result in erosion from disturbed or loosened soils and increase the sediment load in runoff that may enter Camas Slough or the Columbia River or ditches within the action area. Removal of structures and pilings below OHWM may mobilize existing bottom sediments and lead to increased turbidity and sedimentation of the action area. Sedimentation and turbidity can increase scour potential, alter shoreline vegetative structure, and affect primary food production and fish feeding efficiency. High turbidity may also impair respiration in salmonids. The timing of construction would be designed to minimize in-water disturbance by limiting the in-water work period to low tide times and low-flow conditions during the agency-established fish window. With these measures in

Exhibit 3 SHOR23-01

place, sedimentation and turbidity effects would be short-term and minimal throughout the in-water demolition phase.

The use of heavy equipment brings the unlikely but potential risk for hazardous materials such as fuel, oils, or hydraulic fluids to enter the surrounding environment. Such an introduction could degrade water quality or be toxic to fish. BMPs would be implemented, and spill prevention and management measures would be incorporated during construction to further reduce the risk to the environment in case of an inadvertent spill (see Section 2.7 for impact minimization and avoidance measures). Potential effects on water quality as a result of the introduction of contaminants such as fuel or oil are expected to be insignificant given the small quantity possible and short-term during the construction phase.

Potential impacts from dredging of contaminated sediments are more difficult to assess. Most of the information concerning the effects of contaminated sediments on marine organisms deals with the impacts of settled sediments. Few studies have dealt with resuspended contaminated sediments. Organisms exposed to resuspended contaminated sediments can develop physiological problems due to direct exposure to dissolved contaminants or bioaccumulation of metals and organic chemicals. However, much of the data suggest that significant adverse impacts do not occur at resuspended sediment concentrations and durations typically associated with dredging Projects. In general, previous studies indicate that potential effects from dredging are transient and not significant (Anchor 2003).

Short-term contaminant risks can be expected primarily from increases in water-column exposure. In most situations where sediment contamination is from historical chemical releases, contaminant partitioning behavior and disequilibrium between the water column and sediments results in contaminant concentrations in the water column that are far lower than those in the sediment interstitial water. Dredging and resuspension will introduce interstitial water into the water column, as well as facilitate desorption of contaminants from suspended sediment particles into the water column. The resulting increase in water column exposure can result in adverse effects to aquatic biota either through direct toxicity to the exposed organisms, or by increasing tissue residues of bioaccumulative contaminants within the food chain (Bridges et al. 2008).

6.1.2.1 General Effects of Turbidity on Fish

Turbidity is a naturally occurring phenomenon in the Columbia River, especially with increased flows during the spring due to snow melting, controlled releases by the various dams along the river, and storms that may occur any time of the year. Several factors contribute to turbidity levels in the water, including suspended sediments, dissolved particles, finely divided organic and inorganic matter, chemicals, plankton, and other microscopic organisms. While not all of these materials may be harmful to fish, it is known that high levels of turbidity can be fatal to salmonids. However, salmonids also can be affected by turbidity at relatively low levels (Lloyd 1987). Juvenile salmonids have been observed in naturally turbid estuaries and highly turbid glacial streams; this indicates that they can cope with elevated turbidity during certain life stages (Gregory and Northcote 1993, cited in Bash et al.

Exhibit 3 SHOR23-01

2001). In contrast, salmonids not normally exposed to elevated turbidity levels may be adversely affected at relatively low levels (Gregory 1992, cited in Bash et al. 2001).

Several factors play a role in determining the severity of effects, such as turbidity level, the extent of the turbidity plume, duration and frequency of exposure, the toxicity and angularity of the particles, life stage of the fish, and access of "turbidity refugia" (Bash et al. 2001). Turbidity above background levels may have the following effects on fish, depending on the amounts and length of exposure: direct mortality, gill tissue damage, physiological stress, and behavioral changes.

Direct Mortality: Direct mortality from extremely high levels of suspended sediment has been demonstrated. However, the concentrations at which mortality occurred were far higher than those typically occurring during dredging operations. Laboratory studies have consistently found that the 96-hour median lethal concentration for juvenile salmonids is above 6,000 milligrams per liter (mg/L) (Stober et al. 1981; Salo et al. 1980). Based on an evaluation of seven clamshell dredge operations, LaSalle (1988) determined that the upper limits in suspended sediment levels were 700 mg/L and 1,100 mg/L at the surface and bottom of the water column, respectively (within approximately 300 feet of the operation). Concentrations of this magnitude could occur at sites with fine silt or clay substrates, which are not typical of the Project site. Because direct mortality occurs at turbidity levels that far exceed those of typical dredging operations, direct mortality from suspended sediment is not expected to occur during Project construction.

Gill Tissue Damage: When the filaments of salmonid gills are clogged with sediment, fish attempt to expunge the sediment by opening and closing their gills excessively, in a physiological process known as "coughing." In response to the irritation, the gills may secrete a protective layer of mucus. Although this may interfere with respiration, it is not a lethal effect (Berg 1982, as cited in Bash et al. 2001). Servizi and Martens (1992) noted a significant increase in coughing in sub-yearling coho when turbidity measured 30 Nephelometric turbidity units. Redding et al. (1987) also found that the appearance of gill tissue was similar for control fish and those exposed to high, medium, and low concentrations of suspended topsoil, ash, and clay. Based on the results of these studies, juvenile and subadult salmonids, if present, are not expected to experience gill tissue damage even if exposed to the upper limit of suspended sediment expected to be generated by dredging and debris removal. Further, adult salmonids, if present, would be expected to avoid areas with less than favorable conditions and would, therefore, tend to avoid potentially harmful conditions.

Physiological Stress: Exposure to approximately 500 mg/L of suspended sediment for two to eight consecutive days has been found to cause stress in salmonids (Redding et al. 1987; Servizi and Martens 1987). These studies found no significant difference in blood plasma glucose concentrations at concentrations of 150 to 200 mg/L of glacial till. These results suggest that the upper limit of suspended sediment near dredging activity (700 to 1,100 mg/L for very fine substrates) can cause stress in juveniles if exposure continues for an extended time. Continued exposure, however, is unlikely due to the tendency for salmonids to avoid areas with elevated suspended sediment concentrations (Salo et al. 1980). While sediment concentrations in the Project area may reach an upper limit (700 to 1,100 mg/L for very fine substrates) of suspended sediment during dredging and debris removal activities, it is expected that concentrations would occur for a shorter period than two

Exhibit 3 SHOR23-01

to eight consecutive days. Concentrations of suspended sediment caused by pile removal and other demolition related activities would be too low to cause stress in salmonids.

Behavioral Changes: Behavioral responses to elevated levels of suspended sediment include feeding disruption and changes in migratory behavior (Servizi and Martens 1987). Several studies indicate that salmonid foraging behavior is impaired by high levels of suspended sediment (Bisson and Bilby 1982; Berg and Northcote 1985). Redding et al. (1987) found that yearling coho and steelhead exposed to high levels (2,000 to 3,000 mg/L) of suspended sediment did not rise to the surface to feed. However, yearling coho and steelhead exposed to lower levels (400 to 600 mg/L) actively fed at the surface. The results of these studies suggest that the thresholds at which feeding effectiveness is impaired exceeded the upper limit of expected suspended solids during dredging and pile removal. Therefore, significant changes in feeding are not expected.

Additionally, adult salmonids are not necessarily closely associated with the shoreline and would be less vulnerable to adverse impacts should they encounter turbid conditions. Whitman et al. (1982) used volcanic ash from the eruption of Mount Saint Helens to recreate highly turbid conditions faced by returning adult salmon. Their study found that adult Chinook was able to detect natal waters through olfaction even when subjected to seven days of total suspended sediment levels of 650 mg/L. Suspended sediment levels are not expected to reach that level and salmonids would tend to avoid areas with higher concentrations of sediment; therefore, no changes in migratory behavior are expected due to Project construction. In addition, all construction would be scheduled to occur within approved windows for construction which minimizes the number of fish potentially exposed to any increases in turbidity.

6.1.3 Chemical Contamination

Numerous potential sources of chemical contamination are associated with in-water work in the Columbia River and Camas slough from the demolition activities:

- Equipment located in or over the water (such as barges or equipment operating on barges, temporary work platforms, and existing structures) are potential sources of contamination.
- Demolition of structures would occur both in and over the water and may release contamination such as concrete debris, concrete dust created by saw cutting, and possibly lead paint.
- Approximately 3,000 piles, of which approximately 2,000 are timber piles, are proposed for removal. It is assumed that these piles have been chemically treated, based on their age and intended purpose. Contaminants from the piles could be mobilized during demolition and/or removal of the piles.

The majority of demolition would occur in the Camas Slough along the riverbank and along the river bottom. Demolition would occur on the riverbank. Breaking up the Berger crane foundation or the Dock Warehouse piers with a hoe-ram operation, excavator, or saw cutter could potentially introduce concrete dust and debris into the water; however, because of the containment proposed, debris booms and turbidity curtains would be used to retain suspended sediments and potential debris reducing the extent and duration of effects from materials that may enter the water.

Exhibit 3 SHOR23-01

The primary effect of removing piles is the temporary suspension of sediment, which may result in increased levels of turbidity and/or potential release of any contaminants contained in disturbed sediment. Throughout the Project area sediments have been determined to be comprised of coarse-grained materials, with up to 80 percent sand in many locations. This coarse material does not remain in suspension due to its size and settles out quickly, limiting both the extent and duration of turbidity when disturbed. In addition, low levels of organic matter content in most locations limit the surface areas available for chemical adsorption, which reduces the likelihood of long-term chemical retention in sediments.

Sediment in Camas Slough and Columbia River in the Project area has been tested repeatedly prior to annual dredging events by GP and others and has been generally demonstrated to not contain any chemicals of concern at levels above state regulatory levels.

Suspended sediment may hamper adult salmon respiratory function, potentially stalling migrating salmon in the mouths of rivers or streams while waiting for water to clear. Increased turbidity also may hinder juvenile foraging ability or affect the distribution of prey species. Conducting demolition during low water would reduce potential sediment impacts by allowing work to occur in the dry.

Hydrocarbons can leach from treated piles into the surrounding aquatic environment, soils, and benthic organisms during the life of the pile, potentially causing adverse effects on fish and benthic invertebrates. Sediments in direct contact with treated piles have increased likelihood of creosote concentration, so any removed treated wood piles would be placed directly in a containment area (barge deck) without any attempt to clean debris attached to the pile. Impacts from broken piles would likely be minimal, as floating debris would be collected inside the float containment boom and collected for disposal.

It is assumed that approximately 2,000 timber pilings to be removed have been chemically treated using a wood preservative such as creosote. The primary chemical of concern in creosote is polycyclic aromatic hydrocarbons, which can leach into the substrate surrounding each pile. Removal of these piles has the potential to temporarily adversely affect fish species present through increased suspended sediment resulting in exposure. However, fish are at lower risk than mollusks and benthic organisms, since fish have some ability to metabolize and excrete polycyclic aromatic hydrocarbons. Removing treated piles would improve the surrounding aquatic environment over the long term through the removal of contaminated sediment. No containment is proposed for the removal of the timber pilings; however, the high flow in the Columbia River would be highly likely to dilute any contamination encountered, and the extent of the contamination is expected to be minimal.

In general, construction equipment operating on land poses a low risk of releasing chemical contaminants (such as petroleum fuel, other fluids, and from erosion of the shoreline) that could enter surface water bodies by way of stormwater inlets, ditches, or other forms of conveyance. Implementation of an SPCC and erosion control plan would minimize the risk of contaminants entering the water from land and would ensure that the risk of contaminant release is discountable. Overall, this aspect of the Project is unlikely to adversely affect any listed fish.

Exhibit 3 SHOR23-01

6.1.4 Human Disturbance

In-water disturbance during construction may disturb salmonids such that they avoid the Project area because of human disturbance. Work is proposed to occur during the approved in-water work window during low-flow conditions. However, salmonids have the potential to occur year-round in the action area and may be migrating through the area during the construction time frame. Therefore, there is potential to encounter and possibly injure individual salmonids during the removal of pilings, demolition of structures, and removal of debris. These could result in temporary direct impacts on salmonids during construction activities.

6.1.5 Aquatic Predation

Several studies have shown that overwater structures in fresh water increase the vulnerability of salmonids to predators by creating favorable predator habitat. Northern pike minnow associate with back-eddies or the edges of shear flow areas created by pilings in free-flowing areas while other predators associate with the dock structure itself (Petersen and Ward 1999). Large- and smallmouth bass have been documented utilizing overwater structures for foraging and spawning (Kaher et al. 2000). Juvenile Chinook salmon are the salmonids most likely to be found near overwater structures in the littoral zone. Nearshore habitats in the main-stem Columbia River are critically important for subyearling fall Chinook salmon (Dauble et al. 1989; Rondorf et al. 1990). Since juvenile Chinook salmon use the littoral zone as rearing habitat, they are most vulnerable to predators. After subyearlings become larger than 60 to 70 millimeters, they tend to move into deeper water which greatly reduces their vulnerability to predators in littoral zones and around docks (Chapman 2007).

Overwater structures may increase predation on juvenile salmonid salmon in several ways which include providing cover and preferred refugia for ambush predators such as bass, create shaded areas that increase a predator's capture efficiency of pray, and interrupt migration routes. The additional time spent navigating around these structures increase exposure to predators in these areas. In addition, changes in substrate, aquatic vegetation, and ambient light caused by overwater structures may indirectly increase predation through ecological interactions.

Northern pikeminnow and smallmouth bass are the primary predators that use the nearshore littoral zone. Northern pikeminnow feed primarily on juvenile salmonids (Petersen et al. 1993) and are the primary predator of juvenile salmonids in Columbia River reservoirs (Beamesderfer and Rieman 1988; Poe and Rieman 1988; Poe et al. 1991; Zimmerman 1999).

As the salmon migrate downstream, they increase in size and move farther offshore. Studies conducted upriver in McNary Reservoir and the Hanford Reach of the Columbia River found that subyearling Chinook salmon favored water less than 2 meters deep with low lateral bed slopes and water velocities less than 0.4 m/s (Vendetti et al. 1997; Tiffan et al. 2002). These shallow shoreline habitats with low velocities and slopes likely provide refuge from predatory fish that may be too large to enter very shallow water. Differences in habitat associations of subyearling Chinook salmon and their primary predators help to reduce predation on Chinook, although structures may also attract predators. Subyearling Chinook salmon prefer sandy or small gravel/cobble substrate and avoid complex habitats such as bedrock cliffs and riprap (Key et al.1996; Garland and Tiffan 2002).

Exhibit 3 SHOR23-01

Northern pikeminnows, the primary predator of juvenile salmonids, tend to occupy free-flowing areas with low-velocity (1-foot per second or less) microhabitats and back-eddies (Beamesderfer and Rieman 1988; Petersen et al. 1993). Pilings supporting overwater structures tend to create backwater, low-velocity habitat which is preferred by these predators. Due to the reduction is overwater structures and pilings within the water this is considered a long-term direct benefit to salmonids.

6.1.6 Avian Predation

Predatory birds are sometimes attracted to in-water structures such as pilings. They will congregate on these man-made structures and use them as an artificial perch point. Since birds congregate where prey is abundant, these perches could provide them with the opportunity to prey on juvenile salmon migrating through the action area. Upstream of Bonneville Dam, predation by birds (particularly terns and cormorants) can be substantial, but predation in the lower Columbia River is generally very low (Evans et al. 2012). Since the Columbia River is both wide and deep in the Project area, young fish will not tend to be concentrated, reducing the attractiveness of the site to predatory birds.

The effects of overwater structures on the relationship between salmonids and avian predators are widely recognized but have not been subject to extensive study (Carrasquero 2001). Some birds may use the Project facilities as perches, but it is unlikely that the presence of birds will result in the predation of substantial numbers of salmonids as they move downriver. While the research is limited in regard to actual predation by birds, this Project intends to remove a significant number of pilings that currently provide perch points, and therefore benefit young fish migrating through the Camas Slough and Columbia River channel. Thus, this is considered a long-term direct benefit to salmonids.

6.1.7 Alteration of Aquatic Environments

Aquatic habitats within the action area have been previously disturbed by historic and current uses. Wood mill operations throughout the area required the installation of dolphins, pilings, and pipelines to support structures and infrastructure as well as historic log driving for mill operations. Much of these activities were outside of wetland areas but within the aquatic habitats of Camas Slough and Columbia River. Treated wood pilings have been identified as sources of contamination through the release over time of metals, polycyclic aromatic hydrocarbons, and metal oxides, depending on the treatment method (WDFW 2006; Werme et al. 2010; Hutton and Samis 2000). The physical structure of pilings and dolphins also may affect microhabitats by increasing shading and local scour, including impacts on shoreline stability (WDFW 2006; Werme et al. 2010).

Removal of dolphins and pilings would result in temporary disturbance and water quality impacts such as increased sediment, as described above, but would also result in permanent habitat improvement. The action of removing treated wood pilings and dolphins may result in a temporary release of contaminants through disturbance of contaminated sediment and exposure of previously buried treated wood, which can act as fresh creosote upon exposure to oxygen in the water (Seattle Public Utilities 2015). Potential effects on aquatic habitats as a result of disturbance of contaminated sediments are expected to be insignificant based on the age of most of the pilings and would not be discernible on the individual level. Removal of treated pilings and dolphins removes these sources of

contamination. Over the long term, the concentration of contaminants in the sediment would decrease, water quality would improve, and the pathway of exposure for fish through contamination of prey and forage would be reduced. Removal of dolphins and pilings is expected to benefit aquatic habitats in the long term.

6.2 Indirect Effects

Indirect effects result from the proposed action but occur at a later time or place, but which are still reasonably certain to occur. Specific elements of the Project that may cause indirect effects on fish include the following:

- Temporary increase in turbidity and/or pollutants due to sediment disturbance, inadvertent introduction of debris and/or contaminants into the action area (e.g., petroleum products from equipment).
- Temporary disturbance to prey/food sources down or upriver from in-water work activities.
- Temporary disturbance to migration of adults and outmigration of juveniles using Camas Slough as a thoroughfare to reach the Washougal River.

6.2.1 Water Quality

Removal of pilings and structures may result in increased turbidity from disturbance of sediment and could result in increased sediment load from runoff that may enter the Columbia River or Camas Slough within the action area. Increased turbidity may result in prey/food sources avoiding the Project area, which would indirectly affect salmonids by relocating their food source or screening food sources.

Sedimentation and turbidity can alter the riparian vegetative structure and primary food production, and also could alter the prey/food source population for salmonids. For this Project, sedimentation and turbidity impacts would be short-term, occurring primarily during the construction phase. Following construction, the aquatic habitat would likely re-equilibrate within hours to conditions suitable for primary food production. Therefore, these potential impacts on water quality are considered temporary indirect effects on salmonids.

6.2.2 Altered Predator-Prey Relationships

The potential loss of some salmonid prey due to siltation and substrate disturbance may occur during structure and pile removal. However, there would likely be minimal to no effects on predator-prey relationships for rearing anadromous fish after demolition is complete. Short-term impacts due to increased siltation would likely diminish over time and not cause any long-term changes to foraging behavior or prey availability.

6.2.3 Washougal River Migration

The published federal in-water work window for the Columbia River is from November 15 to February 28, in any given year. However, the nearby Washougal River has a much shorter in-water work window

of August 1 to August 31 (WDFW 2018). While the action area does not extend to the mouth of the Washougal River, multiple salmon species are known to use the Camas Slough as a migrating channel to reach the Washougal River as adults and to out-migrate back into the Columbia River towards the ocean as juveniles. Therefore, it is likely that species that are migrating as adults to the nearby Washougal River are likely to pass through the action area around the in-water work window set for the Washougal River and would likely be within the river for spawning well after August and would less likely being residing in Camas Slough.

In-water work could have a temporary indirect effect on salmonids accessing the Washougal River as it could delay late-returning adults or early-outmigrating juveniles. However, this would a temporary impact while in-water work is occurring, and the Project is working with the agencies to determine the most suitable in-water work window to minimize impacts on salmon migration.

6.2.4 Human Disturbance

As discussed, short-term effects of excavation, demolition, dredging and fill placement include temporary reduction in water quality parameters such as increased turbidity, which may result in temporary disturbance to aquatic species including causing prey/food sources for salmonids to avoid the area during construction activities.

Placement of fill within Camas Slough below the OHWM to restore riverbed contours may result in long-term indirect effects to salmonids by facilitating altered hydraulic flows that could result in new current patterns to emerge, alter sediment deposition, and resultant riverbank vegetation development and habitat for fauna and prey/food sources, resulting in a net increase in available potential habitat for vegetation and prey/food sources.

6.3 Critical Habitat Effects

Critical habitat has been designated within the action area for the listed species retained for further evaluation. Because construction noise is anticipated to permeate into aquatic environments (see Section 3.1.2), noise impacts on listed fish species and critical habitat were evaluated.

The proposed construction activities have the potential to temporarily increase sedimentation and turbidity through in-water work, sediment and soil disturbance, and removal or alteration of the shoreline in the Project area. The proposed demolition activities would remove or alter the shoreline and portions of the aquatic bed to accommodate the removal of pilings and structures, including debris removal. In-water work also may result in temporary prey/food sources avoiding the Project area. These effects are considered temporary and are anticipated to be insignificant given the size of the Project area and action area within the riverine habitat, and provided that construction planning, minimization measures, and BMPs are implemented to further minimize effects. With these measures in place, no long-term negative effects on PCEs for bull trout; Chinook, chum, and coho salmon; steelhead; or Pacific eulachon critical habitat are anticipated to occur as a result of the proposed construction.

6.4 Summary of Effects on Habitat Pathways and Indicators

A checklist is provided in **Table 14** to address each habitat parameter for potential effects of the proposed construction activities on the action area reach and downstream habitat of the listed species retained for further evaluation. The proposed construction activities have the potential to temporarily affect select habitat parameters, such as temporary increases in sedimentation and turbidity, the potential for minimal, temporary adverse effects in the case of inadvertent spills (e.g., fuel or oil from construction equipment), and temporary disturbance to food sources. Temporary effects are anticipated to be minimized through the use of construction planning and timing, as well as implementation of BMPs. No long-term degradation of habitat parameters is anticipated to occur as a result of the proposed construction. However, as a result of this Project several parameters could be restored with the removal of in-water structures and overwater structures that currently reside along the Camas Slough riverbank.

Table 14. Summary of Potential Project Effects for all ESA Listed Species' Habitat

Habitat Parameter	Effects of the Action		
	Restore	Maintain	Degrade
Subpopulation Characteristics			
Subpopulation size		x	
Growth and survival		x	
Life history diversity and isolation		x	
Persistence and genetic integrity		x	
Water Quality			
Temperature		x	
Sediment		x	
Chemical Contamination	x		
Habitat Access			
Physical Barriers	x		
Habitat Elements			
Substrate		x	
Large Woody Debris Quantity		x	
Pool Frequency and Quality		x	
Large Pools		x	
Off-channel Habitat		x	
Refugia	x [1/]		
Channel Condition & Dynamics			
Width/Depth Ratio		x	
Stream Bank Condition	x		
Floodplain Connectivity		x	
Flow/Hydrology			
Change in Peak/Base Flows		x	
Increase in Drainage Network		x	

Habitat Parameter	Effects of the Action		
	Restore	Maintain	Degrade
Watershed Conditions			
Road Density & Location		x	
Disturbance History		x	
Riparian Reserves		x	
Disturbance Regime		x	
Integration of Species and Habitat		x	

Note:
1/ The refugia for salmonids would be restored due to the reduction in predator refugia.

6.5 Cumulative Effects

No future state, local, or private activities that are reasonably certain to occur within the action area were identified that would require a cumulative effects analysis. Following removal of the obsolete infrastructure, GP intends to continue to operate the mill located on the site.

6.6 Effects from Interrelated and Interdependent Activities

No interdependent or interrelated activities are anticipated as a result of the proposed Project. No changes to mill operations would result from removal of the structures.

Exhibit 3 SHOR23-01

7.0 CONCLUSIONS AND EFFECT DETERMINATIONS

The environmental baseline in the action area may be affected by the following:

- Temporary disruption in normal fish activity from in-water work created by elevated noise levels in the Camas Slough and the Columbia River, potentially causing a disturbance, injury, or mortality to listed fish.
- Temporary increase in turbidity and/or pollutants due to sediment disturbance, inadvertent introduction of debris and/or contaminants into the action area drainage (e.g., petroleum products from equipment).
- Temporary disturbance of migration of adults and outmigration of juveniles using Camas Slough as a thoroughfare to reach the Washougal River.
- Temporary disturbance of prey/food sources from human disturbance during in-water work activities.
- Long-term reduction of aquatic predator refugia through removal of artificial structures.
- Long-term reduction of avian predation on juvenile fish through removal of artificial perches.
- Permanent improvement of habitat through removal of artificial structures (e.g., treated wood and metal dolphins, pilings).
- Permanent reduction of numbers of potential in-water sources of creosote through removal of treated wood.
- Permanent reduction of shading by man-made structures

Based on the proposed Project actions and its anticipated effects (see Section 6.0), and considering the minimization and avoidance measures outlined in Section 2.7, effect determinations for listed species occurring in the action area are summarized in **Table 15** and discussed in further detail in Sections 7.1 through 7.6.

Table 15. Effect Determinations for Listed Species in the Action Area

Species	Listing Status	Effect Determination
Bull trout (*Salvelinus confluentus*) Critical habitat; in action area	Threatened	May affect but is not likely to adversely affect.
Chinook salmon (*Oncorhynchus tshawytscha*) Lower Columbia River ESU Critical habitat; in action area	Threatened	May affect but is not likely to adversely affect.
Chum Salmon (*Oncorhynchus keta*) Columbia River ESU Critical habitat; in action area	Threatened	May affect but is not likely to adversely affect.
Coho Salmon (*Oncorhynchus kisutch*) Lower Columbia River ESU Critical habitat; in action area	Threatened	May affect but is not likely to adversely affect.
Steelhead (*Oncorhynchus mykiss*) Lower Columbia River DPS Critical habitat; in action area	Threatened	May affect but is not likely to adversely affect.

Exhibit 3 SHOR23-01

Species	Listing Status	Effect Determination
Pacific Eulachon (*Thaleichthys pacificus*) Southern DPS Critical habitat; in action area	Threatened	May affect but is not likely to adversely affect.

Abbreviations:
DPS = Distinct Population Segment
ESU = Evolutionarily Significant Unit

7.1 Bull Trout

7.1.1 Bull Trout Species

The effect determination for bull trout as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Bull trout are documented as occurring and are migratory in the mainstem Lower Columbia River basin, including the action area.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of the Camas Slough. Hoe-ram operations to remove concrete and vibratory pile removal would occur to remove dolphins and piles within Camas Slough and Columbia River.
- Migratory/forage habitat for bull trout is available within the action area.

A "not likely to adversely affect" determination is warranted based on the following rationale:

- In-water work would be restricted to a time period when juveniles are less likely to occur in the Project area.
- Migration of adult bull trout would not be impaired.
- Suitable spawning habitat is not located within the action area.
- The amount of foraging habitat affected would be insignificant in comparison to the available foraging habitat in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- The effects of sedimentation and turbidity would be minimized by adhering to an erosion control plan and implementing erosion control BMPs. Implementation of BMPs for erosion and sediment control would render effects on bull trout insignificant.
- Refueling of equipment would occur farther than 150 feet from any surface water feature. All equipment operators would be trained in spill response and an SPCC plan would be prepared for this Project.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat.

7.1.2 Bull Trout Critical Habitat

The effect determination for bull trout critical habitat as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Critical habitat for bull trout has been designated within the action area.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of Camas Slough.

A "not likely to adversely affect" determination is warranted based on the following rationale:

- No critical habitat PCEs would be affected by the proposed Project.
- The amount of habitat affected would be insignificant in comparison to the available habitat and designated critical in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- Suitable spawning habitat is not located within the action area.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat and prey/food source habitat.

7.2 Chinook Salmon

7.2.1 Chinook Salmon Species

The effect determination for Chinook salmon, LCR ESU, as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Chinook salmon are documented as occurring in the mainstem Lower Columbia River, including the action area.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of the Camas Slough. Hoe-ram operations to remove concrete and vibratory pile removal would occur to remove dolphins and piles within Camas Slough and Columbia River.
- Migratory/forage habitat for Chinook salmon is available within the action area.

A "not likely to adversely affect" determination is warranted based on the following rationale:

- In-water work would be restricted to a time period when juveniles are less likely to occur in the Project area.
- Migration of adult Chinook salmon would not be impaired.

Exhibit 3 SHOR23-01

- Suitable spawning habitat is not located within the action area.
- The amount of foraging habitat affected would be insignificant in comparison to the available foraging habitat in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- The effects of sedimentation and turbidity would be minimized by adhering to an erosion control plan and implementing erosion control BMPs. Implementation of BMPs for erosion and sediment control would render effects on Chinook salmon insignificant.
- Refueling of equipment would occur farther than 150 feet from any surface water feature. All equipment operators would be trained in spill response and an SPCC plan would be prepared for this Project.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat.

7.2.2 Chinook Salmon Critical Habitat

The effect determination for Chinook salmon critical habitat as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Critical habitat for Chinook salmon has been designated within the action area.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of Camas Slough.

A "not likely to adversely affect" determination is warranted based on the following rationale:

- No critical habitat PCEs would be affected by the proposed Project.
- The amount of habitat affected would be insignificant in comparison to the available habitat and designated critical in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- Suitable spawning habitat is not located within the action area.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat and prey/food source habitat.

7.3 Chum Salmon

7.3.1 Chum Salmon Species

The effect determination for chum salmon, Columbia River ESU, as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

Exhibit 3 SHOR23-01

A "may affect" determination is warranted based on the following rationale:

- Chum salmon are documented as occurring in the mainstem Lower Columbia River, including the action area.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet Camas Slough. Hoe-ram operations to remove concrete and vibratory pile removal would occur to remove dolphins and piles within Camas Slough and Columbia River.
- Migratory/forage habitat for chum salmon is available within the action area.

A "not likely to adversely affect" determination is warranted based on the following rationale:

- In-water work would be restricted to a time period when juveniles are less likely to occur in the Project area.
- Migration of adult chum salmon would not be impaired.
- Suitable spawning habitat is not located within the action area.
- The amount of foraging habitat affected would be insignificant in comparison to the available foraging habitat in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- The effects of sedimentation and turbidity would be minimized by adhering to an erosion control plan and implementing erosion control BMPs. Implementation of BMPs for erosion and sediment control would render effects on chum salmon insignificant.
- Refueling of equipment would occur farther than 150 feet from any surface water feature. All equipment operators would be trained in spill response and an SPCC plan would be prepared for this Project.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat.

7.3.2 Chum Salmon Critical Habitat

The effect determination for chum salmon critical habitat as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Critical habitat for chum salmon has been designated within the action area.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of Camas Slough.

Exhibit 3 SHOR23-01

A "not likely to adversely affect" determination is warranted based on the following rationale:

- No critical habitat PCEs would be affected by the proposed Project.
- The amount of habitat affected would be insignificant in comparison to the available habitat and designated critical in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- Suitable spawning habitat is not located within the action area.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat and prey/food source habitat.

7.4 Coho Salmon

7.4.1 Coho Salmon Species

The effect determination for coho salmon, LCR ESU, as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Coho salmon are documented as occurring in the mainstem Lower Columbia River, including the action area.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of the Camas Slough. Hoe-ram operations to remove concrete and vibratory pile removal would occur to remove dolphins and piles within Camas Slough and Columbia River.
- Migratory/forage habitat for coho salmon is available within the action area.

A "not likely to adversely affect" determination is warranted based on the following rationale:

- In-water work would be restricted to a time period when juveniles are less likely to occur in the Project area.
- Migration of adult coho salmon would not be impaired.
- Suitable spawning habitat is not located within the action area.
- The amount of foraging habitat affected would be insignificant in comparison to the available foraging habitat in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- The effects of sedimentation and turbidity would be minimized by adhering to an erosion control plan and implementing erosion control BMPs. Implementation of BMPs for erosion and sediment control would render effects on coho salmon insignificant.
- Refueling of equipment would occur farther than 150 feet from any surface water feature. All equipment operators would be trained in spill response and an SPCC plan would be prepared for this Project.

Exhibit 3 SHOR23-01

- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat.

7.4.2 Coho Salmon Critical Habitat

The effect determination for coho salmon critical habitat as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Critical habitat for coho salmon has been designated within the action area.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of the Camas Slough.

A "not likely to adversely affect" determination is warranted based on the following rationale:

- No critical habitat PCEs would be affected by the proposed Project.
- The amount of habitat affected would be insignificant in comparison to the available habitat and designated critical in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- Suitable spawning habitat is not located within the action area.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat and prey/food source habitat.

7.5 Steelhead

7.5.1 Steelhead Species

The effect determination for steelhead, LCR DPS, as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Steelhead are migratory in the Columbia River, including the action area. Adult and juvenile steelhead may occur in the action area year-round.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of the Camas Slough. Hoe-ram operations to remove concrete and vibratory pile removal would occur to remove dolphins and piles within Camas Slough and Columbia River.
- Migratory/forage habitat for steelhead is available within the action area.

Exhibit 3 SHOR23-01

A "not likely to adversely affect" determination is warranted based on the following rationale:

- In-water work would be restricted to a time period when juveniles are less likely to occur in the Project area.
- Migration of adult steelhead would not be impaired.
- Suitable spawning habitat is not located within the action area.
- The amount of foraging habitat affected would be insignificant in comparison to the available foraging habitat in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- The effects of sedimentation and turbidity would be minimized by adhering to an erosion control plan and implementing erosion control BMPs. Implementation of BMPs for erosion and sediment control would render effects on steelhead insignificant.
- Refueling of equipment would occur farther than 150 feet from any surface water feature. All equipment operators would be trained in spill response and an SPCC plan would be prepared for this Project.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat.

7.5.2 Steelhead Critical Habitat

The effect determination for steelhead critical habitat as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Critical habitat for steelhead has been designated within the action area.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of the Camas Slough.

A "not likely to adversely affect" determination is warranted based on the following rationale:

- No critical habitat PCEs would be affected by the proposed Project.
- The amount of habitat affected would be insignificant in comparison to the available habitat and designated critical in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- Suitable spawning habitat is not located within the action area.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination, which would benefit fish habitat and prey/food source habitat.

7.6 Pacific Eulachon

7.6.1 Pacific Eulachon Species

The effect determination for Pacific eulachon, southern DPS, as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Pacific eulachon are migratory in the Columbia River, including the action area. Adult and juvenile steelhead may occur in the action area year-round.
- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of the Camas Slough. Hoe-ram operations to remove concrete and vibratory pile removal would occur to remove dolphins and piles within Camas Slough and Columbia River.
- Migratory habitat for Pacific eulachon is available within the action area.

A "not likely to adversely affect" determination is warranted based on the following rationale:

- In-water work would be restricted to a time period when juveniles are less likely to occur in the Project area.
- Migration of adult Pacific eulachon would not be impaired.
- Suitable spawning habitat is not located within the action area.
- No foraging habitat is located within the action area.
- The effects of sedimentation and turbidity would be minimized by adhering to an erosion control plan and implementing erosion control BMPs. Implementation of BMPs for erosion and sediment control would render effects on Pacific eulachon insignificant.
- Refueling of equipment would occur farther than 150 feet from any surface water feature. All equipment operators would be trained in spill response and an SPCC plan would be prepared for this Project.
- The proposed armoring of a portion of the dike would provide additional scour and erosion protection, reducing the amount of sedimentation and turbidity from dike banks benefiting fish habitat.

7.6.2 Pacific Eulachon Critical Habitat

The effect determination for Pacific eulachon critical habitat as a result of the proposed Project is "**may affect but is not likely to adversely affect**."

A "may affect" determination is warranted based on the following rationale:

- Critical habitat for Pacific eulachon has been designated within the action area.

Exhibit 3 SHOR23-01

- The Project would require in-water work (removal of pilings/dolphins, and debris) that may result in temporary increases in sedimentation and turbidity during construction.
- Clearing and grading (removal of structures and restoring the shoreline) would occur within 100 feet of the Camas Slough.

A “not likely to adversely affect” determination is warranted based on the following rationale:

- No critical habitat PCEs would be affected by the proposed Project.
- The amount of habitat affected would be insignificant in comparison to the available habitat and designated critical in the Project vicinity. In addition, these habitats are protected by local critical areas regulations.
- Suitable spawning habitat is not located within the action area.
- Removal of pilings and restoration of the shoreline would reduce erosion and chemical contamination which would benefit fish habitat and prey/food source habitat.

Exhibit 3 SHOR23-01

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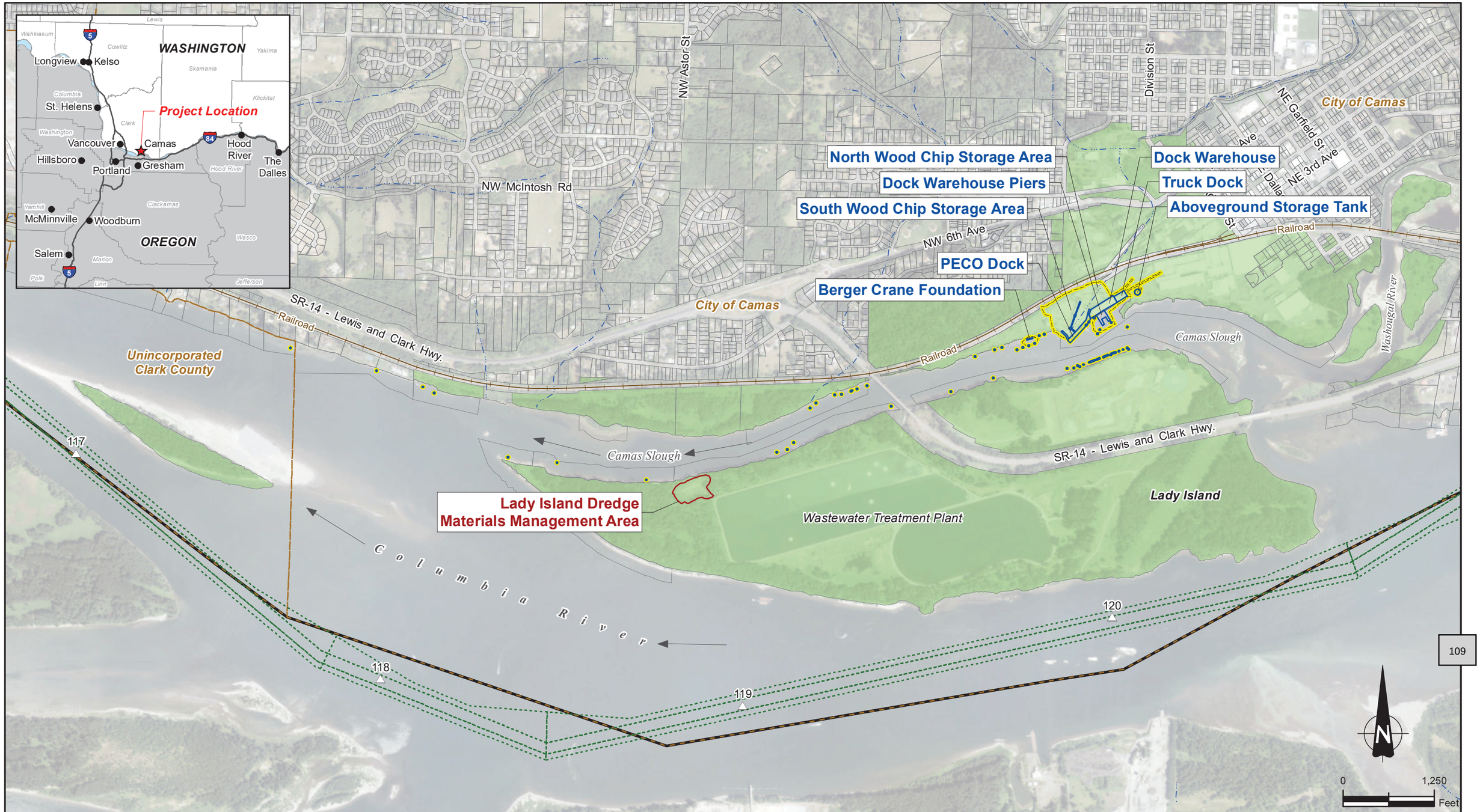
FIGURES



Project Limits	Tax Lot
Columbia River Mile Marker	Tax Lot Owned by Georgia-Pacific
Stream/River	City Boundary
Structure To Be Removed	County Boundary
Dolphin To Be Removed	Federal Navigation Channel
Lady Island Dredge Materials Management Area	

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

PROJECT LOCATION

DATE: NOVEMBER 2022
SCALE: 1 " = 1,250 '
PROJECT NO.:
FIGURE: 1

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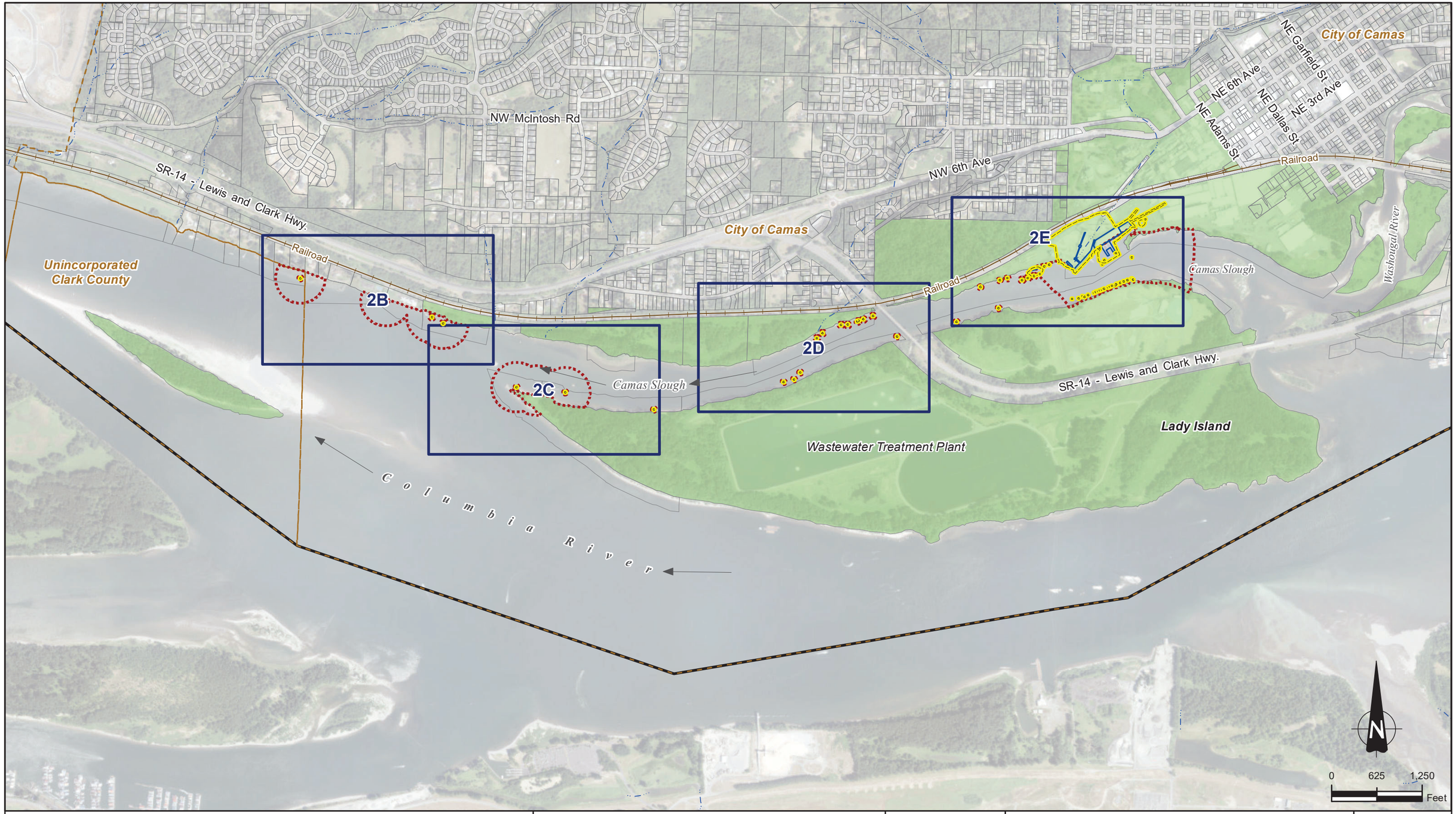

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Action Area
Stream/River
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary
County Boundary

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

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TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP
OVERVIEW

DATE
JANUARY 2023

SCALE
1 " = 1,250 '

PROJECT NO.

FIGURE
110

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Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary
Action Area:
Vibratory Pile Removal Underwater Action Area
Dredging Water Quality Action Area

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

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TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED AND STUDY AREA MAP

DATE: JANUARY 2023
SCALE: 1 " = 200 '
PROJECT NO.
FIGURE: 111

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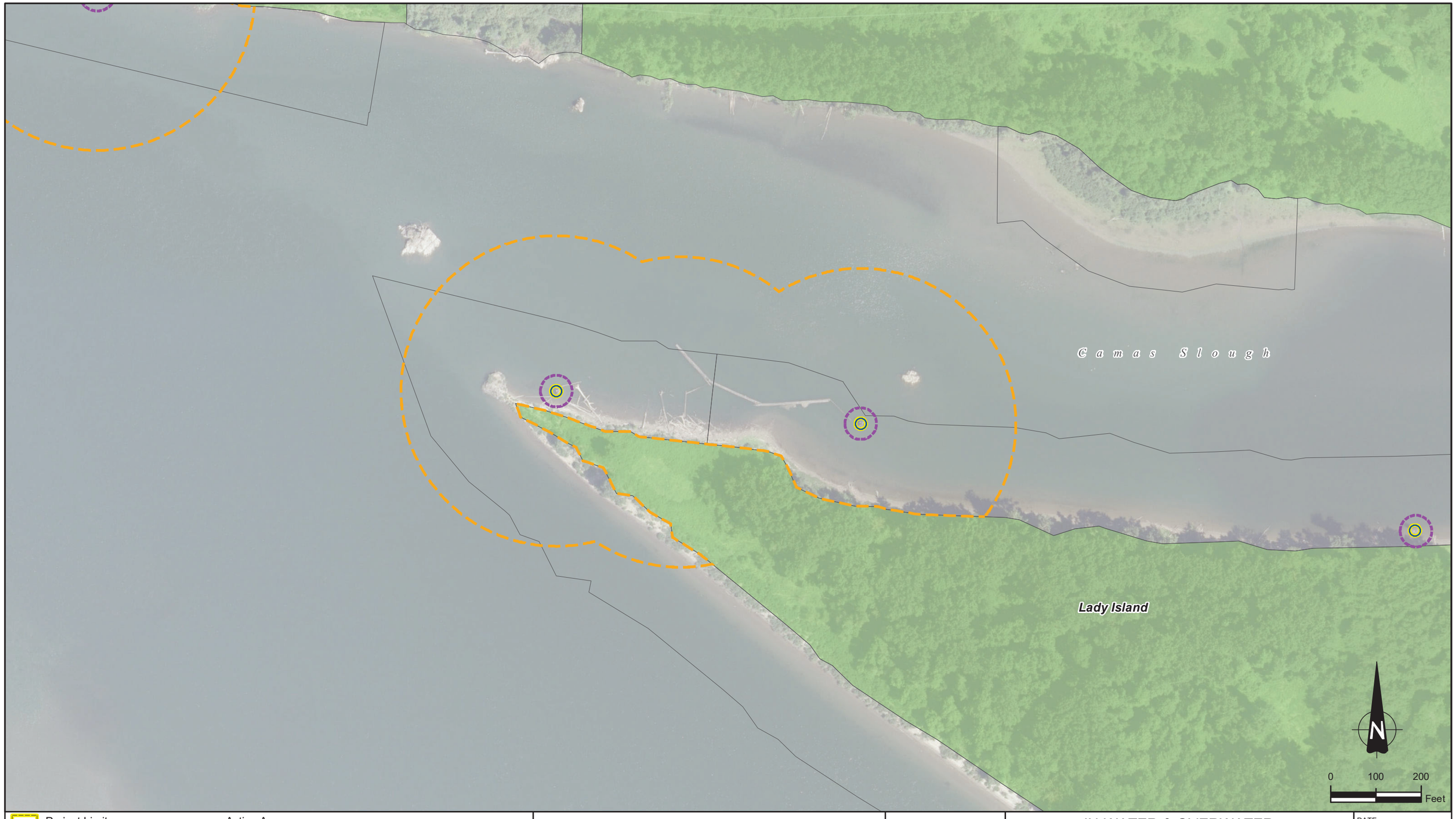

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

Action Area:
Vibratory Pile Removal Underwater Action Area
Dredging Water Quality Action Area

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED AND STUDY AREA MAP

DATE: JANUARY 2023
SCALE: 1 " = 200 '
PROJECT NO.
FIGURE: 112

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Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

Action Area:
Dredging Water Quality Action Area

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE
JANUARY 2023

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
2B-2E

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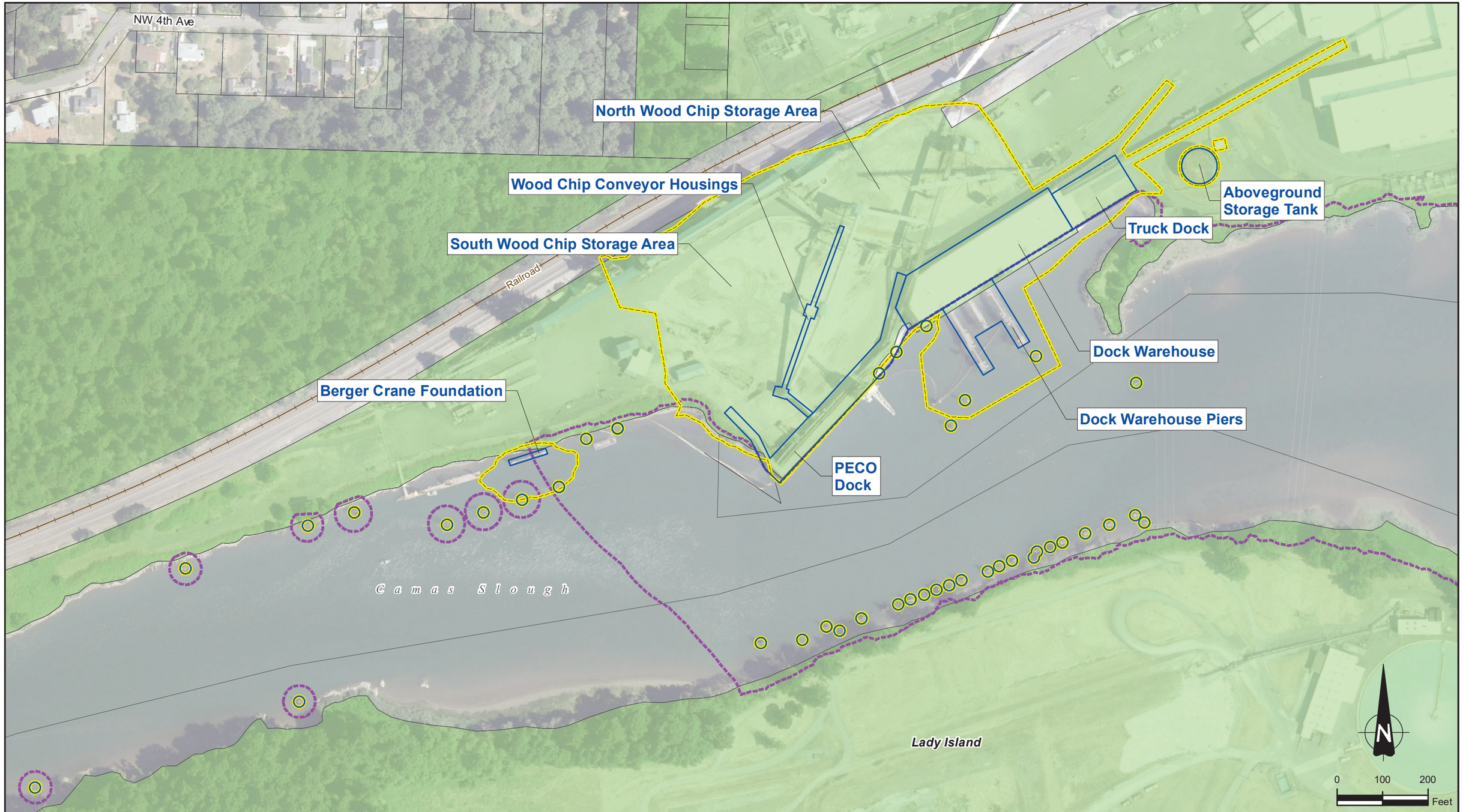

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

Action Area:
Dredging Water Quality Action Area

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE: JANUARY 2023
SCALE: 1 " = 200 '
PROJECT NO.
FIGURE: 114

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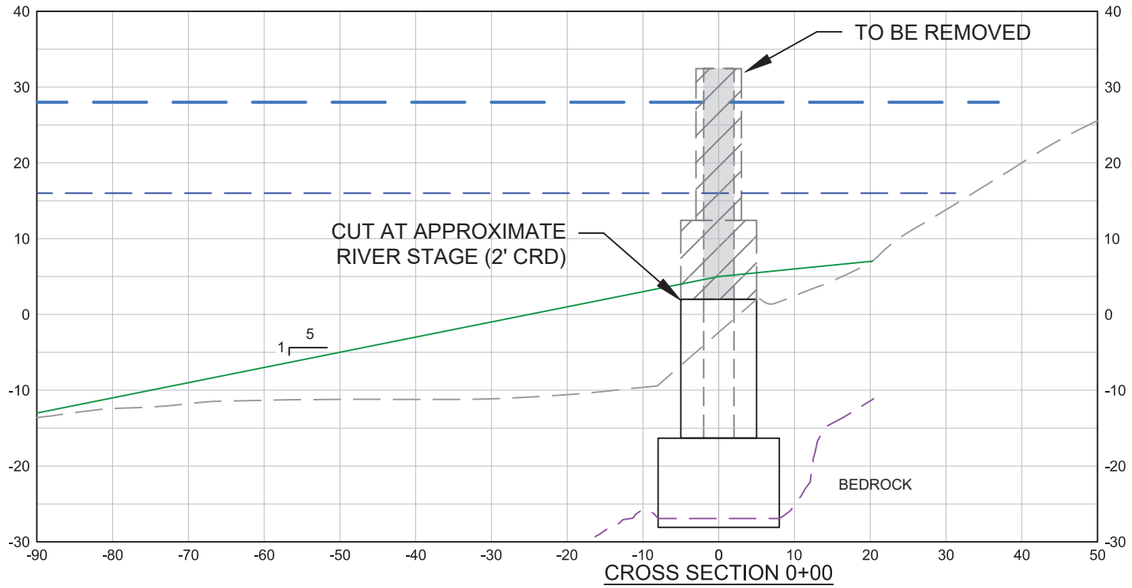
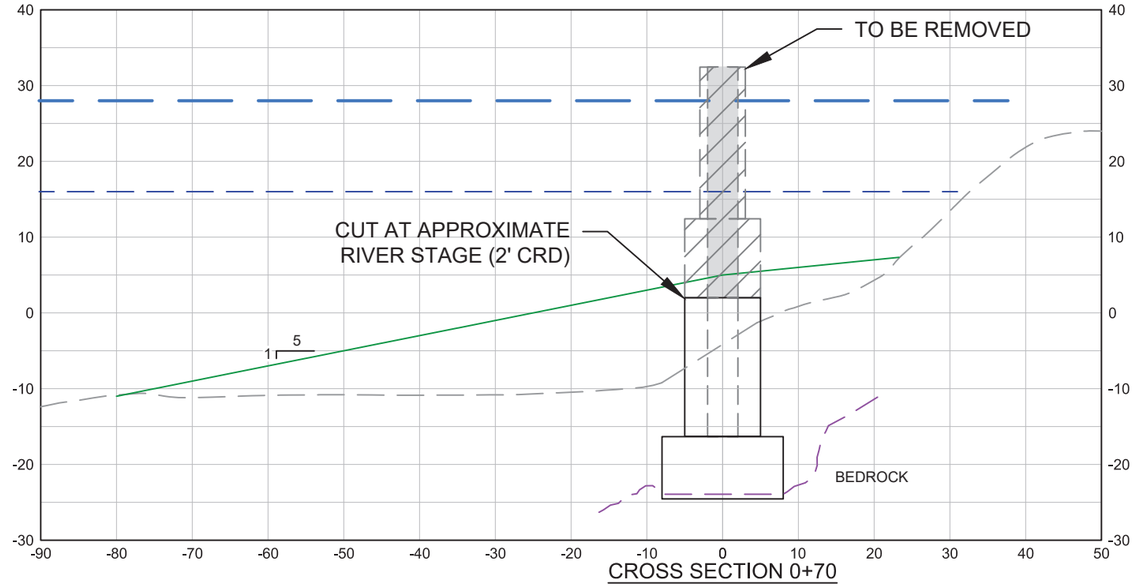


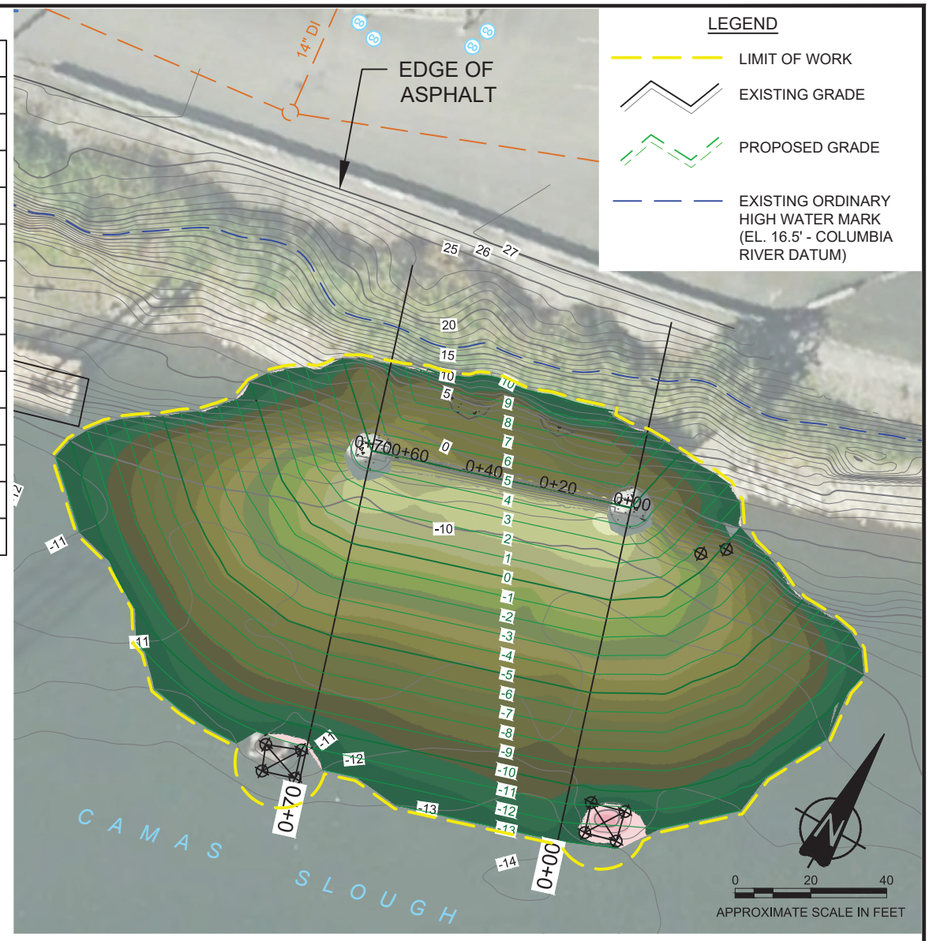
CROSS SECTION 0+00

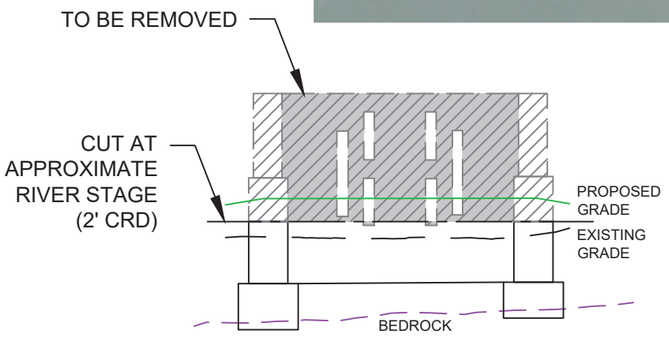


CROSS SECTION 0+70

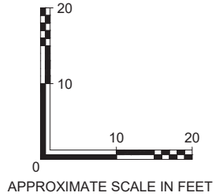
Depth Thickness Table in Ft		
MIN	MAX	Color
0	+1	
+1	+2	
+2	+3	
+3	+4	
+4	+5	
+5	+6	
+6	+7	
+7	+8	
+8	+9	
+9	+10	
+10	+11	
+11	+12	

3,500 c□FILL





BERGER CRANE FOUNDATION PHOTO



APPROXIMATE SCALE IN FEET

CROSS SECTION LEGEND

- ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING GRADE
- PROPOSED FINAL GRADE

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE: OCTOBER 2022
			SCALE: AS SHOWN
Tetra Tech		GRADING PLAN BERGER CRANE FOUNDATION	PROJECT NO.
			FIGURE: 115

LEGEND

LIMIT OF WORK

EXISTING GRADE

PROPOSED GRADE

EXISTING ORDINARY HIGH WATER MARK
(EL. 16.5' - COLUMBIA RIVER DATUM)

UTILITY LEGEND

GRIT SUMP COLLECTION

KEY

FILL = 3,500 CY

BERGER CRANE
FOUNDATION

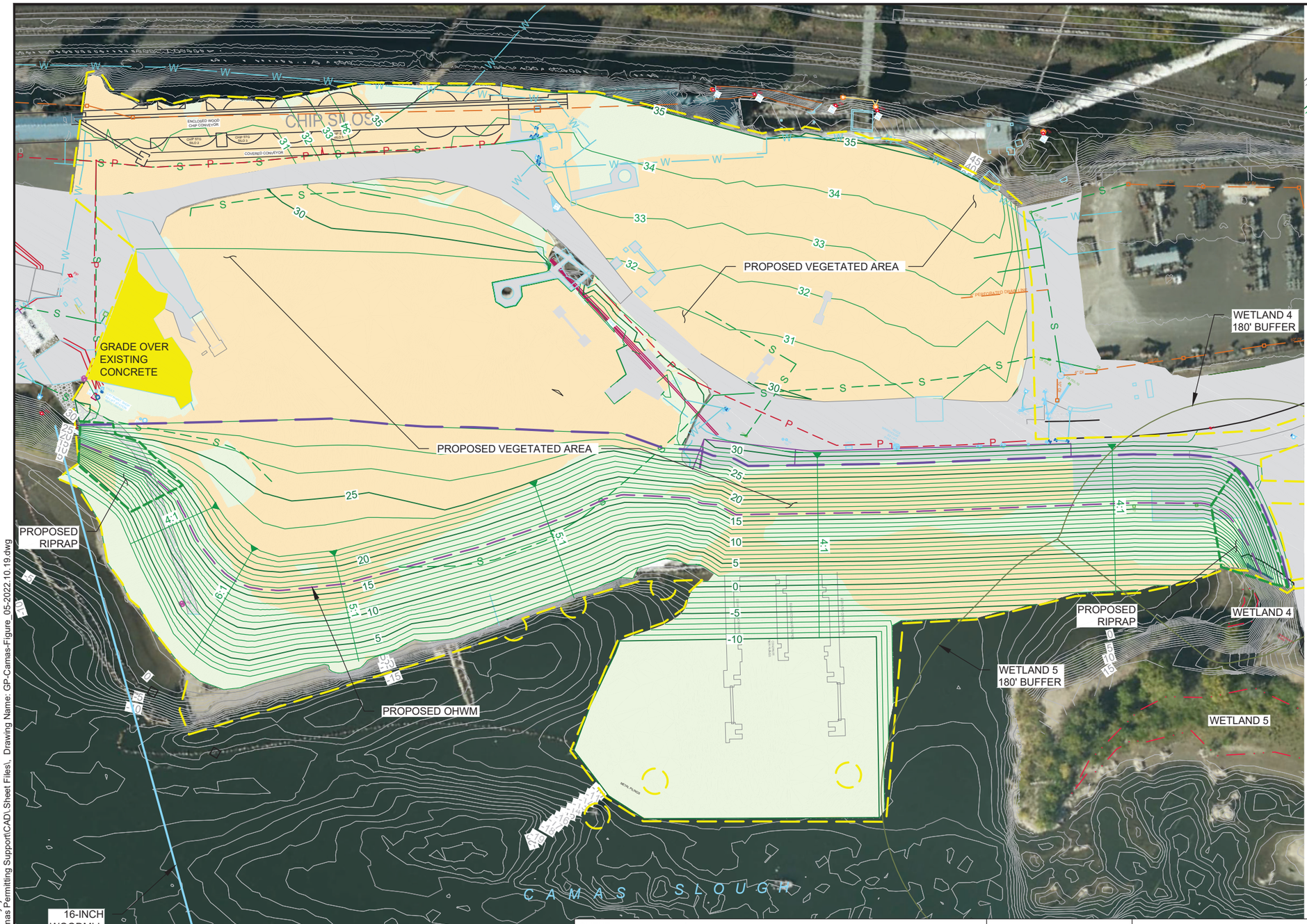
GANGWAY

N

0 20 40

APPROXIMATE SCALE IN FEET

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE OCTOBER 2022
Tetra Tech		BERGER CRANE FOUNDATION RIVER BOTTOM RESTORATION	SCALE AS SHOWN PROJECT NO. FIGURE 116



LEGEND

- LIMIT OF WORK
- EXISTING GRADE CONTOURS (SITEWIDE LAND SURVEYING 7/07/20)
- PROPOSED FINAL GRADE CONTOURS
- PROPOSED ORDINARY HIGH WATER MARK (OHWM) (EL. 16.5' - COLUMBIA RIVER DATUM)
- PROPOSED 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING WETLAND

UTILITY LEGEND

- FIRE MAIN
- W — WATER
- S — PROCESS SEWER
- GRIT SUMP COLLECTION
- OL — OVERHEAD POWER LINE
- P — UNDERGROUND POWER LINE
- NATURAL GAS

EARTHWORK QUANTITIES

NORTH WOOD CHIP AREA:
130,730 SF (3.00 ACRE)
CUT = 5,678 CY
FILL = 32,943 CY

SOUTH WOOD CHIP AREA, PECO DOCK, WAREHOUSE, AND PIERS:
340,088 SF (7.81 ACRE)
CUT = 32,676 CY
FILL = 20,788 CY

DRAFT

0 50 100
APPROXIMATE SCALE IN FEET

CLIENT
Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

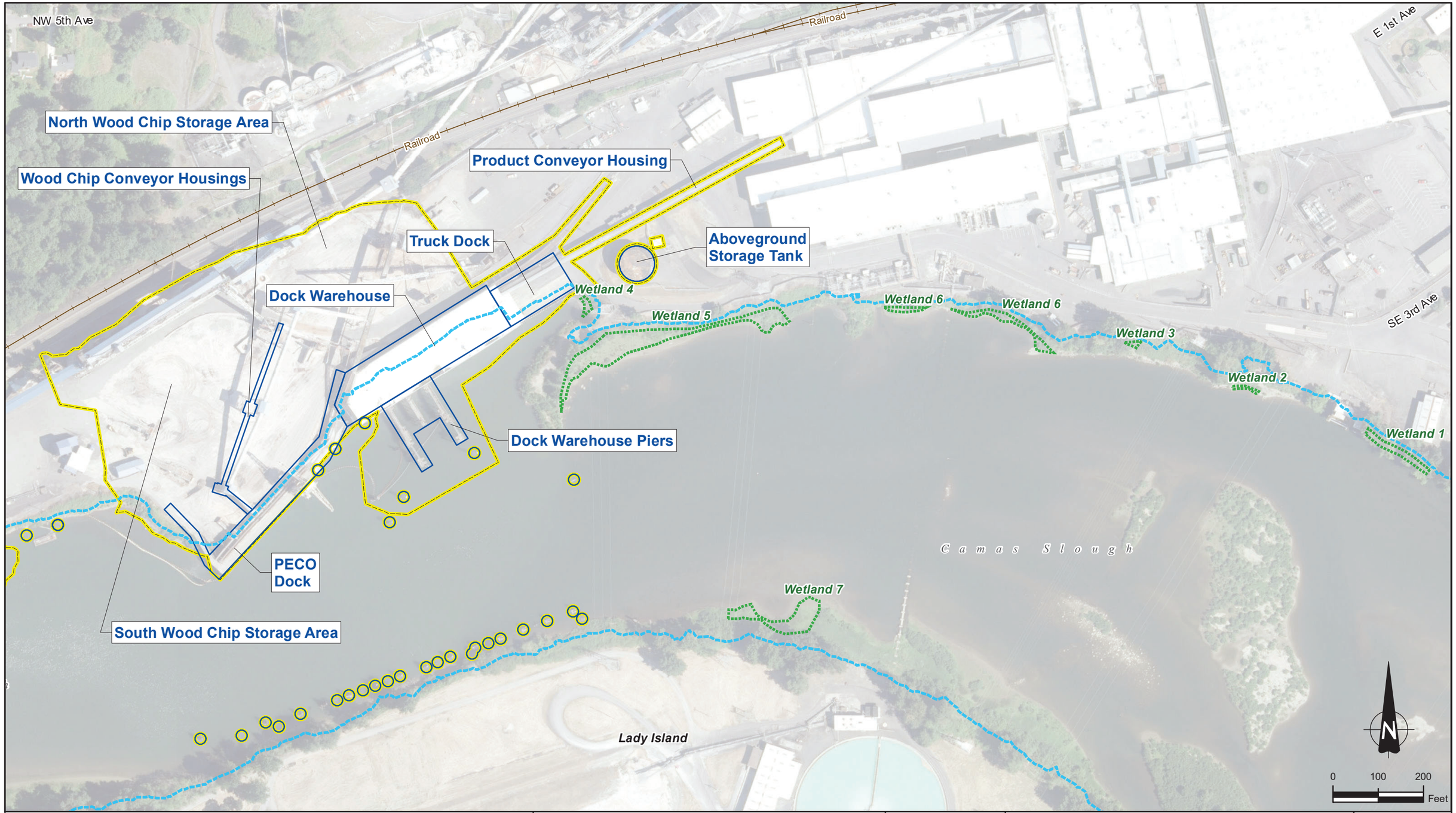
TETRA TECH
www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

GRADING PLAN - PECO DOCK, DOCK WAREHOUSE, AND DOCK WAREHOUSE PIERS

DATE 10/19/22
SCALE AS SHOWN
PROJECT No. 194-0117
FIGURE

Plot Date: 10/19/22 - 5:03pm, Plotted by: joel.cameron
Drawing Path: P:\194-0117-0064 Camas Permitting Support\CAD\ Sheet Files\, Drawing Name: GP-Camas-Figure_05-2022.10.19.dwg



Project Limits
Structure To Be Removed
Dolphin To Be Removed
OHWM (elevation: 16.05 ft., CRD)
Wetland Boundary (surveyed 08/20/2019 & 07/22/2020)

Notes:
ft = foot/feet
CRD = Columbia River datum
OHWM = Ordinary High Water Mark

GEORGIA-PACIFIC
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IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

WETLAND MAP

DATE: JANUARY 2023
SCALE: 1 " = 200 '
PROJECT NO.
FIGURE: 118

DRAWN BY: SD CHECKED BY: KD

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Exhibit 3 SHOR23-01

APPENDIX A: ESSENTIAL FISH HABITAT EVALUATION

Exhibit 3 SHOR23-01

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) has determined that an Essential Fish Habitat (EFH) consultation is necessary for the proposed Project to satisfy the requirements in the Magnuson-Stevens Fishery Conservation and Management Act and the 1996 Sustainable Fisheries Act.

An EFH assessment is an analysis of the effects of a proposed action on essential fish habitat. Mandatory contents include a description of the proposed action; an analysis of the effects of that action on EFH; the federal agency's views on those effects; and proposed mitigation, if applicable. Additional information that should be discussed (if appropriate) includes the results of on-site inspections; the views of recognized experts on affected habitat or fish species; a review of pertinent literature; and an alternatives analysis (50 Code of Federal Regulations 600.920[g]).

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. To interpret the definition of EFH, "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate. "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities. "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. "Spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

The EFH is described by Fishery Management Councils in amendments to Fishery Management Plans and is approved by the Secretary of Commerce, acting through NOAA Fisheries (50 Code of Federal Regulations 600.10). Salmonid EFH is discussed in Appendix A of Amendment 14 to the Pacific Coast Salmon Plan (PFMC 2019a).

Essential Fish Habitat within the Action Area

For the in-water and over-water demolition of structures at the Camas Mill, Pacific salmon and groundfish EFH management units were identified within portions of the action area in Camas Slough and the Columbia River (NOAA Fisheries 2020). The majority of the action area is identified as Pacific salmon EFH. The marine influence and possible saltwater intrusion within the action area require that marine species of fish and their associated life-history stages with designated EFH need to be addressed.

The EFH designation for the Pacific salmon fishery includes all streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except above the impassable barriers as identified by the Pacific Fishery Management Council. The Pacific salmon management unit includes Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and pink salmon (*O. gorbuscha*). Only Chinook and coho species have been documented in the Columbia River (WDFW 2020). The Project action area does not provide spawning habitat for these species, due to its location within the tidally influenced lower reach of the Columbia River, which lacks suitable spawning substrate. However, the Project action area does contain adequate habitat for adult migration, juvenile out-migration, and rearing where suitable habitat is present. Coho and Chinook are known to stage in Columbia River as subadults.

Exhibit 3 SHOR23-01

The EFH designation for groundfish is defined as those waters and substrates necessary to ensure the production is needed to support a long-term sustainable fishery (PFMC 2019a). The marine extent of groundfish EFH includes those waters from the near-shore and tidal submerged environment within Washington, Oregon, and California state territorial waters out to the exclusive economic zone offshore between the Canada and Mexico borders. The west coast groundfish management unit in the Washington coast nearshore environment includes 83 species that generally live on or near the bottom of the ocean and include species groups such as skates and sharks, rockfish, flatfish, lingcod, English sole and other groundfish (PFMC 2019b). Because of their association with the ocean bottom and coastal areas, they are not likely to occur in the Project area but may be associated with areas downstream from the action area in the more tidally influenced lower Columbia River estuary.

Analysis of Potential Effects

Potential impacts of the proposed Project on Endangered Species Act listed fish species and habitats are discussed in Section 7.0 of this Biological Assessment and are expected to be similar for all federally managed fish species that occur within the action area. The proposed construction activities have the potential to temporarily affect select habitat parameters, such as temporary increases in sedimentation and turbidity, for minimal, temporary adverse effects in the case of inadvertent spills (e.g., fuel or oil from construction equipment), temporary disturbance to food sources, and limited removal of riverine habitat (refugia). Temporary effects are anticipated to be minimal through the use of construction planning and timing, and implementation of best management practices to further minimize effects. No long-term degradation of habitat parameters for Pacific salmon or groundfish is anticipated to occur as a result of the proposed construction.

Essential Fish Habitat Conservation Measures

Several measures would be implemented to minimize potential adverse effects to fish habitat in general. These measures are listed below:

- Contractors would be required to prepare and implement a spill prevention, control, and countermeasures plan consistent with Washington State Department of Ecology regulations.
- Contractor personal would be trained in hazardous material handling and would be equipped with appropriate spill response materials including oil-absorbent pads.
- Extreme care would be taken to ensure that no petroleum products, hydraulic fluid, sediment, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into surface water.
- Material used for construction would be stockpiled in upland areas, in a designated stockpile area.
- Equipment would be inspected daily for drips or leads in order to prevent spills or releases to surface water.
- In order to reduce the potential impacts on listed species, work would be conducted during low flow conditions to the extent possible.

Exhibit 3 SHOR23-01

Conclusion and Effect Determination

The proposed construction activities have the potential to temporarily affect select riverine habitat parameters. Temporary effects are anticipated to be minimal through the use of construction planning and timing, and implementation of best management practices to further minimize effects. Removal of wood-treated pilings, improvement of the shoreline, and removal of debris would provide long-term beneficial effects to water quality through reduced sedimentation and turbidity. No long-term degradation of habitat parameters is anticipated to occur as a result of the proposed construction. Therefore, the Project ***will not adversely affect*** EFH for Pacific salmonids or groundfish.

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Exhibit 3 SHOR23-01

APPENDIX B: SPECIES DESCRIPTIONS AND LIFE HISTORIES

Exhibit 3 SHOR23-01

LISTED SPECIES RETAINED FOR FURTHER EVALUATION

Bull Trout

Bull trout were historically distributed in major river drainages in the Pacific Northwest from California to the headwaters in Canada. Despite a fairly wide range of bull trout in the Northwest, current distribution in the Columbia River basin represents approximately only 45 percent of their historical distribution in this basin (63 Federal Register [FR] 31647).

Bull trout exhibit resident and migratory life history strategies, depending on population and local habitat accessibility and structure. Resident bull trout spend their life cycle in the stream or tributary in which they spawn and rear. Migratory bull trout spawn in streams where rearing takes place for up to four years before migrating to lakes (adfluvial), rivers (fluvial), or in some cases, the ocean (anadromous). Resident and migratory populations may occur together (63 FR 31647).

Unlike other salmonids, bull trout have a narrower tolerance for habitat quality parameters and require particularly cold, clean water. Bull trout reach breeding age between four and seven years of age and may live up to 12 years. Unlike other salmonids, bull trout have a narrower tolerance for habitat quality parameters and require particularly cold, clean water. Because of this, their spawning generally takes place between August and November. Migratory bull trout may begin spawning in April. Fry emerge in early April to May.

Chinook Salmon (Lower Columbia River Evolutionarily Significant Unit)

Chinook are the largest of the Pacific salmon species and are found in the larger river systems and some smaller coastal river drainages from California to Alaska. Chinook alevins emerge in the spring and exhibit either “ocean-type” or “stream-type” life-history strategies. Migration distance, stream flows, and temperatures, and productivity of streams and estuaries appear to be the strongest environmental factors affecting species emigration timing (Myers et al. 1998).

Chinook in the lower Columbia River generally follows an ocean-type life history cycle. This means they migrate to the ocean as fry, sub-yearling, or yearling juveniles. Ocean-type juveniles generally rear in estuaries and enter saltwater during their first year, usually in the late summer and fall. There are two Lower Columbia River (LCR) Chinook Evolutionarily Significant Unit (ESU) runs that typically fall in this category: fall-run (tules) and late fall-run (brights). Although a third run does exist (the spring-run), Chinook from this run were historically only found in the upper portions of the basin with snowmelt-driven flow regimes.

Adults enter freshwater between August and December, after spending between two to six years in the ocean before returning to their natal streams. Peak spawning occurs from late September to November. Depending on water temperatures, egg incubation lasts through the fall and winter months and emergence occurs in April. Downstream migration begins one to four months after emergence and occurs from March to October. Rearing juveniles are likely to be present in the lower Columbia River year-round. This is because fry will generally search for suitable rearing habitat within side sloughs, side channels, spring-fed seep areas, and areas along the outer edges of the stream. These quiet-water side margins and off-channel slough areas are vital for early juvenile habitat.

Exhibit 3 SHOR23-01

Chum Salmon (Columbia River Evolutionarily Significant Unit)

Chum have the largest natural geographic and spawning distribution of any Pacific salmonid, primarily because their range extends farther along the shore of the Arctic Ocean than other salmonids. Chum are also the second largest of Pacific salmon and known for their large canine-like fangs and the striking body color of spawning males. Chum spend more of their life history in marine waters than other Pacific salmonids. They typically spawn in coastal areas, and juveniles out-migrate to the ocean almost immediately after emergence (Good et al. 2005).

Columbia River chum ESU adults return to the river in mid-October to December. They primarily spawn in the lower reaches of the Columbia River and their migration is mostly related to water temperatures. Chum fry out-migrate from March through May, shortly after emergence. Chum juveniles feed in the estuaries before entering the ocean.

Coho Salmon (Lower Columbia River Evolutionarily Significant Unit)

Similar to Chinook in their distribution, coho occur in major river basins around the Pacific Rim from California to Alaska. Coho do not have the major life-history variations seen in some of the other listed salmonid species occurring in the lower Columbia River. The LCR coho ESU includes two distinct runs: early returning (Type S) and late returning (Type N). Type S coho generally migrate south of the Columbia River once they reach the ocean, returning to freshwater in mid-August and to spawning tributaries in early September. Spawning peaks from mid-October to early November. Type N coho have a northern distribution in the ocean, return to the Columbia River from late September through December, and enter the tributaries from October through January.

LCR coho ESU adults typically return to spawn as type N, returning from late September through November. After emergence as fry, they move to shallow, low-velocity rearing areas, which usually include pool habitat, quiet backwaters, side channels, and small creeks (LCRFB 2010). Juveniles migrate seaward from April to June after spending at least a year in the river. They spend approximately 18 months in the ocean before returning to freshwater by the age of 3 to spawn.

Steelhead (Lower Columbia River Distinct Population Segment)

Steelhead exhibit highly complex life-history strategies—more so than other species of Pacific salmonid. Steelhead exhibit both anadromous and freshwater resident life histories and may produce offspring that take on a life-history strategy opposite to that of their parents. The anadromous form may spend up to seven years in freshwater before entering the smolt life stage, and they may spend up to three years in salt water prior to first spawning (Good et al. 2005). Steelhead can spawn more than once (iteroparous), whereas almost all other salmonids spawn only once before dying (semelparous).

The non-anadromous forms are typically referred to as rainbow trout. Although the anadromous and resident forms are considered to be the same species, the exact relationship between the two forms is not well understood, and little data is available on the interactions between the two forms. In coastal populations, it is unusual for the two forms to co-occur, in part because they are usually separated by a natural or man-made migration barrier.

The LCR steelhead distinct population segment (DPS) includes both summer- and winter-run steelhead. Summer-run steelhead are considered stream-natural types, enter the freshwater in a

Exhibit 3 SHOR23-01

sexually immature condition between May and October, and require several months to mature and spawn. Winter-run steelhead are ocean-maturing, and enter freshwater between November and April, and spawn shortly thereafter (NOAA Fisheries 2005). Fry emergence occurs from March into July, with peak emergence generally occurring in April and May.

Summer-run rearing takes place primarily in the faster parts of pools, while winter-run rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. The dominant age class of out-migrating steelhead smolts in the lower Columbia River is typically age two and generally occurs from March to June, with peak outmigration usually in April or May (NOAA Fisheries 2005).

Pacific Eulachon (Southern Distinct Population Segment)

Pacific eulachon are members of the osmerid family (smelts) and are endemic to the northeastern Pacific Ocean. The Columbia River and its tributaries support the largest known Pacific eulachon run in the world (Gustafson et al. 2010). Pacific eulachon are very important to the Pacific coastal food web, due to their availability during spawning runs and their high lipid content. They are consumed by a large variety of shorebirds, marine mammals, and fish.

The Pacific eulachon Southern DPS is significant to the species because it constitutes over half of the geographic range of the entire species' distribution and includes at least two of the major production areas (the Columbia and Fraser Rivers) for the entire species. Unfortunately, this species has declined in the past 20 years, especially since the mid-1990s.

Pacific eulachon typically spend three to five years in saltwater before returning to freshwater to spawn from late winter through early summer. River entry and spawning begin as early as December and January in the Columbia River basin and last through May, with peak entry and spawning during February and March. Pacific eulachon require freshwater for spawning and are unlikely to spawn in the brackish waters of the lower Columbia River estuary. Within days of hatching, the larvae are rapidly carried downstream and dispersed by estuarine and ocean currents. As they grow, they migrate out to deeper depths. Although adults can repeatedly spawn, most die shortly after spawning.

OTHER CONSIDERED SPECIES

Coastal Cutthroat Trout

Cutthroat trout (*Oncorhynchus clarki clarki*) are widely distributed in the lower Columbia River tributary systems and all life history forms are reported in all lower Columbia River drainages. They were originally proposed to be listed as threatened in 1999 in the southwestern Washington/Columbia River DPS (which includes the Columbia River and its tributaries), but the U.S. Fish and Wildlife Service withdrew the listing proposal in 2002 and reconfirmed in 2010 (75 FR 8621).

Similar to bull trout, there are several life-history forms of cutthroat trout, including resident, fluvial, and anadromous (LCFRB 2010). The boundaries are not rigid and individual fish are known to move from one life-history form to another within their lifespan. The non-migratory life-history form includes fish generally found in small streams and headwaters and are smaller at maturity. The freshwater migratory life-history form are fish that migrate entirely within freshwater. This includes populations that migrate from large tributaries to small tributaries to spawn, pupations that inhabit

Exhibit 3 SHOR23-01

lakes and migrate upstream to spawn in the lake's tributaries, and populations that live in lakes and migrate downstream to spawn in the lake outlet (USFWS 2020) Lastly, the saltwater migratory life-history form migrates from freshwater natal areas to feed in marine environments.

Cutthroat trout typically spawn from December through June, with peak spawning in February. Fry emerge between March and June, with peak emergence in mid-April. Due to their use of a large variety of habitat types, they spend more time in the freshwater environment than do most other anadromous Pacific salmonids (USFWS 2020). Coastal cutthroat trout would likely be encountered during the in-water construction work window while they are migrating or rearing, but currently, they are only listed as a species of concern. While they do not hold the same protections as other salmonids on this Project, the same precautions would apply to this species to ensure the species is not negatively affected.

Therefore, the Project is ***likely to affect, but will not adversely affect populations, individuals, or suitable habitat*** for coastal cutthroat trout, as they could use the Project action area for migrating, feeding, or rearing. Effects are likely to be very minimal even if they are displaced by the Project, because similar suitable habitat is abundant outside of the action area.

Green Sturgeon

Green sturgeon (*Acipenser medirostris*) are an anadromous sturgeon found in nearshore marine waters from Mexico to Canada. Green sturgeon are long-lived, slow-growing fish and the most marine-oriented of the sturgeon species. Northern and Southern DPS green sturgeon occupies coastal estuaries and coastal marine waters, and therefore those observed in coastal bays, estuaries, and coastal marine waters outside of natal rivers may belong to either DPS. The southern DPS at present only contains a single spawning population, the Sacramento River (73 FR 52083). The northern DPS, consisting of Klamath River and Rogue River spawning populations, was listed as a species of concern (LCRFB 2010). However, sturgeon from both DPSs occur in the Columbia River estuary during summer months and typically occur offshore from late fall through early spring.

While the southern DPS sturgeon are anadromous, they are only known to utilize the lower Columbia River estuary from the mouth of the river up to river kilometer 74 or 46 miles seasonally (74 FR 52299). This is far outside of the range of the action area, which is roughly 76 miles upstream of the designated habitat for the species. There is no evidence of spawning in the Lower Columbia River by green sturgeon.

While it is possible that green sturgeon could exist within the action area of the Camas Slough or Columbia River, it is unlikely they will be encountered during the in-water work window, as they would be occurring offshore during that time period, rather than using the estuary or mainstem river. Therefore, the Project is ***not likely to affect populations, individuals, or suitable habitat*** for green sturgeon, as the action area is well outside of the current range of this species; thus, this species would not be exposed to Project impacts.

Pacific Lamprey

Pacific lamprey (*Entosphenus tridentatus*) are a native anadromous inhabitant of most Pacific Northwest rivers, including the Columbia River. Young lampreys are algae filter feeders and burrow in sandy stream margins and side channels for about six years before migrating downstream to the

Exhibit 3 SHOR23-01

ocean (LCRFB 2010). Adults, on the other hand, are parasitic and feed by attaching themselves to a variety of prey in marine environments. While, this species is not listed as either a species of concern, threatened, or endangered, they are culturally and ecologically important to the lower Columbia River, as they are an important food source for native peoples and many estuary inhabitants.

After spending one to three years in the ocean, they cease feeding and migrate to freshwater in the spring (Columbia River Inter-Tribal Fish Commission 2020). Pacific lamprey are susceptible to many of the same threats as salmonids, which include reduced access to spawning habitat, degradation of spawning and rearing areas, and losses of juveniles to entrainment and non-indigenous predators. It is likely that Pacific lamprey would be encountered during the in-water construction work window while they are migrating, rearing, or feeding; however, they are not currently listed. While they do not hold the same protections as other fish within the lower Columbia River, the same precautions would apply to this species to ensure the species is not negatively affected.

Therefore, the Project is ***likely to affect, but will not adversely affect populations, individuals, or suitable habitat*** for Pacific lamprey, as they could use the Project action area for migrating, feeding, or rearing. Effects are likely to be very minimal even if they are displaced by the Project because similar suitable habitat is abundant outside of the action area.

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Exhibit 3 SHOR23-01

APPENDIX C: SUMMARY OF HABITAT PATHWAYS AND INDICATORS

Exhibit 3 SHOR23-01

A habitat assessment was conducted using the U.S. Fish and Wildlife Service matrix of pathways and indicators to rate habitat parameters for bull trout to establish baseline conditions for the Project reach of Columbia River. Most of the habitat parameters in the matrix of pathways were assessed at the action area scale. Where necessary, information for watershed-scale habitat parameters were used for the Lower Columbia River.

Table C-1 summarizes the baseline habitat conditions for bull trout. Baseline habitat parameters and conditions are briefly discussed in the following sections for bull trout specifically which range from subpopulation characteristics to watershed conditions within the action area.

There are five other species protected by the National Oceanic and Atmopheric Association (NOAA) Fisheres Service within the action area; therefore, baseline habitat conditions such as water quality parameters for Chinook, chum, coho, steelhead, and Pacific eulachon would also be similar throughout the action area.

Table C-1. Summary of Baseline Conditions for Bull Trout Habitat

Habitat Parameter	Environmental Baseline[1/]			Effects of the Action		
	Properly Functioning	At-Risk	Not Properly Functioning	Restore	Maintain	Degrade
Bull Trout Subpopulation Characteristics						
Subpopulation size			x		x	
Growth and survival			x		x	
Life history diversity and isolation			x		x	
Persistence and genetic integrity			x		x	
Water Quality						
Temperature			x		x	
Sediment			x		x	
Chemical Contamination			x	x		
Habitat Access						
Physical Barriers		x		x		
Habitat Elements						
Substrate		x			x	
Large Woody Debris Quantity			x		x	
Pool Frequency and Quality		x			x	
Large Pools		x			x	
Off-channel Habitat		x			x	
Refugia		x		x [2/]		
Channel Condition & Dynamics						
Width/Depth Ratio		x			x	
Steam Bank Condition		x		x		
Floodplain Connectivity			x		x	

Habitat Parameter	Environmental Baseline[1/]			Effects of the Action		
	Properly Functioning	At-Risk	Not Properly Functioning	Restore	Maintain	Degrade
Flow/Hydrology						
Change in Peak/Base Flows			x		x	
Increase in Drainage Network		x			x	
Watershed Conditions						
Road Density & Location			x		x	
Disturbance History			x		x	
Riparian Reserves		x			x	
Disturbance Regime			x		x	
Integration of Species and Habitat		x			x	

Notes:
1/ The categories of function ("properly functioning," "at risk," and "not properly functioning") are defined for each indicator in the "USFWS Matrix of Diagnostics - Pathways and Indicators" as provided in the WSDOT Biological Assessment Preparation for Transportation Projects: Advanced Training Manual (WSDOT 2019).
2/ The refugia for salmonids would be restored due to the reduction in predator refugia.

Subpopulation Characteristics within Subpopulation Watersheds

The Priority Habitats and Species database (WDFW 2020) indicates bull trout are present throughout the Columbia River watershed. Current bull trout abundance in the mainstem of the Columbia River has not been thoroughly documented. However, records indicate that bull trout detections are infrequent and limited to very few individuals (USFWS 2002). The low abundance of bull trout in the Columbia River indicates that the migratory form of bull trout is essentially absent. Numerous migration barriers (dams) occur between the various subpopulations which have fragmented bull trout habitat and prevented access to historical foraging and overwintering sites. Subpopulations are not likely to recover within 5 to 10 years.

Due to the low abundance of bull trout in the Columbia River, the Project is not expected to affect large numbers of bull trout. Core populations occur in Columbia River tributaries far from the action area. The Project is expected to *maintain* subpopulation characteristics.

Water Quality

The Columbia River mainstem water temperatures at Washougal, Washington, range from approximately 6 degrees Centigrade (°C) to 43 degrees Fahrenheit (°F) in early spring to approximately 22°C (72°F) in late summer (USGS 2019). Temperatures in the action area are assumed to be comparable or higher within Camas Slough. For at least some of the year, water temperatures exceed the matrix standards of 48°F for spawning, 54°F for rearing, and 41°F for incubation.

Additionally, the Columbia River (Friendly Reach) is on the Washington State Department of Ecology 303(d) list for temperature, and the mainstem Columbia River in Water Resource Inventory Area 28 is listed for temperature (Ecology 2020). The U.S. Environmental Protection Agency has approved total maximum daily loads for dioxin and total dissolved gas in the Columbia River (ODEQ 1991, Ecology and ODEQ 2002). Substrates in the action area consist mainly of sand with a very low proportion of fine sediment.

Exhibit 3 SHOR23-01

The proposed Project would not further degrade riparian vegetation, affect cool water sources, or reduce flow. During construction, the Project would implement a temporary erosion and sediment control plan and a pollution control plan to minimize the risk of introducing chemical contaminants into the Columbia River and Camas Slough.

There would be no permanent impacts to chemical contamination or substrates in these water bodies. The risk of contamination from equipment is restricted to the duration of the Project. Stormwater runoff would undergo a high level of treatment before being discharged into the Columbia River or Camas Slough. Therefore, the Project would *maintain* water quality.

Habitat Access

There are no physical barriers to fish passage within the action area, nor are there barriers between the action area and the Pacific Ocean. The proposed Project would not involve the creation of permanent physical barriers and would reduce the number of physical barriers such as docks and pilings. However, pile removal operations and debris booms would create a temporary barrier to migration in the Columbia River. In-water work also would create temporary, partial barriers to the migration of juvenile fish in shallow in-water habitat. The Project would *temporarily degrade* this indicator but ultimately would maintain this indicator and could potentially *restore* habitat access.

Habitat Elements

In the Columbia River and Camas Slough, the substrate consists mainly of sand, with relatively small percentages of fine sediments and organic material (NOAA Fisheries 2002). Bedrock is known to occur near or at the surface in some locations in Camas Slough, and within 25 feet of the surface throughout Camas Slough which has led to gravel and cobble in the substrate to be present within Camas Slough. However, there is little to no gravel or cobble present in the substrate within the Columbia River. There is also a lack of woody riparian vegetation along the river, due to historic conversion to agriculture, urban and industrial development, in addition to extensive dredging which has limited the recruitment of large woody debris to the river channels.

The Columbia River contains essentially no pool habitat within the action area. Camas Slough, on the other hand, is considered sufficient in providing consistent holding water for adult salmon. However, glide habitat is the dominant stream habitat type in this area. Few to no pools are formed or maintained by large wood, and the potential for future recruitment of large wood in these systems is very low. Pool quality is similarly degraded. Adequate cover is limited due to the lack of large wood, overhanging banks, alcoves, and other types of cover. The sandy substrate of the Columbia River moves continuously with the river currents, which is likely to cause a reduction in the volume of any pools that may form. Cool water is generally absent, as evidenced by 303(d) list temperature exceedances.

Within the action area, the Columbia River and Camas Slough contain few to no backwaters, ponds, oxbows, and other low-energy off-channel habitats. Historic off-channel areas have been filled, rechanneled, diverted, and otherwise developed for urban use over the past 150 years. Although the

Exhibit 3 SHOR23-01

Project may involve some riparian or in-stream restoration, improvements would not increase large wood to 80 pieces per mile. Therefore, the Project would *maintain* habitat elements.

Channel Conditions and Dynamics

Within the action area, the Columbia River measures on average 2,400 feet wide and has a variable channel depth up to 75 feet deep. Camas Slough measures approximately 800 feet wide with a variable water channel depth.

The Columbia River is a broad channel constrained by surrounding urbanized development. Streambanks along the Columbia River and Camas Slough within the action area are generally stable. The Project would temporarily affect the riverbank of the Columbia River and Camas Slough during demolition and would improve riverbank conditions by the removal of structures.

There is a severe reduction in connectivity between the river and its historic floodplain due to riverbank armoring and fills. Overbank flows occur only very occasionally. As a result, wetland extent is thought to be reduced. As a result of development and the presence of invasive species, the succession of riparian vegetation has been significantly altered.

The Project would not affect river depth, bank stability, erosion, or floodplain connectivity and is expected to *maintain* the channel conditions and dynamics.

Flow/Hydrology

The development on the Columbia River, including hydropower system, navigation, irrigation, and flood control, has significantly influenced peak seasonal discharges and the velocity and timing of flows in the river. The Columbia River estuary historically received annual spring freshet flows that were 75 to 100 percent higher on average than current freshet flows. Historical winter flows (October through March) also were approximately 35 to 50 percent lower than current flows (Independent Scientific Advisory Board 2000). Camas Slough receives all the Washougal River discharge, where flows regularly exceed 1,000 cubic feet per second from November to April, and typically fall below 100 cubic feet per second in late summer (LCFRB 2010).

The action area is urbanized, and the surrounding is industrial due to the nearby mill operations. Additionally, the drainage of natural streams in the area has been changed, routed underground through pipes.

The Project is expected to *maintain* the flow and hydrology and could potentially improve the drainage of natural stormwater from the surrounding area, with the removal of several structures.

Watershed Conditions

Roads crossing the river have been constructed above the channel beds. The road network within the action area is low density, as most of the work to be performed is either in water or along the shoreline of Camas Mill. However, given the current industrial, commercial, and urban development of the surrounding area, overall vegetation conditions, impervious surfaces, and high road densities have affected runoff regimes.

Exhibit 3 SHOR23-01

The Columbia River watershed consists of well over 15 percent "equivalent clear-cut area." Additionally, riparian forests along the lower mainstem of the Washougal River and the Camas Slough have been cleared for industrial uses, residential uses, and road corridors and only a few places contain native deciduous species. The disturbance is especially pronounced in riparian areas, and there is no potential for the development of old-growth due to intense urbanization.

Numerous dams throughout the Columbia Basin regulate flows within the action area. Although the hydrograph is stable, it is highly altered from its natural state. The Columbia River channel is highly simplified, with little hydraulic complexity in the pools or side channels.

Overall, the Project is expected to *maintain* the current watershed conditions.

Integration of Species and Habitat Conditions

The integration of species and habitat conditions in the action area is currently very poor. Very few detections of bull trout have been recorded in the lower Columbia River at, near, or downstream of Bonneville Dam. Habitat conditions in the action area are not expected to improve within five to ten years. The tributary subpopulations of bull trout are separated by many miles of mainstem Columbia River and several large passage barriers. The subpopulations are effectively isolated from one another.

In-water work to remove pilings and docks would create a temporary passage barrier within the action area. However, given that few bull trout use the action area and given that large dams already isolate the subpopulations from one another, the Project is not expected to a cause significant barrier to migration between subpopulation areas. The Project also would have no effect on survival and recruitment where core subpopulations occur in the Lewis, Hood, and Klickitat Rivers. Likewise, the Project would not affect habitat conditions in these areas. Therefore, the Project would *maintain* this indicator.

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Exhibit 3 SHOR23-01

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January 24, 2023

Caleigh Belkoff
Environmental Manager
Georgia-Pacific Consumer Operations LLC
401 NE Adams Street
Camas, WA 98607

Subject: Certification of No-Rise and Description of Flood Hazard for Demolition of One Dolphin
Clark County, Washington

CERTIFICATION OF NO-RISE

The purpose of this letter is to certify that the demolition of one dolphin along the north bank of the Columbia River as proposed by Georgia-Pacific Consumer Operations LLC (GP), if performed in substantial accordance with the information in this letter, will not increase the base elevations of the base (100-year) flood, as shown in the Federal Emergency Management Agency's (FEMA's) Revised Flood Insurance Study for Clark County, Washington and Incorporated Areas, dated effective January 19, 2018.

The proposed demolition of the dolphin does not constitute "construction" or "development" within the floodplain or floodway of Clark County as defined by Clark County Ordinance. The proposed action does not involve any construction or temporary storage of materials in the floodway, and no fill would be placed in the floodway. The action exclusively is to demolish and remove a man-made encroachment—one "dolphin" consisting of multiple connected piles—along the north bank of the Columbia River. The ground and bathymetric elevations will not change, and no portion of the structure or its elements will remain above ground.

The remainder of this letter further describes the proposed demolition and the finding of no-rise.

PROJECT DESCRIPTION

GP is planning to remove one dolphin/pier structure that encroaches within the floodway along the north bank of the Columbia River in an area of unincorporated Clark County. The vicinity of this location is shown on Figure 1.

The structure to be removed lies approximately 65 feet west of the jurisdictional boundary between unincorporated Clark County and the City of Camas, near river mile 117.31. The structure lies immediately downstream (west) of an "L" shaped dock crossed by the city–county boundary. The dock is not part of the project and will not be demolished. A closer view of the area showing both the dolphin and the dock is shown on Figure 2.

The dolphin structure will be removed to below the ground (bathymetric) surface, and the ground elevations will be kept unchanged at their existing elevations.

The demolition of this dolphin will be done as part of a larger demolition project at the GP Camas Mill, the rest of which is entirely within the City of Camas, whereby GP will demolish other structures and obstructions (encroachments) upstream along the north bank of the Columbia River and both banks of Camas Slough. However, those actions have no relevance to this unincorporated area of Clark County because they are upstream.

GP is the sole organization responsible for maintaining, developing, removing, and deconstructing facilities at the GP Camas Mill.

FLOOD HAZARD DESCRIPTION

The dolphin structure to be demolished and removed is in the floodway on the north bank of the Columbia River. FEMA has studied this reach of the river in detail as part of the Flood Insurance Study for Clark County, Washington

and Incorporated Areas, dated January 19, 2018 (FEMA, 2018), and in the associated Flood Insurance Rate Maps (FIRMs).

Attachment 1 provides the following information from the FEMA (2018) Flood Insurance Study (FIS) annotated to show the project location:

- FEMA's FIRM panel 529 showing flood zones in the vicinity of the project;
- Flood Profile 22P of the Columbia River from river mile 117.0 to 122.2 annotated to show the location of the dolphin at river mile 117.31; and
- Floodway Data table (FIS Table 9) highlighting lettered cross-sections AA through AB, which are located immediately downstream and upstream of the project area.

The demolition location is depicted on FIRM panel 529. The dolphin location corresponds to river mile 117.31. This location is slightly different from the location of the county–city boundary shown on the FEMA FIS flood profiles because the jurisdiction line crosses the river at an angle and is plotted on the FIS profile at the river mile where it crosses the profile baseline near the river center. Figure 3 shows a close-up view of FIRM panel 529 showing the location of the dolphin and the angled orientation of the county–city boundary. For comparison, Figures 2 and 3 show the same area at the same scale.

REGULATORY CONTEXT

Clark County Code 40.420.020-A-2 (Standards; Uses; Prohibited Uses in SFHA's) states as follows:

> *b. Floodway encroachments are prohibited unless certification by a licensed professional engineer registered in the state of Washington is provided demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge. If it has been adequately demonstrated through calculations that the encroachment will not result in increased flood levels, all new nonresidential construction and nonresidential substantial improvements shall comply with all applicable flood hazard reduction provisions of this chapter.*

Clark County Code does not require a flood hazard permit if no construction or fill ("development") is occurring in the Special Flood Hazard Area (100-year floodplain).

ANALYSIS

The proposed demolition of the dolphin does not constitute development in the floodplain because no construction or renovation of a structure will occur, nor will any fill be placed in the floodplain or floodway, and no change in grade will result following demolition and removal. The activity is solely to demolish and remove an existing multi-pile dolphin structure that currently encroaches flow in the floodway. The encroachment is small relative to the full cross-section of the Columbia River, and is further lessened because the dolphin is hydraulically "sheltered" by the "L"-shaped dock just upstream. That dock is not part of the project and will remain. Following removal of the dolphin, the bathymetry and bank elevations will be the same as before. As a result of this removal, hydraulic conveyance in this vicinity will either be unchanged or slightly improved, and the removal cannot result in an increase in base flood elevations both at this site and further away, either upstream or downstream.

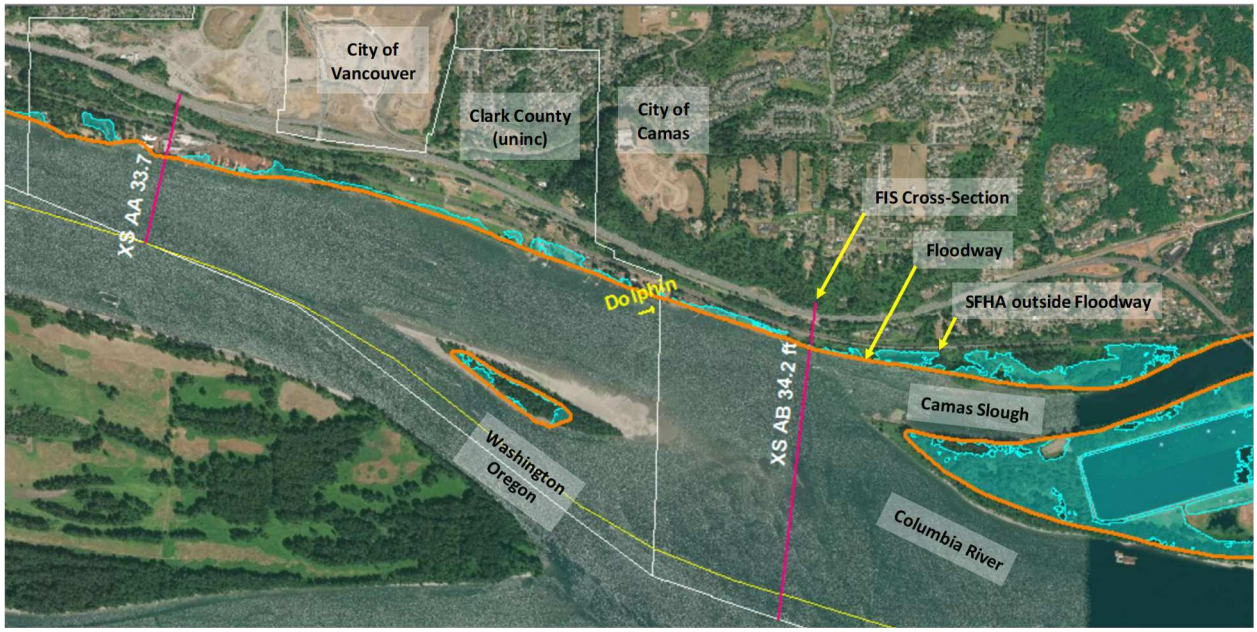


Figure 1. Vicinity of Dolphin Proposed for Demolition. Notes: Location is highlighted with yellow arrow labeled "Dolphin" and is between FEMA Cross-Sections AA and AB on the Columbia River about 65 feet west of the boundary between the City of Camas and unincorporated Clark County. Elevations are in feet relative to the North American Vertical Datum of 1988 (NAVD88). Flood hazard information is shown for the Washington side.

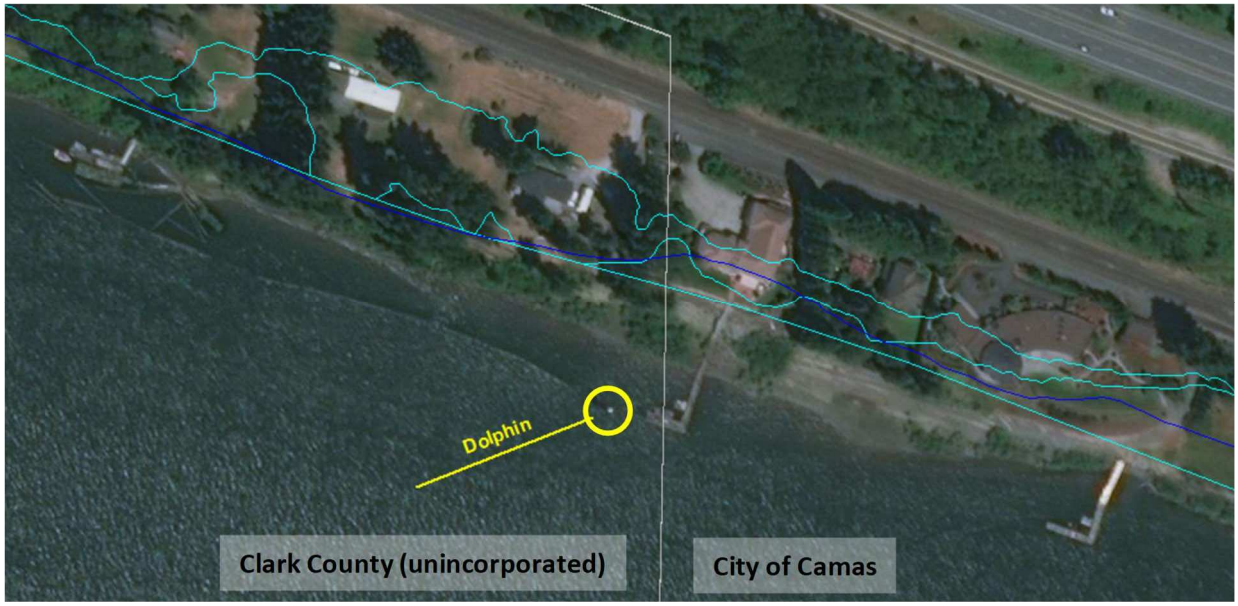


Figure 2. Location of Dolphin Proposed for Demolition. Note: Dolphin is about 65 feet west of the boundary between the City of Camas and unincorporated Clark County. The "L"-shaped dock upstream is not part of the project.

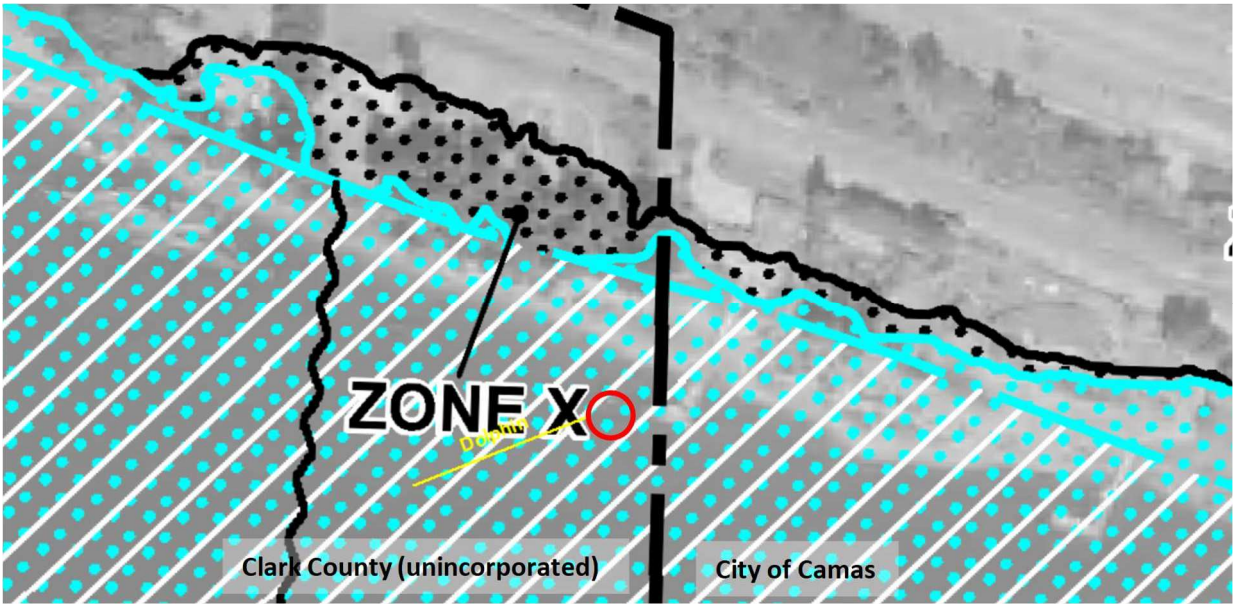


Figure 3. Location of Dolphin Proposed for Demolition on FEMA FIRM Panel. Note: Dolphin is about 65 feet west of the boundary between the City of Camas and unincorporated Clark County. A portion of FIRM panel 529 is shown; the full panel showing the location is included in Attachment 1. Figures 2 and 3 show approximately the same area at the same scale.

If you have any questions, please do not hesitate to contact me.

Sincerely,

WSP USA Environment & Infrastructure Inc.

Seth Jelen, PE, CFM, BCEE, CWRE
Principal Engineer—Water Resources
E-mail: seth.jelen@wsp.com

Project Review by:
Tyler Marley, PE
Senior Project Engineer – Water Resources
E-mail: tyler.marley@wsp.com

Attachments: Attachment 1-1: Flood Insurance Map (FIRM) 529
Attachment 1-2: Columbia River Flood Profiles
Attachment 1-3: Columbia River Floodway Data

ATTACHMENTS

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this **FIRM**. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base Map information shown on this **FIRM** was derived from the U.S.D.A. Farm Service Agency National Agriculture Imagery Program (NAIP) produced at a scale of 1:12,000 from photography dated 2009.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

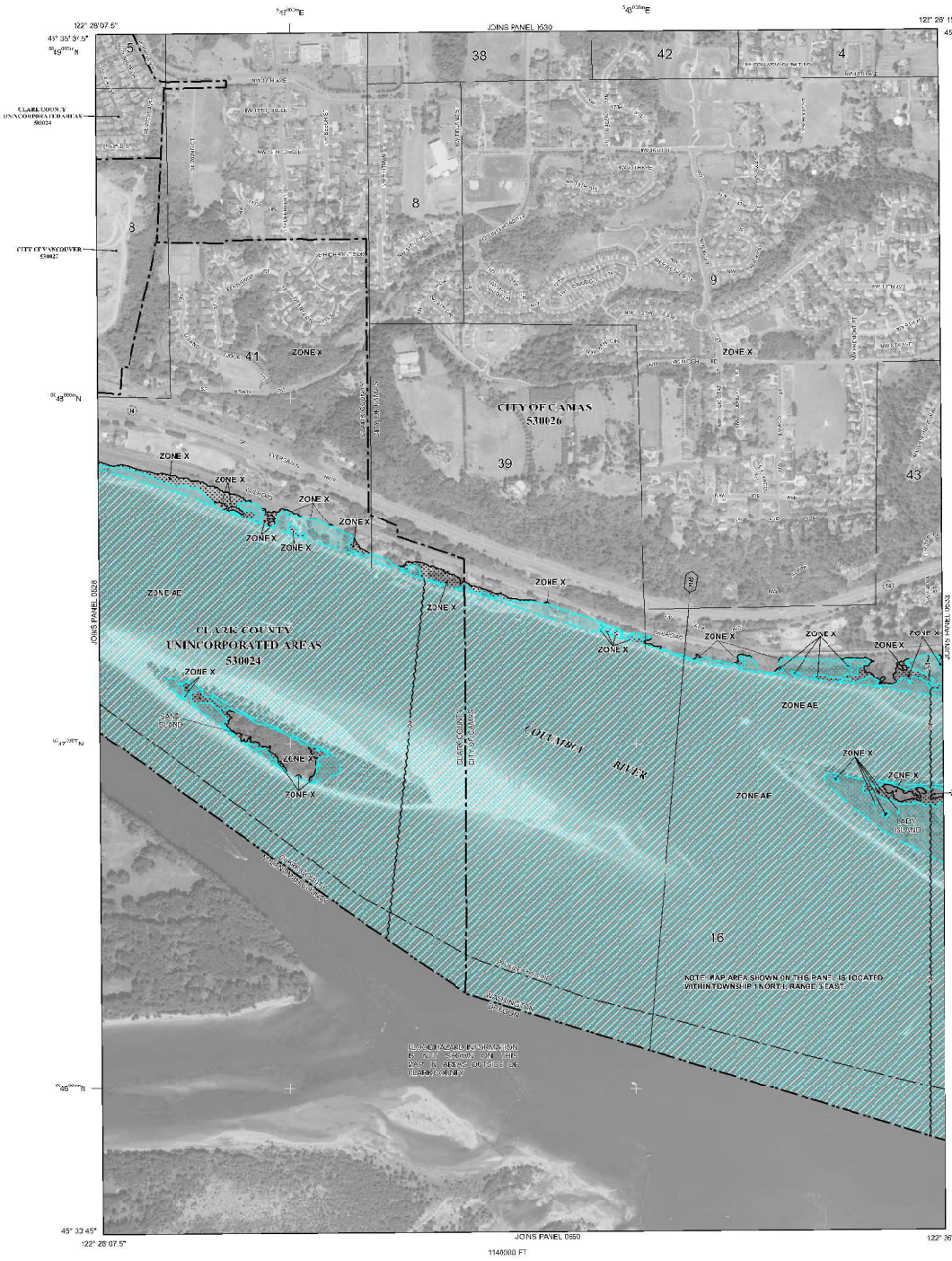
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous **FIRM** may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report, (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** — No Base Flood Elevations determined.
- **ZONE AE** — Base Flood Elevations determined.
- **ZONE AH** — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined for areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** — Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3180000 FT — 5000-foot ticks: Washington State Plane South Zone (FIPS Zone 4602), Lambert Conformal Conic projection
- 1000-meter Universal Transverse Mercator grid values, zone 10
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 5, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

PANEL 0529D

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 529 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

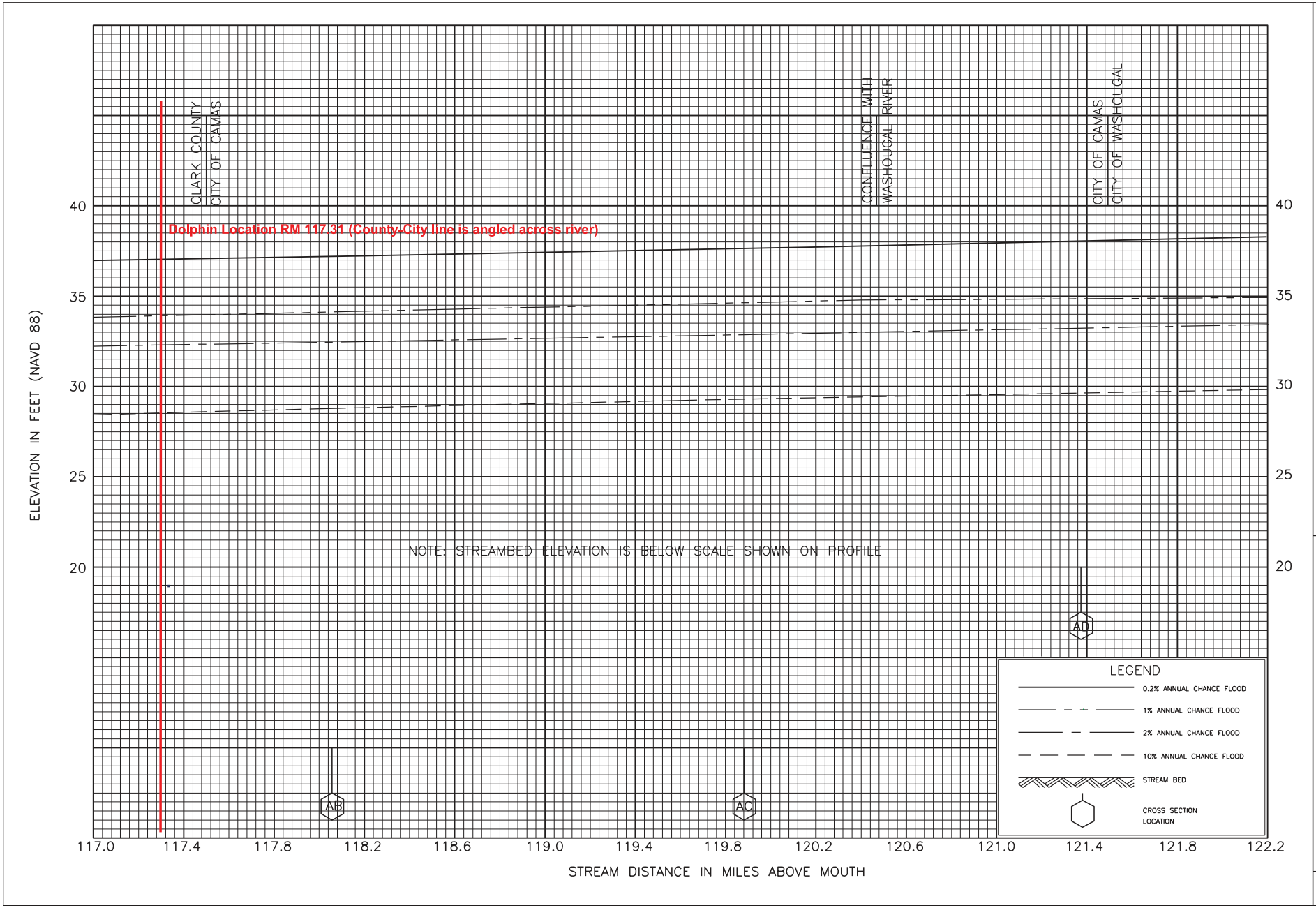
COMMUNITY	NUMBER	PANEL	SUFFIX
CAMAS, CITY OF	530026	0529	D
CLARK COUNTY	530024	0529	D
VANCOUVER, CITY OF	530027	0529	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53011C0529D

EFFECTIVE DATE
SEPTEMBER 5, 2012

Federal Emergency Management Agency



FLOOD PROFILES

COLUMBIA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
CLARK COUNTY, WA
AND INCORPORATED AREAS

22P

FLOODING SOURCE		FLOODWAY			1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F. P. S.)	REGULATORY (NAVD88)	WITHOUT FLOODWAY (NAVD88)	WITH FLOODWAY (NAVD88)	INCREASE
COLUMBIA RIVER								
AA	116.10	4,773 / 1,206[2]	178,406	3.2	33.7	33.2	34.1	0.9
AB	118.06	6,731 / 3,745[2]	210,779	2.7	34.2	33.6	34.4	0.8
AC	119.88	2,280 / 1,367[2]	127,035	4.4	34.6	33.9	35.0	0.9
AD	121.37	4,250 / 1,101[2]	157,277	3.6	34.9	34.3	35.1	0.8
AE	122.86	5,500 / 1,856[2]	189,310	2.9	35.1	34.7	35.5	0.8
AF	123.43	5,700 / 2,039[2]	197,499	2.8	35.3	34.8	35.7	0.9
AG	123.98	5,800 / 2,475[2]	206,916	2.7	35.4	34.8	35.7	0.9
AH	125.53	6,950 / 4,728[2]	198,505	2.8	35.6	35.1	36.0	0.9
AI	126.58	5,900 / 5,498[2]	173,646	3.2	35.8	35.2	36.1	0.9

(1) Stream distance in miles above mouth

(2) Elevations computed without consideration of backwater from Columbia River

(3) Elevations based on HEC-2 hydraulic model

(4) Width/width within county limits

(5) Width excluding island/right channel width looking downstream/width of right channel within corporate limits

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, WASHINGTON

AND INCORPORATED AREAS

FLOODWAY DATA

COLUMBIA RIVER

Shoreline Report including Critical Areas Review, Ordinary High Water Determination, and Impact Assessment

In-Water and Overwater Structures Removal Project
Camas Mill, Camas, WA

Revised February 2023

Prepared for

Georgia-Pacific

Georgia-Pacific Consumer Operations, LLC
Camas, WA

Prepared by

TETRA TECH

19803 North Creek Pkwy
Bothell, WA 98011

EXECUTIVE SUMMARY

Georgia-Pacific Consumer Operations LLC (GP), is planning to abate, remove, and demolish several structures associated with discontinued operations at Camas Mill in the city of Camas and in unincorporated areas of Clark County, Washington. The structures to be removed are located in-water and/or overwater on the Columbia River and Camas Slough and are located within the City of Camas or Clark County Shoreline Management Areas.

The In-water and Overwater Removals Project (Project) will include the following activities:

- Demolition of structures;
- Pipe and concrete cutting and removal;
- Piling removal using vibratory hammers or, in some cases, saw-cutting;
- Sediment dredging; and
- Excavation/filling to create final riverbank and riverbed contours.

The Shoreline Management Act (Revised Code of Washington 90.58) requires jurisdictions with shorelines to develop and implement a Shoreline Master Program. Such programs (referred to as "Shoreline Management Plans") have been developed by the City of Camas (2021) and Clark County (2016). The majority of the Project area is within the shoreline areas managed by the City of Camas under the City's Shoreline Management Plan (City of Camas 2021), with the exception of one dolphin to be removed that is located within the Clark County Shoreline Management Zone and is managed under the County's Shoreline Management Plan (Clark County (2016). Under the state Shoreline Management Act, "Development" (Washington Administrative Code 173-27-030(6)) does not include dismantling or removing structures if there is no other associated development or redevelopment. Therefore, the removal of the structures themselves is not regulated under the state Shoreline Management Act. However, other activities of the Project are regulated under the Act, including:

- Sediment dredging,
- Filling at the Wood Chip Yard to restore grades, and
- Excavation/filling to create final riverbank and riverbed contours and to cover the portion of retained Berger Crane Foundation.

Wood Environment and Infrastructure Solutions, Inc. (Wood) conducted surveys in between July 2019 and July 2020 to characterize the shoreline environment and fish and wildlife habitat, document the presence and extent of wetlands, and determine the Ordinary High Water Mark location in the Project area. A Shoreline Report was prepared by Wood in March 2021 that addresses the Project as proposed at that time; this report has been updated by Tetra Tech to reflect the current planned Project. To support permitting under the state Shoreline Management Act, the City's Shoreline Management Plan, as well as evaluations of Waters of the U.S. and of the State, this report includes:

- A description of the proposed Project, project activities, and estimated timing;

- An analysis of available site information and a discussion of the existing shoreline environment;
- The results of field investigations to determine and delineate the extent of Waters of the U.S. and state, including wetlands;
- Ordinary high-water determination;
- A Fish and Wildlife Conservation Area review to identify habitats present and the potential for species listed as Priority Species by the Washington State Department of Fish and Wildlife and for species protected under the Endangered Species Act; and
- An impacts assessment of potential effects of the Project and a discussion of the best management practices to be implemented during Project implementation to mitigate those potential effects.

Critical areas within the study area include the Columbia River including Camas Slough and associated the associated shoreline area along with seven wetland areas associated with the Slough. The study area includes a 300-foot area around proposed structure removals on the main Mill parcel and Lady Island.

Beneficial long-term effects of the Project to fish and wildlife habitat conservation areas and species include:

- Reduced riverbed and riverbank obstructions,
- Removal of creosote-treated piles,
- Reduced shading along the river and reduction of predator refugia, and
- Creation of new shallow nearshore habitat.

The Project has been designed to avoid and minimize impacts to shoreline and critical areas to the extent possible. Permanent impacts to shoreline areas would result from placement of fill where the riverbank and riverbed would be shaped to new shallow nearshore topographic contours following removal of structures; however, the Project would reduce the overall amount of previously placed artificial fill along the riverbank.

No trees are within the Project footprint and no trees would be removed by the Project.

It is anticipated that the Project will require review and approvals under the state Shoreline Management Act, including a Substantial Development permit, as well as potentially a Conditional Use Permit under the City of Camas Shoreline Management program. Other approvals will be needed from the City of Camas, Clark County, the Washington State Department of Ecology, the Washington State Department of Natural Resources, and the Washington State Department of Fish and Wildlife, as well as permits and approvals to comply with the Clean Water Act Sections 404 and 401 through the U.S. Army Corps of Engineers and Washington State Department of Ecology.

Exhibit 5 SHOR23-01

Table of Contents

1.0 INTRODUCTION 1-1

1.1 Project Location 1-2

1.2 Land Ownership 1-3

1.2.1 Georgia-Pacific Property 1-4

1.2.2 State Aquatic Lands Lease Areas 1-4

1.3 Study Area Definition 1-4

1.4 Project Description 1-5

1.4.1 Dolphins and Pilings 1-6

1.4.2 Dock Warehouse Piers 1-6

1.4.3 Berger Crane Foundation 1-6

1.4.4 Riverbank Structures – Truck Dock, Dock Warehouse, and PECO Dock 1-7

1.4.5 Aboveground Oil Storage Tank 1-8

1.4.6 South Wood Chip Storage Area and Wood Chip Conveyor Housings 1-8

1.4.7 Miscellaneous Debris Removal 1-9

1.5 Project Schedule 1-9

1.6 Regulatory Overview 1-10

1.6.1 Shoreline Management Act 1-12

1.6.2 Clean Water Act 1-14

1.6.3 Rivers and Harbors Act 1-15

1.6.4 Hydraulic Projects in State Waters 1-15

1.6.5 Activities on State-Owned Aquatic Lands 1-15

1.6.6 State Environmental Policy Act 1-15

1.7 Qualifications of Study Authors 1-15

2.0 METHODS 2-1

2.1 Review of Available Published Information 2-1

2.2 Field Investigation 2-1

2.3 Wetland Classification and Ratings 2-2

2.4 Ordinary High-Water Mark Determination Methods 2-2

Exhibit 5 SHOR23-01

2.5 Evaluation of Fish and Wildlife Habitat Conservation Areas—Habitat Assessment 2-3
2.6 Impacts Assessment 2-4
3.0 RESULTS 3-1
3.1 Geology and Topography 3-1
3.2 Floodplains 3-2
3.3 Vegetation 3-2
3.4 Soils 3-3
3.5 Climate and Precipitation 3-3
3.6 Columbia River Including Camas Slough 3-5
3.7 Columbia River Hydrograph 3-6
3.8 Riverbank Descriptions 3-7
3.8.1 Natural Riverbank 3-8
3.8.2 Natural Steep Riverbank 3-8
3.8.3 Artificially Benched Riverbank 3-8
3.8.4 Highly Altered Riverbank 3-8
3.9 Ordinary High-Water Mark Determination 3-9
3.10 Wetlands 3-10
3.10.1 Wetland 1 3-11
3.10.2 Wetland 2 3-11
3.10.3 Wetland 3 3-12
3.10.4 Wetland 4 3-12
3.10.5 Wetlands 5 and 6 3-12
3.10.6 Wetland 7 3-13
3.11 Shoreline Area and Wetland Buffer Area 3-13
3.12 Wildlife and Habitat Conservation Areas 3-15
3.12.1 Riparian Habitats and Surface Waters 3-15
3.12.2 State and Federal Threatened and Endangered Species 3-15
3.12.3 State priority habitats and species 3-16
4.0 IMPACTS ASSESSMENT 4-1
4.1 Direct Impacts to Wetlands 4-1

Exhibit 5 SHOR23-01

4.2 Wetland Buffer Impacts 4-1
4.3 Direct Impacts to Columbia River Including Camas Slough 4-1
4.3.1 Dredging 4-2
4.3.2 Riverbed and Riverbank Shaping 4-2
4.4 Shoreline Area (Buffer) Impacts 4-3
4.5 Fish and Wildlife Habitat Conservation Areas 4-3
4.6 Indirect Impacts 4-4
4.7 Channel Hydraulics 4-4
4.8 Water Quality 4-5
4.9 Human Disturbance 4-5
4.10 Cumulative Effects 4-6
5.0 MITIGATION SEQUENCING 5-1
5.1 Avoidance 5-1
5.2 Minimization and Best Management Practices 5-1
5.3 Rectifying Impacts 5-1
6.0 SHORELINE CONDITIONAL USE EVALUATION 6-1
6.1 Consistent with Washington State's Shoreline Policy and the City Master Program 6-1
6.2 Will not interfere with the normal public use of public shorelines 6-1
6.3 Use of the site and design of the project is compatible with other authorized uses within the area, with uses planned for the area under the comprehensive plan, and shoreline master program 6-2
6.4 Will cause no significant adverse effect to the shoreline environment in which it is to be located 6-2
6.5 That public interest suffers no substantial detrimental effect 6-2
7.0 CONCLUSIONS 7-1
8.0 LIMITATIONS 8-1
9.0 REFERENCES 9-1

Exhibit 5 SHOR23-01

List of Tables

Table 1.	Parcels Included in the Project Area	1-3
Table 2.	Summary of In-water Removals	1-5
Table 3.	Quantity and Area of Overwater Removals along Riverbank	1-5
Table 4.	Other Structures to be Removed in Shoreline Area	1-5
Table 5.	Estimated Number of Pilings to be Removed	1-6
Table 6.	Proposed Open Work Windows	1-10
Table 7.	Regulatory Requirements	1-11
Table 8.	Common Invasive Species Present in Study Area	3-2
Table 9.	Monthly Precipitation Data for Vancouver Pearson Field Airport, Washington, for April-June 2019	3-4
Table 10.	Precipitation for 10 Days Preceding Field Work on July 16-17, 2019	3-4
Table 11.	Monthly Precipitation Data for Vancouver Pearson Field Airport, Washington, for April-June 2020	3-5
Table 12.	Wetland Classification Summary	3-11
Table 13.	Wetland Rating Summary	3-14
Table 14.	Dredging, Fill, and Excavation Areas in the Columbia River and Camas Slough	4-2
Table 15.	Shoreline Area (Buffer) Impact Quantities and Areas	4-3

List of Figures

Figure 1	Project Location
Figure 2A	Structures to Be Removed and Study Area Map Overview
Figure 2B	Structures to Be Removed and Study Area Map – Inset Map 2B
Figure 2C	Structures to Be Removed and Study Area Map – Inset Map 2C
Figure 2D	Structures to Be Removed and Study Area Map – Inset Map 2D
Figure 2E	Structures to Be Removed and Study Area Map – Inset Map 2E
Figure 3	Grading Plan, Berger Crane Foundation
Figure 4	Berger Crane Foundation River Bottom Restoration
Figure 5	Grading Plan—PECO Dock, Dock Warehouse, and Dock Warehouse Piers
Figure 6	Example of the Columbia River annual hydrograph, with peak flows in June and low flows in October of most years

List of Appendices

Appendix A	Site and Structures Photographs
Appendix B	Wetland Field Investigation Methodology
Appendix C	Wetland Field Data Sheets
Appendix D	Wetland Rating Forms and Supporting Figures
Appendix E	IPaC and PHS Species Lists
Appendix F	Best Management Practices

Exhibit 5 SHOR23-01

List of Acronyms

°F	degrees Fahrenheit
BMP	best management practice
CCC	Clark County Code
CMC	Camas Municipal Code
CRD	Columbia River Datum
CWA	Clean Water Act of 1972
DPS	distinct population segment
Ecology	Washington Department of Ecology
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FEMA	Federal Emergency Management Agency
FR	*Federal Register*
GIS	geographic information system
GP	Georgia-Pacific Consumer Operations, LLC
HGM	hydrogeomorphic
HPA	Hydraulic Project Approval
IPaC	Information for Planning and Consultation (USFWS)LA Lease Area
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OHWM	ordinary high-water mark
PHS	priority habitats and species
RCW	Revised Code of Washington
RM	river mile
SEPA	Washington State Environmental Policy Act
SF	square foot/feet
SR	State Route

Exhibit 5 SHOR23-01

USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
Wood	Wood Environment and Infrastructure Solutions, Inc.
WRIA	Water Resources Inventory Area

1.0 INTRODUCTION

Georgia-Pacific Consumer Operations LLC (GP) is planning to abate, remove, and demolish structures associated with prior operations along the waterfront at the Camas Mill located in the City of Camas and in unincorporated areas of Clark County, Washington. The structures to be removed are located in-water and/or overwater on the Columbia River and Camas Slough and within the Shoreline Management Area of the City of Camas, or in-water within unincorporated Clark County. This report documents the activities to be conducted in shoreline areas and presents an impacts assessment including a discussion of methods and results used to evaluate the impacts.

The structures to be removed include:

- A warehouse;
- Five docks/piers;
- Conveyor housings;
- An aboveground oil storage tank;
- Crane foundation;
- Approximately 3,000 pilings that are associated with the above structures, serve as mooring dolphins, or are abandoned; and
- Associated utilities.

The majority of the Project area is within the shoreline areas managed by the City of Camas under the City's Shoreline Management Plan (City of Camas 2021), with the exception of one dolphin to be removed that is located within the Clark County Shoreline Management zone and is managed under the County's Shoreline Management Plan (Clark County (2016). Under the state Shoreline Management Act, "Development" (Washington Administrative Code [WAC] 173-27-030(6)) does not include dismantling or removing structures if there is no other associated development or redevelopment. Therefore, the removal of the structures themselves is not regulated under the state Shoreline Management Act. However, other activities of the Project are regulated under the Act, including:

- Sediment dredging,
- Filling at the Wood Chip Yard to restore grades, and
- Excavation/filling to create final riverbank and riverbed contours and to cover the portion of retained Berger Crane Foundation.

River dredging will occur to enable barge access to piers for removal. Example photographs of the structures to be removed are presented in **Appendix A**.

GP is the sole organization responsible for maintaining, developing, removing, and deconstructing facilities identified here.

Wood Environment and Infrastructure Solutions, Inc. (Wood), at the request of GP, performed a field investigation of the Project study area between July 2019 and July 2020 and prepared a Shoreline and

Exhibit 5 SHOR23-01

Critical Areas Review and Impact Assessment in 2021 to support the Washington State Environmental Policy Act (SEPA), shoreline review, permitting under the Clean Water Act of 1972 (CWA), and other project review requirements associated with the Project as proposed in 2021. This report has been updated by Tetra Tech to reflect the current planned Project. This report provides:

- A description of the proposed Project, Project activities, and estimated timing;
- An analysis of available site information and a discussion of the existing shoreline environment;
- The results of field investigations to determine and delineate the extent of Waters of the U.S. and state, including wetlands;
- Ordinary high-water determination;
- A Fish and Wildlife Conservation Area review to identify habitats present and the potential for species listed as Priority Species by the Washington Department of Fish and Wildlife (WDFW) and for species protected under the Endangered Species Act (ESA); and
- An impacts assessment of potential effects of the Project and a discussion of the best management practices (BMP) to be implemented during Project implementation to mitigate those potential effects.

Information relative to fish and wildlife habitat conservation areas protected as critical areas is also presented. Additional detail on specific species and habitats listed under the ESA is provided in the *Biological Assessment* for this Project (Tetra Tech 2023).

This document has been prepared to meet the requirements of the City of Camas and Clark County Shoreline Master Programs and requirements for critical areas reports (Camas Municipal Code [CMC] 16.51.140 and Clark County Code [CCC] 40.440, 40.450, and 40.460). It has also been developed to provide information relevant to the SEPA process.

Note that this report does not include review of other critical areas as described in the CMC, such as geologically hazardous areas, frequently flooded areas, or critical aquifer recharge areas. Floodplain effects have been evaluated and summarized in separate reports (Wood 2023c.

1.1 Project Location

The Project area lies within the City of Camas, Washington, except for one dolphin to be removed on the Columbia River that is located outside the City limits within unincorporated Clark County, Washington. The legal description is Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16, Willamette Meridian.

Figure 1 provides an overview of the Project location. Note that figures are presented at the end of this narrative.

Figures 2A through 2E show the locations of structures to be removed that include:

- Areas along the riverbank within the main Mill parcel,
- Riverbank locations on Lady Island,
- In-water locations in the Camas Slough, and

- In-water locations extending approximately 3 miles downriver from the Mill on the Columbia River mainstem.

A bathymetric and upland survey of the Project footprint was completed in 2020, and Project drawings are based on that information (**Figures 3 and 4**).

Figure 5 indicates the extent of the preliminary grading plan.

The Project area consists of a portion of the Camas Slough, which runs between Lady Island and the city of Camas, Washington, located on the north bank of the main channel, lower Columbia River. Lady Island lies between the Camas Slough and the Columbia River main channel. The Project is between river mile (RM) 117 and RM 121, with the majority of activity at approximately RM 119 to RM 120.

The structures to be removed are located adjacent to the riverbank or entirely or partly below the ordinary high water mark (OHWM) of the Camas Slough/Columbia River and are located within either the City of Camas Shoreline Management Area or Clark County Shoreline Management Area. The Columbia River is protected as a Water of the U.S. and is also classified as a Shoreline of Statewide Significance under the Washington State Shoreline Management Act (Revised Code of Washington [RCW] 90.58).

1.2 Land Ownership

As stated, the proposed Project would occur on property owned or leased by GP (**Table 1)**. The Project area is designated as industrial land use (City of Camas 2019a,b). Lady Island is designated as Industrial land use and is classified as Medium Intensity and High-Intensity shoreline designations (City of Camas 2015, 2019b; Clark County 2019).

Table 1. Parcels Included in the Project Area

Assessor Number	Owner	Parcel Type Description/Zoning
08370-0000	Fort James Camas, LLC (GP)1/	Manufacturing—paper products/Heavy Industrial/Lady Island
09104-4013	Georgia-Pacific Corporation	Manufacturing—lumber and wood products/Heavy Industrial
09104-4015	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/Main Mill Parcel
09104-4027	Specialty Minerals Inc.2/ (GP)	Storage warehouse/Heavy Industrial
50090-1000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-2000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-3000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4001	Fort James Camas, LLC (GP)	Tidelands/Water
50081-7000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-8000	Fort James Camas, LLC (GP)	Tidelands/Water

Notes:
1/ Previous corporate name, Fort James Camas LLC, is shown on County's tax parcel information.
2/ Specialty Minerals was a part of Fort James Camas LLC.

Exhibit 5 SHOR23-01

1.2.1 Georgia-Pacific Property

The structures to be removed along the riverbank are within the main Mill parcel (Parcel 09104-4013), which supports a large variety of industrial and warehouse structures related to pulp and papermaking processes and materials management, along with a variety of office and safety-related buildings. The Mill has a long history at this location.

The Project area also includes the banks of Lady Island. Lady Island is owned in its entirety by GP (Parcel 08370-0000). Lady Island includes both developed and undeveloped areas, including the wastewater treatment facilities for the Mill, a dredged materials management area, an industrial landfill, and structures conveying overhead electrical infrastructure. Washington State Route (SR) 14 crosses the northeast portion of the island, connecting to the city of Camas via bridges across Camas Slough to the north and east. Undeveloped portions of Lady Island are mainly forested.

Activities on Lady Island include storage of dredged materials and treatment of construction stormwater at GP's wastewater treatment facilities for stormwater from main Mill parcel area during demolition.

Lady Island is zoned as Heavy Industrial land use and is classified as Medium Intensity and High Intensity shoreline designations (City of Camas 2015, 2019b). Shorelines are classified as Medium Intensity east of Camas Mill and south of SR 14, and High Intensity within the main Mill parcel.

1.2.2 State Aquatic Lands Lease Areas

GP has an established state aquatic lands lease along with several easements with the Washington Department of Natural Resources (WDNR) in Camas Slough and the Columbia River for use of state bedlands.

One dolphin located downriver of the main mill site at approximately RM 117 is on state aquatic bedlands within Clark County. This area is known as Lease Area (LA) 1, and the single nine-pile dolphin at this location would be removed. All other activities on state-owned land are within the city of Camas.

1.3 Study Area Definition

As required under CMC 16.53.030, the study area for this report extends 300 feet beyond the limits of the proposed action. The study area comprises a series of polygons along the river and riverbanks. For individual structures, piles, and dolphins to be removed, the study area was the structure plus the required 300-foot surrounding area (see **Figures 2A through 2E**).

The main Mill main parcel comprises the terrestrial portions of the study area (called "main Mill parcel" throughout this report). The study area also includes the portions of Lady Island.

The U.S. Army Corps of Engineers (USACE) currently maintains a 17-foot-deep and 300-foot-wide federal navigation channel in the Columbia River adjacent to the south side of Lady Island. No part of the Project would affect the federal navigation channel.

1.4 Project Description

Project activities would be conducted in-water in the Camas Slough and Columbia River, along the riverbank areas, and in the Shoreline Area on the main Mill parcel. **Table 2** summarizes structures to be removed from in-water locations and also indicates which aquatic land LAs or land easement the structures are located within. **Table 3** summarizes overwater structures to be removed. **Table 4** summarizes structures to be removed that are located upland of the OHWM and within the City's Shoreline Area.

Table 2. Summary of In-water Removals

Structure to be Demolished	Location within State Aquatic Lands Lease Area Number or Easement	In-water Filling or Dredging required?
Open-water dolphins and piling	Lease Areas (LA): 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19	None
Downriver dolphin in Clark County	LA 1	None
Dock Warehouse piers - access dredging	LA 17	Dredging
Berger Crane foundation	LA 17	Filling
Tug Dock	LA 17	None

Table 3. Quantity and Area of Overwater Removals along Riverbank

Structure to be Demolished	Filling or Excavation/Dredging	Total Area Covered by Structures (SF)
Riverbank Structures: Truck Dock, Dock Warehouse, and PECO Dock[1/]	Excavation/dredging and filling	40,450

Note:
1/ Together, the Truck Dock, Dock Warehouse, and PECO Dock cover approximately 1,055 lineal feet along the riverbank. Given the contiguous nature of the structures, removal activities are summarized for all three structures together.

Table 4. Other Structures to be Removed in Shoreline Area

Structure	Filling or Excavation	Total Area of Ground Disturbance (SF)	Notes
Aboveground Oil Storage Tank	None	0	Demolition is to slab, and no ground disturbance planned
South Wood Chip Storage Area	Excavate remaining wood chips and back fill to design grades	155,580	Approximately 11,100 CY of fill for restoration of area topography (all located landward of OHWM)
Product Conveyor Housing[1/]	None	0	Elevated housing, no ground disturbance
Wood Chip Conveyor Housings[1/]	None	0	Elevated housing, no ground disturbance

Note:
1/ Conveyor housings cross over the South Wood Chip Storage Area and the Truck Dock area. The adjacent North Wood Chip Storage Area is approximately 3.0 acres of upland habitat outside of the shoreline zone, but will be graded and reclaimed collectively with activities proposed in the South Wood Chip Storage Area.

Abbreviations:
CY = cubic yard
OHWM = ordinary high-water mark
SF = square feet

1.4.1 Dolphins and Pilings

Approximately 3,000 pilings comprising wood, carbon steel H-piling, concrete-filled pipe, or concrete would be removed from locations in the Camas Slough, and extending approximately 3 miles downriver from the main Mill parcel to RM 117 (see **Figures 2A–2E; Appendix A, Photographs 3, 4, and 5**). Dolphins are groups of 3, 5, 7, or 9 piles individually installed at an angle and bound together to create a sturdy structure for mooring purposes or to provide protection to an adjacent structure (see **Appendix A, Photographs 7 and 8,** for example of a dolphin). **Table 5** lists the locations and approximate number of pilings to be removed.

Table 5. Estimated Number of Pilings to be Removed

Location	In-water or Overwater	Approximate Number of Pilings 1/
Open-water dolphins and pilings	In-water	250
One downriver dolphin in Clark County	In-water	9
Pilings at riverbank associated with in-water structures 2/	In-water	200
Pilings associated with overwater structure foundations 3/	Overwater	2,500
Estimated Total Numbers of Pilings		Approximately 3,000

Notes:
1/ Numbers of piling are estimates and the total estimated number has been rounded up.
2/ In-water pilings include pilings associated with mooring dolphins, riverbank pilings, sheet pilings, pilings supporting the Dock Warehouse Piers, and pilings at the Tug Dock.
3/ Overwater pilings include pilings providing the foundations supporting the Dock Warehouse, PECO Dock, and Truck Dock along the riverbank.

1.4.2 Dock Warehouse Piers

Three piers servicing the warehouse each extend approximately 175 feet from the warehouse into the Camas Slough (**Figure 2E; Appendix A, Photograph 3**). The piers are decked with concrete and with concrete pile caps, supported by 54 octagonal, solid concrete piles, along with 21 concrete-filled carbon steel pipe piles. Most of the piles are protected with truck tires that function as bumpers.

Due to deep shoaling beneath the piers, dredging of sediments across approximately 1.6 acres beneath the piers will be required to enable barges and demolition crane to access the piers for removal. The piers will be removed following BMPs with protection from debris fall as well as following BMPs for pile removals.

Approximately 7,000 square feet (SF) of overwater shade would be removed from this location when the piers are removed.

1.4.3 Berger Crane Foundation

The Berger Crane foundation is located approximately along 1,000 feet west of the PECO Dock in Camas Slough, stands completely within the river approximately 40 feet distant from the top of the riverbank, and covers approximately 300 SF of the riverbed (**Figures 3 and 4**). The foundation is a remnant of a portion of a wood mill built in 1948 and demolished in 2002 or shortly thereafter. The narrow, 90-foot-long, wall-like structure, (**Appendix A, Photograph 6**) previously supported a large gantry crane (Berger Crane) that lifted logs from the river to the wood mill.

Exhibit 5 SHOR23-01

The foundation is a massive concrete structure made with steel reinforcement. The two end member columns were built on prepared bedrock that lies below the riverbed sediments to provide stability for the foundation. It is estimated that the structure extends approximately 15 to 25 feet below the current sediment line.

The structure would be demolished down to river stage (estimated to be +2 feet Columbia River Datum [CRD]), retaining the portion below water level. Approved clean, suitable fill material would be used to cover the retained lower columns and create river bottom contours that match the natural riverbed in this previously dredged location, resulting in restored shallow, nearshore river habitat.

1.4.4 Tug Dock

The Tug Dock is a 2,040 SF floating dock structure lying west of the Berger Crane foundation (Figure 2E). The Tug Dock is approximately 180 feet long and lies approximately 30 feet from and parallel to the riverbank. Built in 1984, the Tug Dock provided boat moorage and access to the river. This floating dock structure is held in place by pilings and is accessed from the top of the riverbank by an 80-foot-long, modern, metal gangway (Appendix A, Photograph 7). Four large guidance/mooring dolphins in this location would be removed.

Once removed, approximately 2,040 SF of shade will have been removed from the nearshore area.

1.4.5 Riverbank Structures – Truck Dock, Dock Warehouse, and PECO Dock

Together, the Truck Dock, Dock Warehouse, and PECO Dock cover approximately 1,055 continuous feet of riverbank with about 12,100 SF of total area currently perched overwater. Following removal, approximately 40,450 SF of riverbank would no longer have structures.

Following the removal of structures, the riverbank would be reshaped to 5 to 1 and 4 to 1 slopes transitioning to about 2 to 1 and slightly steeper to match existing grades. The eastern extent of this location is largely behind a small peninsula and is known to be an area of river deposition, while the western extent protrudes into the river and would be subject to more river currents than the eastern extent and require coarser material.

1.4.5.1 Truck Dock

This approximately 3,700 SF flat, asphalt- and concrete-covered area provided truck access to the loading bays on the east end of the Dock Warehouse (**Figure 2E; Appendix A, Photograph 1**). The dock is supported by approximately 320 pilings constructed from wood and pipe along approximately 350 feet of the riverbank. The dock is protected by a 100-foot-long marginal pile bulkhead at the water's edge.

Elevated conveyors formerly conveyed materials between buildings. The product conveyor housings in the vicinity of the Dock Warehouse would be removed, starting from the building and removing the structure to a support at an inland location that allows for the remaining portions of the housing to be retained.

Following removal, approximately 1,140 SF of overwater area would be uncovered at this location.

Exhibit 5 SHOR23-01

1.4.5.2 Dock Warehouse

Situated between the Truck Dock and the PECO Dock on the riverbank (**Figures 2E**), the Dock Warehouse is a 23,500 SF, three-story (lower/loading dock, first, and second floors) concrete and wooden structure (**Appendix A, Photograph 3**). The Dock Warehouse extends along approximately 400 lineal feet of riverbank and is supported by approximately 1,020 pilings with concrete pier foundations along the upper riverbank and upland side.

Originally constructed in 1934 at the site of a previous dock, the building was used to house paper shipped through the Mill. The concrete and wooden building was covered with white sheet metal siding in 1980. Following demolition, approximately 7,041 SF of overwater shading would be removed.

1.4.5.3 PECO Dock

The PECO Dock is located west of the Dock Warehouse and was constructed in 1983 (**Figures 2E**). This 305-foot-long marginal dock was built largely overwater to support a 9-ton crane (manufactured by PECO) and used to offload wood chips from river barges. The dock is approximately 13,200 SF in area and supported by approximately 170 carbon steel H-pilings (**Appendix A, Photograph 5**). Approximately 450 dilapidated wood pilings from a previous structure are also beneath the dock would be removed. An additional 200 to 300 wood and steel pipe pilings along the riverbank between and around the PECO Dock and Dock Warehouse would also be removed.

1.4.6 Aboveground Oil Storage Tank

A decommissioned 40,000-gallon steel aboveground oil storage tank located approximately 100 feet east of the Truck Dock and 150 feet north of the shoreline would be deconstructed and removed down to slab level (**Figure 2E; Appendix A, Photograph 9**). The tank was decommissioned and cleaned in 2015. The tank and its associated pipes and utilities would be removed, while the slab and earthen containment berm would be retained.

1.4.7 South Wood Chip Storage Area and Wood Chip Conveyor Housings

There are two distinct previously used wood chip storage areas, the South Wood Chip Storage Area and the North Wood Chip Storage Area. The South Wood Chip Storage Area was previously used to store wood chips for pulping at the Mill (**Figure 2E**). Currently, most of the wood chips have been removed with only minor amounts remaining. The removal resulted in a depression that would be backfilled to design grades with clean structural materials. Work activities include demolition of the overhead conveyor housing, removal of remaining chips, and filling the resulting depression to design grade (see **Figure 5**). Elevated conveyors formerly conveyed wood chips from the PECO Dock to the South Wood Chip Storage area (**Appendix A, Photograph 2**). The conveyor housings would be removed and the foundations for the supports would remain.

The North Wood Chip Storage Area was also previously used to store wood chips for pulping at the Mill. This area is located outside of the shoreline zone but would be part of the overall grading and reclamation plan that will include the entire wood chip storage area (i.e., north and south). As this

Exhibit 5 SHOR23-01

area will no longer be considered a location at the mill with industrial activity, this area will be designed to allow drainage to naturally flow back to Camas Slough. **Figure 5** indicates the preliminary grading plan for this area.

1.4.8 Miscellaneous Debris Removal

Unspecified debris that currently exists in very scattered locations along the riverbank or in-water in the Project vicinity and within lease areas would be removed by the demolition contractor. Examples of miscellaneous debris include cable, chain, floating deck walkways, log booms, unidentified metal scrap, and broken pilings. Debris would be loaded to barges or to an upland location and taken off-site to approved disposal locations. Activities would be limited to extracting or cutting off connections and lifting materials on to barges for disposal. No ground disturbance is planned to accomplish miscellaneous debris removal.

1.5 Project Schedule

Removal of the in-water and overwater structures would occur in a manner that is not disruptive to ongoing operations at the Mill. Work would be time to occur during regulatory in-water work windows for the Camas Slough and Columbia River in the project reach to protect sensitive species. Agencies at the state and federal level set the timing for in-water work, these include the WDNR, WDFW, U.S. Fish and Wildlife Service (USFWS), and National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NOAA Fisheries).

In-water work windows are established to provide protection to biologically sensitive periods. Project-specific allowances are necessary to reduce repeated reentry while accomplishing the removal of structures and to allow safe operations of vessels.

Work timing with specific activities allowed during each work window would be protective of fish, habitat, and water quality, while allowing the project to remove the various in-water and shoreline structures effectively, safely, and within a shorter time span.

The project has reviewed published agency requirements, site habitats, river hydrographs, available information on species likely to be present, and has summarized the information. The Project's *Draft Biological Assessment* (Tetra Tech 2023) evaluated potential effects of Project activities on threatened and endangered species. Based on this research and analysis, the in-water work windows shown in **Table 6** have been proposed for agency consideration. The timing has been developed to reflect the Columbia River and Camas Slough annual river stage hydrograph and planned so that work along the riverbank is completed in the dry to the greatest extent possible.

Implementation of the proposed work windows would allow certain work activities to occur year round, thereby reducing the overall duration of the project compared to the many seasons that would be required if work were limited to a standard single 120-day in-water work window. The proposed timing approach would also reduce repeated reentry impacts, while protecting biological resources during sensitive seasonal time periods.

Exhibit 5 SHOR23-01

An in-water work window that would allow dredging to begin in August is proposed. This is early enough in the work season to allow these removal activities to be completed after the bulk of the peak juvenile salmonid outmigration in the spring/summer and the peak run timing for Pacific eulachon in the late winter/early spring. An early start timeframe for these structure removals below the OWHM will not result in adverse effects to any fish or other aquatic species, or to other river-dwelling species.

With the proposed construction work windows available, work would span approximately three years, with the actual schedule dependent on the in-water work windows. Ultimately, the demolition schedule will also be influenced by weather, river stage, and equipment and contractor availability. Work would likely not be continuous for the 36 months, but work would occur intermittently during those years to take advantage of river stage. At the time of this document development, demolition is expected to begin in late 2023/early 2024, following receipt of all project permits and approvals.

Table 6. Proposed Open Work Windows

Proposed In-Water Work Windows	Allowed Activity during the Work Window
Year-round, provided work does not violate water quality standards	
	Extract pilings using vibratory equipment or direct pulling, except for concrete piles.
	Structure demolition conducted overwater or below the OHWM, but outside the wetted perimeter of the river (in-the-dry).
	Excavation/dredging for riverbank reshaping, but outside the wetted perimeter of the river (in-the-dry).
	Fill placement for riverbank/riverbed shaping, but outside the wetted perimeter of the river (in-the-dry).
	Fill placed at upland locations (e.g., North and South Wood Chip Area)
	Above OHWM miscellaneous debris removal activities
August 1 to February 28	
	Extraction of concrete piles at the Dock Warehouse piers
	Riverbed dredging
	Below OHWM miscellaneous debris removal activities
	Riverbank fill placement in the wet
	Berger Crane foundation demolition
November 1 to February 28	
	Riverbed filling—new riverbed at Berger Crane foundation

Abbreviations:
OWHM = ordinary high-water mark

1.6 Regulatory Overview

The Project would require approvals from the City of Camas, Clark County, Washington Department of Ecology (Ecology), WDNR, and WDFW, as well as permits and approvals through the USACE and Ecology to comply with Sections 404 and 401 of the CWA and Section 408 of the Rivers and Harbors Act (**Table 7**).

A review under SEPA led by the City of Camas would be performed. Following receipt of all permits and approvals, in-water and overwater work would be performed during the work timelines outlined in the applicable permits.

Table 7. Regulatory Requirements

Permit or Approval	Agency	Attendant Approvals	Application
SEPA Review and Determination	City of Camas	SEPA review and threshold determination	SEPA Checklist and supporting documentation
Shoreline Substantial Development Permit/Conditional Use	City of Camas	Requires SEPA determination be completed prior to issue	City Application and supporting documentation
FEMA Floodplain Review and Zero Rise evaluation	City of Camas and Clark County	SEPA determination	Floodplain Report and Zero-rise Certification
Historic and Archaeological Review	City of Camas and DAHP	SEPA determination	Inventory of Historic Properties and Archaeologic Resources Report
Grading Review	City of Camas	SEPA determination	Grading plans
Materials Reuse Approvals	Clark County Public Health and Ecology	Suitability determination	Data Report and determinations
Construction Stormwater General Permit	Ecology	SEPA determination	Notice of Intent and public notices
Approval under Existing Industrial Discharge Permit for construction stormwater discharges	Ecology	SEPA determination	Letter to Ecology addressing conditions provided in Condition S7 of the permit
Clean Water Act Section 401 Water Quality Certification	Ecology	CWA Section 404, ESA concurrence, requires anti-degradation review and review of suitability of materials for reuse	Joint Aquatic Resources Permit Application (JARPA); Suitability determination from DMMP, Pre-application meeting request form.
Clean Water Act Section 404 Permit (Individual)	USACE	Requires review and concurrence by USFWS and NOAA Fisheries under ESA. Requires Section 106 consultation with Tribes and DAHP. Requires NEPA compliance by federal agency. Requires suitability determination for in-water disposals	JARPA along with Historic and Cultural Resources documentation, Biological Assessment, impacts assessment.
River and Harbors Act, Section 408 for use of Civil Works Projects	USACE	None	USACE provided letter to GP in 2020 indicating no Civil Works are within the project footprint and no further action needed for compliance with this requirement.
Hydraulic Project Approval (HPA)	WDFW	Requires SEPA determination prior to issue.	Application submitted through Aquatic Protection Permitting System (APPS) including supporting reports and JARPA

Abbreviations:
CWA = Clean Water Act
DAHP = Washington Department of Historic Preservation
DMMP = Dredged Material Management Plan
Ecology = Washington State Department of Ecology
ESA = Endangered Species Act
FEMA = Federal Emergency Management Agency
NEPA = National Environmental Policy Act
NOAA Fisheries = National Oceanic and Atmospheric Administration, National Marine Fisheries Service
SEPA = Washington State Environmental Policy Act
USACE = U.S. Army Corps of Engineers
USFWS = U.S. Fish and Wildlife Service
WDFW = Washington State Department of Fish and Wildlife

Exhibit 5 SHOR23-01

1.6.1 Shoreline Management Act

The Shoreline Management Act (RCW 90.58) requires jurisdictions with shorelines to develop and implement Shoreline Master Programs. Such programs have been developed by both the City of Camas (2021) and Clark County (2016). Both approved Shoreline Master Programs address the primary policy areas of the Shoreline Management Act:

- Manage shoreline use for water-dependent users.
- Incorporate environmental protection.
- Preserve and enhance public access and recreational opportunities.

In the project study area, regulated shoreline areas consist of the Columbia River mainstem and the Camas Slough as Waters of Statewide significance. Proposed Project activities would occur within the Aquatic and High Intensity Shoreline Areas **(Figure 4**). As stated, the structures to be removed are located entirely, or in part, below the OHWM of the Columbia River.

Under the Shoreline Management Act (RCW 90.58.030), "Development" does not include dismantling or removing structures; therefore, the removal of the structures themselves is not regulated under the Shoreline Management Act (City of Camas 2021). However, other Project activities are regulated under the Shoreline Management plan, including:

- Sediment dredging,
- Filling to restore topography at the South Wood Chip yard.
- Filling to create final riverbank and riverbed to restore natural contours following removals, and
- Filling at Berger Crane Foundation to create shallow water habitat.

Under the Camas Shoreline Master Program, new dredging shall be permitted only where it is demonstrated by a qualified professional that the proposed water-dependent or water-related uses will not result in significant or ongoing adverse impacts to water quality, fish and wildlife habitat conservation areas and other critical areas, flood holding capacity, natural drainage and water circulation patterns, significant plant communities, prime agricultural land, and public access to shorelines. When such impacts are unavoidable, they shall be minimized and mitigated such that they result in no net loss of functions. Dredging is included in the definition of "Development" under the Shoreline Management Act and dredging is allowed where it will not result in significant adverse impacts.

According to the Camas Shoreline Master Program and the City planners, backfilling activities for structural shoreline bank stabilization in the High Intensity shoreline are permitted subject to a shoreline Conditional Use approval by the City of Camas. If the backfilling is bioengineered or non-structural the use is permitted outright. To be eligible for a Conditional Use approval, the applicant must demonstrate consistency with WAC 173-27-160.

The Camas Shoreline Master Program as well as the CMC contain regulations, provisions, as well as general application requirements for a conditional use approval and shoreline application. This includes the requirements outlined in CMC Section 18.55.110, as well as Appendix B Section VI.B, VII.B,

Section IX of the Camas Shoreline Master Program. Furthermore, both WAC 173-27-160 and Appendix B Section IX of the Camas Shoreline Master Program provide review criteria for conditional use approvals under the Shoreline Protection Act. "Conditional use" means a use, development, or substantial development which is classified as a conditional use. or is not classified within the applicable master program (WAC 173-27-030(4)).

In authorizing conditional use, the applicant must demonstrate that the proposal's proposed use:

- Is consistent with the Program, and the policies of the Act (RCW 90.58.020);
- Will not interfere with normal public use of public shorelines;
- The proposed use of the Site and the design of the development will be compatible with the surrounding authorized uses, the Program, and the comprehensive plan;
- Will cause no significant adverse effects on the shoreline environment or other uses; and
- That the public interest would suffer no substantial detrimental effect.

The Camas Shoreline Master Program and Clark County Shoreline Master Program include requirements to protect critical areas and their buffers that are within the shoreline area. Critical areas protected under the Shoreline Master Programs include wetlands, aquifer recharge areas, frequently flooded areas or flood hazard areas, geologic hazard areas, and fish and wildlife habitat conservation areas (CMC 16.51.070; CCC 40.460.530(B)).

The City of Camas defines fish and wildlife habitat conservation areas (CMC 16.61.010) to include the following areas:

- Locations where state or federally designated endangered, threatened, and sensitive species have a primary association;
- Mapped locations of state priority habitats and species (PHS), as identified by WDFW (2020a)[1];
- Habitats of local importance;
- Naturally occurring ponds under 20 acres that provide fish or wildlife habitat;
- Waters of the state;
- Bodies of water planted with game fish by government or tribal entity; and
- State Natural Area Preserves and Natural Resource Conservation Areas, as defined and managed by WDNR.

Clark County (CCC 40.440.010C) defines fish and wildlife habitat areas as:

- Riparian priority habitat as defined by WDFW (2020a);
- Other PHS as defined by WDFW (2020a); and
- Locally important habitats and species as designated by Clark County.

[1] The PHS database was queried again in 2022 by Tetra Tech, and no additional species were found in the area beyond those found in the 2020 query conducted by Wood. The 2020 PHS query conducted by Wood can be found in Appendix F.

Erosion and sediment BMPs will be implemented to meet the clearing and grading standards (CMC Chapter 15.50.090). The preliminary grading plan (**Figure 5**) will be updated as necessary and submitted to the City of Camas for a clearing and grading permit as required for CMC Chapter 15.50.080.

1.6.2 Clean Water Act

The CWA (33 United States Code [U.S.C.] §1251 et seq.) along with the implementation rules, including the Navigable Waters Protection Rule (85 *Federal Register* [FR] 22250), establishes the structure for regulating discharges of pollutants into waters of the U.S. and regulating quality standards for surface waters.

Section 404 of the CWA establishes a program to regulate the discharge of dredged or fill material into waters of the U.S., including wetlands, and requires a permit before dredged or fill material may be discharged into waters of the U.S. The USACE and the U.S. Environmental Protection Agency jointly implement and enforce the CWA Section 404 program. The USACE Seattle District administers individual and general permit decision, conducts or verifies jurisdictional determination, and enforces Section 404 permit provisions for projects in the area. The Columbia River and Camas Slough are considered jurisdictional waters of the U.S. because they are traditional navigable waters (85 FR 22250). The USACE's jurisdictional boundary for fresh waters under the CWA is the OHWM along with the upland boundary of any adjacent wetlands.

Wetlands are present below the OHWM in the study area and impacts to the wetlands by Project activities would be regulated by the USACE. As part of the Section 404 permitting process, the USACE consults with the USFWS and NOAA Fisheries to evaluate impacts on fish and wildlife protected under the ESA. To facilitate the USACE consultation process, a *Biological Assessment* (Tetra Tech 2023) has been prepared to document the biological resources and evaluate potential effects to species listed on the ESA that may be present in the Project area.

Further, federal agencies are mandated to consider the effects of their undertakings on historic properties under Section 106 of the National Historic Preservation Act of 1966 [16 U.S.C. §470(f)]. Thus, as part of the Section 404 review, the USACE consults with the Washington State Department of Archaeology and Historic Preservation. The Project has developed an *Inventory of Historic Properties and Historic Context* (Wood 2023a), which summarizes the presence of historic structures and provides evaluation regarding eligibility for listing as an Historic Resource. The Project's *Archaeological Resources Survey and Literature Review Report* (Wood 2023b) provides information on resources and an analysis of potential effects. The City also reviews historic and archaeologic resources and requires submission of reports to tribes in the area.

Delegation of CWA Section 401 and its implementing rules authorizes Washington State to certify that a discharge would not violate state water quality standards prior to the issuance of a Section 404 CWA permit. For the Project area, Ecology is the designated state water pollution control agency for issuing a Section 401 Water Quality Certification. Ecology requires a SEPA determination to be completed for the project prior to evaluating and approval of a 401 Certification.

Exhibit 5 SHOR23-01

1.6.3 Rivers and Harbors Act

The Rivers and Harbors Act of 1899 (33 U.S.C. §401 et seq.) regulates all work affecting the condition of navigable waters. Section 10 of the Rivers and Harbors Act requires authorization from the USACE for the construction of any structure in or over any navigable waters of the U.S., the excavation and dredging or deposition of material, or any obstruction or alteration to a navigable water. Under the Rivers and Harbors Act, the jurisdictional boundary for fresh navigable waters is the OHWM (33 CFR 329.11). The Columbia River is considered a navigable water subject to Section 10 (USACE 2008).

1.6.4 Hydraulic Projects in State Waters

Hydraulic projects in or near state waters are required to obtain a Hydraulic Project Approval (HPA) from the WDFW (RCW 77.55). A hydraulic project is considered to be construction or other work activities conducted in or near state waters that would use, divert, obstruct, or change the natural flow or bed of any waters of the state, as well as structures that cross over waters. The Columbia River and Camas Slough are considered Waters of the State with the jurisdictional boundary waterward of the OHWM (RCW 77.55.011).

1.6.5 Activities on State-Owned Aquatic Lands

State-owned aquatic lands are defined as all tidelands, shorelands (i.e., shorelines), harbor areas, the beds of navigable waters, and waterways owned by the state and administered by the WDNR. This Project includes activities on state aquatic lands leased by GP under a 2016 State Aquatic Lands Lease and also bedlands within various Aquatic Land Easements issued by WDNR to GP.

The lease terms require coordination and approvals by WDNR prior to undertaking the Project. Coordination with WDNR to meet the terms of the lease has been initiated with the objective for the Project to identify and meet various lease terms for work occurring within the footprint. WDNR coordination will continue throughout the Project.

1.6.6 State Environmental Policy Act

SEPA (RCW 3.21C) establishes a process to identify and analyze environmental impacts associated with governmental decisions, including issuing permits for private projects. City, county, and state permits and approvals for this Project require that a SEPA review and threshold determination be made prior to issuance of a permit or approval.

The City of Camas is the lead SEPA agency for the Project. A pre-application meeting was initially held with the City in March 2020 and again in December 2022.

1.7 Qualifications of Study Authors

As required in CMC 16.51.140, CMC 16.53.030, and CMC 16.61.020, this *Shoreline Report, including Critical Areas Review, Ordinary High Water Determination, and Impact Assessment* was prepared by qualified biologists. This effort was accomplished by Wood's biologists, Dr. Kristie Dunkin (Project Manager and Biologist) and Ms. Theresa Price (Biologist). Dr. Dunkin earned a Ph.D. in Soil Science

from the University of California at Berkeley and has 20 years of experience in habitat restoration, wetland identification and delineation, impact mitigation, compliance with SEPA and the National Environmental Policy Act (NEPA), and regulatory evaluations. Dr. Dunkin is trained in ordinary high-water mark delineation and wetland rating by Ecology. Dr. Dunkin instructed the Certification course in Wetland Identification and Delineation at the University of Washington for eight years.

Ms. Theresa Price is a botanist and environmental planner at Wood. Ms. Price earned an M.S. in Applied Biological Sciences from Arizona State University at Tempe and has 13 years of experience in botanical inventory, habitat assessment, identification and delineation of wetlands and jurisdictional Waters of the U.S., NEPA/SEPA compliance documentation, and regulatory due diligence reviews. Ms. Price is trained in ordinary high-water delineation, wetland rating, and hydric soils field indicators by Ecology and has attended wetland identification and delineation courses that meet the guidelines of USACE wetland delineation requirements.

On behalf of GP, Tetra Tech has reviewed all of the data collection and other information in this report and updated portions of it to match the proposed project activities to date. Review was completed by Mr. Steve Negri, Senior Biologist and Project Manager. Mr. Negri has more than 24 years of experience developing, managing, and conducting remote field-oriented and wildlife research projects, and evaluating potential effects of various resource management activities on wildlife and vegetation. He has authored numerous Biological Assessments / Biological Evaluations, and has technical experience with ESA Section 7, permitting, and compliance monitoring. Mr. Negri has an extensive portfolio of projects conducted to support project permitting in compliance with federal and Washington state laws and regulations.

Exhibit 5 SHOR23-01

2.0 METHODS

This section describes the methods used to prepare this *Shoreline and Critical Areas Review and Impact Assessment*. **Appendix B** provides detailed methods for wetland identification and delineation used for the project.

2.1 Review of Available Published Information

Available site information was reviewed to identify documented wetlands, streams, or other site characteristics (e.g., vegetation patterns, topography, soils, or aquatic areas) that would indicate the presence of critical areas and shoreline areas within the study area. Applicable literature was queried to identify the wildlife and habitat conservation areas that occur in the study area and include the following:

- Critical Areas Maps (City of Camas 2019a; Clark County 2019);
- National Wetland Inventory (NWI) (USFWS 2019a);
- Soil Survey of Clark County, Washington (Natural Resources Conservation Service [NRCS] 2018);
- Camas, WA-OR 7.5-minute topographic quadrangle (USGS 2017);
- Federal Emergency Management Agency (FEMA) flood hazard areas—City of Camas (FEMA 2019);
- Publicly available aerial imagery of the vicinity (Google Maps 2022);
- USFWS Information for Planning and Consultation (IPaC; USFWS 2020, 2022);
- WDFW Priority Habitats and Species Maps (WDFW 2020a, 2022);
- *SalmonScape* (WDFW 2020b);
- City of Camas Shoreline Master Program (2015, 2021); and
- Clark County Shoreline Master Program (2016).

2.2 Field Investigation

Field work was performed by Wood on July 16 and 17, 2019, January 7, 2020, and on July 22, 2020. During the July 2019 investigation, the study area was evaluated to characterize the shoreline environment and fish and wildlife habitat, as well as document the presence and extent of wetlands, and determine the OHWM location. The same area was revised on January 7, 2020. A subsequent field investigation was performed on July 22, 2020, to include shoreline areas of Lady Island and Camas Slough that were not previously reviewed.

Wetlands along the riverbanks of Camas Slough on the main Mill parcel in the vicinity of overwater structures to be removed (based on the Project design at the time of survey) were delineated. To complete the wetland identification and delineation, biologists implemented the methods outlined in the USACE's *Wetland Delineation Manual* (USACE 1987) and in the *Regional Supplement for Western Mountains, Valleys and Coast Region* (USACE 2010). A description of the wetland investigation

Exhibit 5 SHOR23-01

methodology, including wetland indicators for vegetation, hydric soils, and wetland hydrology parameters, is provided in **Appendix B**. Wetland data observations were recorded on Wetland Field Determination Data Sheets, which are provided in **Appendix C.**

2.3 Wetland Classification and Ratings

Wetland vegetation community classification follows that developed by Cowardin et al. (1979), and hydrogeomorphic (HGM) classification follows Brinson (1993). The *Washington State Wetlands Rating System for Western Washington* (Hruby 2014) was used to rate wetlands. This methodology identifies and quantifies the potential of various wetland functions. The categorization is based on the physical characteristics of water quality, hydrologic, and habitat functions in the wetland and buffers. Within this system, wetlands are given a score based on the functions provided by the wetland and are classified as Category I through Category IV. Functional assessment rating forms and supporting figures are provided in **Appendix D**.

The City of Camas (CMC 16.53.040) determines wetland buffer widths based on the wetland rating scores (including habitat score) using the Washington State Wetlands Rating System along with proposed type and intensity of adjacent land uses. The Wetland Rating forms are presented in **Appendix D**.

2.4 Ordinary High-Water Mark Determination Methods

The OHWM is defined by RCW 90.508.030(2):

> GP*"... on all lakes, streams, and tidal waters, is that mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation, as that conditions exists on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by a local government or the department: Provided that in any area where the ordinary high water mark cannot be found; the ordinary high water mark adjoining salt water shall be the line of mean higher high tide; and the ordinary high water mark adjoining fresh water shall be the line of mean high water."*

Methodology implemented followed the guidance and process described in *Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State* (Anderson et al. 2016) published by Ecology. Note that while the Columbia River is tidal in the Project reach, the river waters are freshwater and not saline. The additional definitions provided for OHWM determination in WAC 173-22-030(5)(a) for low-energy and high-energy tidal environments apply only to marine and estuarine environments with saline waters and do not apply to the study area.

Stream OHWM indicators were used for field inspections as there was minimal tidal influence and contiguous wetlands for much of the reach. Per Ecology methods, the OHWM was determined by a field evaluation of the biological response to the long-term and frequent presence of water on soil and vegetation. The evaluation included observations of the presence of indicators, such as scour lines,

Exhibit 5 SHOR23-01

debris and wrack lines, soil characteristics, topographic breaks, and shifts in vegetation community composition.

Prior to the field investigation, information from a tidal station was used to establish local tidal prism characteristics and bookmark possible OHWM elevations. The nearest NOAA tidal station is located in Washougal, Washington (Station 9440047; NOAA 2019) approximately 1 mile upriver from the eastern end of the study area, and on the same bank. At the station, the mean tidal range is 1.19 feet. The mean higher high water elevation was +25.39 feet, while the mean lower low water level was +21.55 feet (both relative to the North American Vertical Datum of 1988 [NAVD88]). These elevations were used for reference.

During the field investigation, biologists walked the accessible portions of the riverbank on the main Mill parcel looking for indicators and working in transects perpendicular from water's edge up the riverbank. A survey of flagged locations was completed by others.

In addition to the biological field observations, the OHWM in the Project area had been mapped and surveyed as part of GP's 2014 lease agreement with WDNR. That mapping was also used for reference in determining the location of the OHWM.

Riverbank conditions and OHWM downriver from the main Mill parcel were observed from the water to provide existing conditions information. The OHWM was not mapped in these locations as all planned removals are within the channel, and no work would occur on the riverbank or upland of the OHWM.

2.5 Evaluation of Fish and Wildlife Habitat Conservation Areas—Habitat Assessment

Wood performed a habitat assessment for the study area by reviewing existing information pertinent to the study area and walking the project area to observe habitat conditions in the project area. Information from USFWS (2020) and NOAA Fisheries (2020) were obtained for species that fall under the jurisdiction of the federal ESA. Information was also obtained from WDFW for state-listed species and habitats (WDFW 2020a). Information on species listed under Section 7 of the ESA that are potentially present in the action area was obtained from the USFWS IPaC online tool (USFWS 2020, 2022) and from NOAA Fisheries (2020).

The WDFW PHS website and *SalmonScape* interactive mapper were also searched for priority habitats and state protected and sensitive species potentially occurring in the project action area (WDFW 2020a,b)[2]. **Appendix E** provides IPaC and WDFW lists. The WDNR online Natural Heritage Program database (WDNR 2019a,b) was also queried for records of state-listed plants or high-quality ecosystems in the study area.

[2] The PHS database was queried again in 2022 by Tetra Tech, and no additional species were found in the area beyond those found in the 2020 query conducted by Wood. The 2020 PHS query conducted by Wood can be found in **Appendix E**.

Exhibit 5 SHOR23-01

2.6 Impacts Assessment

An impacts assessment was performed to determine permanent and temporary, direct and indirect effects of the project on sensitive receptors. Recent topographic survey information, field survey information on existing conditions, as well as engineering plans were used to determine areas of effects through geographic information system (GIS) analysis. An impacts assessment was performed based on the delineated wetland boundaries, OHWM location, the 200-foot Shoreline Area per the City of Camas Shoreline Management Plan, and information from preliminary-level engineering plans for the project.

The following potential impacts were evaluated:

- Permanent and temporary construction-related impacts including noise and ground disturbance,
- Alteration of the terrestrial and aquatic environments, and
- Potential water-quality effects.

Changes in shading and extent of area removed from the channel were also evaluated.

Quantities of fill and dredging were determined by an engineering analysis. Area calculations were performed by overlaying GIS datasets and calculating intersections of Project activities with sensitive areas. Evaluations of indirect effects were made based on descriptions of the proposed activities planned for removing structures throughout the Project area.

A 30-foot disturbance radius around in-water structures was assumed in assessing water quality impacts.

Exhibit 5 SHOR23-01

3.0 RESULTS

This section presents the results of the literature review and field survey and describes aquatic and shoreline resources within the study area.

3.1 Geology and Topography

Surficial geology in the study area is complex and includes areas of artificial fill, Quaternary Columbia River floodplain alluvium, and outcrops of basaltic andesite bedrock. The study area is located in the northeastern-most extent of the Portland Basin, lying just west of Washington's South Cascades province, where the Columbia River has cut through mountains forming the Columbia River Gorge. The Portland Basin, a northwest/southeast-trending forearc depression, is filled with a wide variety of deposits, including flood basalts, continental and locally derived sediment, catastrophic flood (e.g., Missoula Flood) deposits, and locally derived volcanic materials (Evarts et al. 2009). The basin is divided at its northern extent by the Columbia River. Local volcanic activity at the basin's margins has resulted in volcanic cones, vents, and flows, including Prune Hill, a volcanic cone that rises from the riverbank of the study area. In general, basaltic andesite bedrock is found at the surface, to no deeper than about 30 feet below surface, throughout the study area. Importantly, some of the features scheduled to be demolished are embedded in this bedrock.

Both the main mill parcel and Lady Island survey area are within the boundaries of two mapped surface geologic units. Holocene and Pleistocene-aged quaternary alluvium is mapped on a major portion of the area and is characterized by unconsolidated or semi-consolidated alluvial clay, silt, sand, gravel, and (or) cobble deposits. In swales and other depressions, it locally includes peat, muck, and diatomite. Along the River, this unit includes beach deposits, and also includes areas of modified land and artificial fill. The main Mill parcel and most of Lady Island are mapped as quaternary alluvium.

Tertiary volcanic rocks of the Elkhorn Mountain unit outcrop in several relatively smaller locations on the main Mill Parcel and on Lady Island. The Oligocene-aged rock resulted from a sequence of lava flows and flow breccia, and are composed of dark gray to brown, porphyritic to seriate to aphyric tholeiitic basaltic andesite and basalt, with individual flows generally about 5 to 8 meters thick. This unit of volcanic bedrock occurs on the eastern portion of the south shoreline of Lady Island. The unit forms riverside cliffs, along with the nearby large protruding rocks within the main stem of the Columbia River called "Ione Reef." This unit underlies the Quaternary alluvium and fill materials forming a near-surface bedrock layer across the entire Project area.

Structures to be removed on the main Mill parcel are built on or into an artificially formed riverbank created from fill materials, with the terrace elevation of approximately +35 to +38 feet (relative to NAVD88). The remaining portions of the study area have topography drawn by river channel dynamics. Depending on the river level, most pilings and dolphins are present in water depths not usually greater than 30 feet, and often between 10 and 15 feet deep.

Exhibit 5 SHOR23-01

3.2 Floodplains

Proposed removals would occur entirely within the Columbia River and Camas Slough's regulatory floodway (Zone AE), with the 100-year floodplain (areas with a 1 percent annual chance of flooding) water surface elevation of between 34 feet (NAVD88; western study area extent) and 36 feet (FEMA 2019). An analysis of effects of the Project on the floodway and floodplain was performed and presented in *No-rise Report for Removal of Structures along Camas Slough* (Wood 2023c) and determined that the proposed demolition of piles and other structures and associated changes to ground surface along Camas Slough will not increase the 100-year regulatory flood elevations on Camas Slough, and thus on the Washougal River or Columbia River.

3.3 Vegetation

Most of the study area includes aquatic bed with waters deep enough to lack a vegetation community. On the main Mill parcel, vegetation is generally sparse to absent in the study area, which includes the structures to be removed. Wherever plant communities were present on the main Mill parcel they generally comprised predominantly weedy and invasive species.

Along the Columbia River, black cottonwood (*Populus trichocarpa*) and Oregon ash (*Fraxinus latifolia*) are the tree species where present. Common forest understory plants where present include vine maple (*Acer circinatum*), hawthorn (*Crataegus douglasii),* wild rose (*Rosa gymnocarpa*), blackberry (*Rubus ursinus*), thimbleberry (*Rubus parviflorus*), salmonberry (*Rubus spectabilis*) and snowberry (*Symphoricarpos albus*) (Franklin and Dyrness 1988). Disturbed areas support invasive species, such as Himalayan blackberry (*Rubus armeniacus*).

Vegetation growing along riverbanks adjacent to in-water removals are summarized in the riverbank descriptions given below. **Table 8** summarizes the invasive and weedy species commonly encountered in the study area.

Table 8. Common Invasive Species Present in Study Area

Common Name	Scientific Name	Noxious Weed Class
Indigo bush	*Amorpha fruticosa*	B
Canada thistle	*Cirsium arvense*	C
Field bindweed	*Convolvulus arvense*	C
Teasel	*Dipsacus fullonum*	C
English ivy	*Hedera helix*	C
Himalayan blackberry	*Rubus armeniacus*	C
Reed canarygrass	*Phalaris arundinacea*	C
Tansy ragwort	*Tanacetum vulgare*	C
Common St. Johnswort	*Hypericum perforatum*	C
Hairy cat's ear	*Hypochaeris radicata*	C

Note:
Noxious Weed Class as defined in RCW 17.10.140.

Exhibit 5 SHOR23-01

3.4 Soils

Soil in the study areas and along the riverbanks was mapped by the Natural Resources Conservation Service (NRCS). Soils maps were accessed from the NRCS Web Soil Survey (2018). Soils and sediments in riverbeds are not mapped by NRCS.

Soils on the riverbank within the main Mill parcel are mapped as Fill Land, representing developed areas with nonnative materials. Other riverbanks in the study area were mapped as either Newburg silt loam or Sauvie silt loam series. All the soils on the main Mill parcel in the study area comprise fill historically placed to create a level terrace at river's edge.

In the study area, the north side of the Columbia Riverbank and the north side of Lady Island riverbank were mapped as Newburg silt loam series, while the western extent of Lady Island and the area in the vicinity of the Riverbank Pumphouse were mapped as Sauvie silt loam series.

Newberg silt loam series soils are somewhat excessively drained and located on floodplains with slopes of 3 to 8 percent. They are formed in loamy and sandy alluvium derived from mixed sedimentary and basalt volcanic rocks. The soils are subject to frequent to occasional flooding from December through March.

Deep, poorly drained Sauvie silt loam series soils are also mapped on floodplains. This soil is saturated to the surface in most years from December to March and subject to overflow tidal flooding. Sauvie soils form in mixed alluvium with volcanic ash on flat to 3 percent slopes. When artificially drained and protected from flooding, both soils are used for agriculture. Mapping of Sauvie series soils on Lady Island by the NRCS largely coincides with provisional identification of wetland areas by the City of Camas.

Ecology has assigned soils on the main Mill parcel as Site No. 15156 for potential presence of hazardous substances regulated under Washington State's Model Toxics Control Act. The presence of contaminants on the parcel has not been evaluated at this time, and no other contaminated or potentially contaminated sites are listed in the Project's action area.

3.5 Climate and Precipitation

Climate and precipitation data were collected from a National Weather Service station at the Vancouver Pearson Field Airport, located approximately 12 miles west of the study area. The study area is characterized by 36.60 inches of annual precipitation, average annual mean air temperature of 54.1 degrees Fahrenheit (°F), and average summer air temperature of 66.5°F (NRCS 2019). As with most of western Washington, the highest monthly precipitation generally occurs sometime between October 1 and March 31, with much less precipitation between April and September.

Table 9 summarizes the monthly precipitation data recorded during the 3 months preceding the 2019 field survey. Historical data from 1981 to 2019 were reviewed for historical monthly averages and "normal" rainfall. *Normal* rainfall is classified as rainfall totals that fall between the 30th and 70th percentile values. Each of the 3 months prior to field studies was assigned a condition value based on whether the measured precipitation during that month was considered dry, normal, or wet. The months were then assigned a weight based on that month's temporal proximity to the site visit. June

and April were drier than normal, whereas May had normal monthly precipitation. Results of the analysis showed that the observed precipitation in the 3 months preceding the site visit in July 2019 were considered to be drier than normal.

Table 9. Monthly Precipitation Data for Vancouver Pearson Field Airport, Washington, for April-June 2019

Month	Precipitation (Inches)				Condition (Dry, Wet, Normal)[1/]	Condition Value[2/]	Month Weight Value[3/]	Product of Previous two Columns[4/]
	Historical Monthly Average	3 in 10 years will have		Actual Monthly Total				
		Less Than	More Than					
June	1.40	0.96	1.81	0.63	Dry	1	3	3
May	2.37	1.40	2.88	1.55	Normal	2	2	4
April	2.62	1.97	3.06	0.83	Dry	1	1	1
							TOTAL	8

Notes:
1/ Conditions are considered "normal" if they fall within the range bounded by the 30th and 70th percentiles.
2/ Condition Values: 1 = Dry; 2 = Normal; 3 = Wet.
3/ Month weight values are ranked based on temporal proximity to date of field site visit, 3 being most recent month to the site visit.
4/ A product range of 6-9 = period is drier than normal; 10-14 = period is normal; 15-18 = period is wetter than normal.

Table 10 summarizes the rainfall over the 10 days prior to the 2019 site visit. A total of 0.38 inch of rainfall was recorded during the period, which all fell on 4 days. The remaining 6 days preceding the field work were dry.

Table 10. Precipitation for 10 Days Preceding Field Work on July 16-17, 2019

Date (2019)	Daily Precipitation (Inches)
July 15	0.03
July 14	0.00
July 13	0.00
July 12	0.00
July 11	0.00
July 10	0.06
July 9	0.22
July 8	0.00
July 7	0.00
July 6	0.07
TOTAL	0.38

Note: Precipitation data from Vancouver Pearson Field Airport, Washington.

Table 11 summarizes the monthly precipitation data recorded during the three months preceding the 2020 field survey. Historical data from 1981–2019 were reviewed for historical monthly averages and normal rainfall. June was wetter than normal, April was drier than normal, whereas May had normal monthly precipitation. Results of the analysis showed that the observed precipitation in the 3 months preceding the site visit is considered to be normal. No rainfall was recorded Pearson Field Airport over the 10 days prior to the 2020 site visit.

Table 11. Monthly Precipitation Data for Vancouver Pearson Field Airport, Washington, for April-June 2020

Month, 2020	Precipitation (Inches)				Condition (Dry, Wet, Normal)[1/]	Condition Value[2/]	Month Weight Value[3/]	Product of Previous two Columns[4/]
	Historical Monthly Average	3 in 10 years will have		Actual Monthly Total				
		Less Than	More Than					
June	1.40	0.96	1.81	3.40	Wet	3	3	9
May	2.37	1.40	2.88	2.68	Normal	2	2	4
April	2.62	1.97	3.06	0.91	Dry	1	1	1
							TOTAL	14

Notes:
1/ Conditions are considered "normal" if they fall within the range bounded by the 30th and 70th percentile values.
2/ Condition Values: 1 = Dry; 2 = Normal; 3 = Wet.
3/ Month weight values are ranked based on temporal proximity to date of field site visit, 3 being most recent month to the site visit.
4/ A product range of 6-9 = period is drier than normal; 10-14 = period is normal; 15-18 = period is wetter than normal.

3.6 Columbia River Including Camas Slough

The Columbia River and Camas Slough flow from east to west within the study area. The Columbia River is one of the largest rivers in North America, extending approximately 1,240 miles, draining approximately 258,000 square miles, and emptying into the Pacific Ocean (Kammerer 1990 as cited by Clark County 2011). The Project area is within the Lower Columbia River Reach and is approximately 120 river miles from the Pacific Ocean, and within Washington's Water Resources Inventory Area (WRIA) 28.

Prior to industrial development in the late 1800s, the Columbia River within the study area likely included extensive riparian habitats. Local industrial development along with upriver dam development, and general channelization along the Columbia River to provide river transport and hydroelectricity resulted in infrastructure that hardened riverbanks, created and stabilized navigational channels, and isolated floodplains behind levees. These river channel modifications have greatly altered the river's natural channel and associated riparian habitats. No river levees exist in the project area. Columbia River and Camas Slough are listed on Ecology's 303d Water Quality list of impaired waters for temperature in the study area.

Camas Slough is an approximately 2.4-mile-long river side channel. Camas Slough branches from the Columbia River mainstem at the tip of Lady Island, forming the northern shoreline of Lady Island and the southern shore of the City of Camas. The confluence with the Washougal River occurs at the far eastern (upriver) end of the Camas Slough and Camas Slough receives the entire Washougal River discharge.

In the Project vicinity, SR 14 crosses the Camas Slough twice on bridges, initially near the head of the slough onto Lady Island, then approximately through the middle of the Slough's length back to the north riverbank (**Figure 2A**).

Within the study area, the Columbia River and Camas Slough are tidal, with a mean daily tidal range of approximately 1.19 feet (NOAA 2019). Tidal influence extends upriver to the Bonneville Dam, located approximately 20 river miles upstream from the Project area. In general, tidal influence decreases as

Exhibit 5 SHOR23-01

the volume of water increases in this system, and thus, at high river stages, the tidal influence is largely masked. At low water levels, the semi-diurnal tidal fluctuation is readily observed.

The Lower Columbia River subbasin supports several species of anadromous salmonids, including Chinook salmon (*Oncorhynchus tshawytscha)*, coho salmon (*O. kisutch*), chum salmon (*O. keta*), pink salmon (*O. gorbuscha*), coastal cutthroat (*O. clarkii*), and steelhead (*O. mykiss*) (Lower Columbia Fish Recovery Board 2004; WDFW 2020a,b). These salmonid species spawn in freshwater tributaries upstream from the study area and no spawning habitat is present in the study area.

The study area serves as a migratory corridor for ESA-listed anadromous fish. Adults migrate through the study area primarily while traveling to upstream freshwater habitats. Juveniles fish move downstream, mainly with the Spring freshet, to reach rearing habitats in the estuary before migrating to the Pacific Ocean. Juveniles are known to utilize shallow nearshore habitats with shallow slopes.

Many non-salmonid sensitive fish species are present in the Lower Columbia River, and presumably the Project reach, including green sturgeon (*Acipenser medirostris*), river lamprey (*Lampetra ayresi*), and Pacific eulachon (*Thaleichthys pacificus*), as well as abundant numbers of perches, crappies, sculpin, and larval smelt (Lower Columbia Fish Recovery Board 2004).

3.7 Columbia River Hydrograph

A key timing consideration for in-water work is the Columbia River's annual hydrograph. The Columbia River, and thus the Project location, experiences an annual river hydrologic cycle driven by snowpack melt and precipitation patterns, with peak flows, or about 60 percent of the natural runoff, occurring May through June in most years (NRCS 2020; FWEE 2020). Low river stages occur in the late summer and early fall months (August through October), with the lowest river stage usually occurring in October. There is approximately an annual 15-foot change in water depths, with approximately a three-fold change of river discharge between low and high river stages.

Figure 6 provides an example Columbia River hydrograph showing the annual hydrologic cycle. This graphic is based on 3 years of data from a gauge located in the river's main stem at Vancouver, Washington, approximately 16 miles downriver of the Project area.

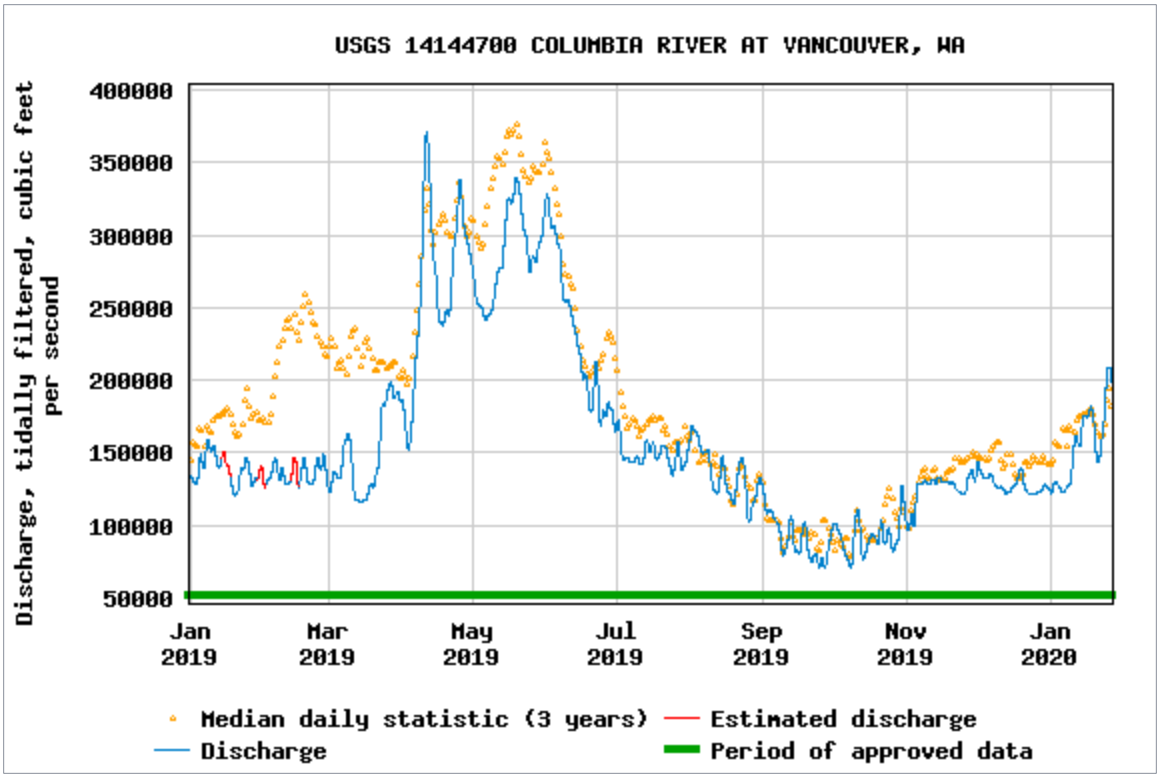


Figure 6. Example of the Columbia River annual hydrograph, with peak flows in June and low flows in October of most years. Note data are screened to remove the semi-diurnal tidal range of approximately 3 feet at this location downriver of the proposed Project.

The confluence of the Washougal River and the Columbia River occurs at the east end of Camas Slough. Camas Slough receives all the Washougal River discharge, which regularly exceed 1,000 cubic feet per second from November to June, but typically falls below 100 cubic feet per second in late summer (Lower Columbia Fish Recovery Board 2010). When the Columbia River's stage is low, relatively little additional flow from the Columbia main stem flows into Camas Slough.

3.8 Riverbank Descriptions

The Project extends along the Camas Slough and Columbia River almost 3 miles. Riverbanks would not be directly disturbed in the vicinity of dolphin removals from the Camas Slough and the Columbia River channel; however, indirect effects are possible due to vessel operations. Riverbank characteristics within the study area were summarized into four types:

- Natural riverbank,
- Natural steep riverbank,
- Benched riverbank, and
- Highly altered riverbank.

Project activities occur only on highly altered riverbank in the Camas Slough on the main Mill parcel. The following provides a short description of the riverbank types.

Exhibit 5 SHOR23-01

3.8.1 Natural Riverbank

Natural riverbank sections occur along the Columbia River adjacent to undeveloped areas and along Lady Island. Areas of riverbank consisting of native soils and sediments and relatively undisturbed by development are common on Lady Island and along the Columbia River. In these locations, the upper riverbank, above OHWM, is forested with Oregon ash, Douglas-fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), willow (*Salix* sp.), and black cottonwoods, along with some native understory trees and shrubs. Below OHWM, an area of shrubs extends usually to a topographic break, where a shelf gradually slopes to the waterline forming the lower bank.

Where present, the shallow lower slope allows for a continuous transition from deep to shallow waters at nearshore areas and is comprised of sand, silt, and fine gravel or, if sedge communities are present, shallow organic deposition layers may be present. At very low river stages, beach-like conditions occur along the lower bank of this type of riverbank. Where sedge communities are present at the toe of the bank, they are most typically monotypic dense communities of water sedge (*Carex aquatilis* var. *aquatilis*). Vegetated lower bank conditions support various habitat functions, including fish rearing, aquatic invertebrate production, wildlife access, organic matter production, and sediment trapping.

3.8.2 Natural Steep Riverbank

Some short sections along the riverbank are lined by natural basaltic andesite rock outcrops or have steep banks cut in cohesive native sediments. These are generally very steep to nearly vertical slopes supporting minimal vegetation. The steep outcrops may extend below the waterline in some locations. These outcrops are generally located in the western extent of the project study area along the Columbia River. One rock outcrop forms the westernmost tip of Lady Island at the mouth of the Camas Slough.

3.8.3 Artificially Benched Riverbank

Riverbank locations that are somewhat altered by artificially created terraces or man-made benches are common in the study area where residential properties are near mooring dolphins to be removed. These riverbanks have short, nearly vertical reinforced sections, between more level terraces. In most cases, the benched riverbanks either support maintained residential vegetation of grasses and shrubs or, in some cases, are occupied by invasive species. These areas have few trees.

3.8.4 Highly Altered Riverbank

Along the main Mill parcel, riverbanks consist of fill, are generally steep, and are armored with boulder-sized riprap. Highly altered riverbank includes the areas on the main Mill parcel where structures are present, and no riverbank is visible.

Vegetated with nonnative plants, few native plant species are present. When present, vegetation is dominated by nonnative Himalayan blackberry with indigo bush starting near OHWM and transitioning to native and weedy herbaceous vegetation at the lower shore in some locations. Few

Exhibit 5 SHOR23-01

trees are present, but where present include black cottonwood and Oregon ash. In some locations, the lower bank and shore consists of armor rocks with minimal to no vegetation or fine sediment.

3.9 Ordinary High-Water Mark Determination

A OHWM determination was conducted along the of the main Mill parcel riverbank in Camas Slough and on the riverbank of Lady Island. On Lady Island, the OHWM line in the vicinity of existing pipeline landings was mapped to determine its location.

During fieldwork in July 2019, and in 2020, the waterline was observed at high and low tide by walking the shoreline. River water levels were observed to reflect the approximate 1.1-foot tidal range, as the river levels were low (approximately at +2.0 feet CRD). Therefore, the riverbank was dry and able to be examined for indicators.

Because almost all the riverbank on the main Mill parcel is armored with large-boulder riprap, direct observations of soil characteristics were limited in many areas. However, for accessible areas of the riverbank, observations included strong indicators of wracked woody and trash debris, sediment lines, and clear changes in vegetation community along the riverbank.

A clear shift from shrub-dominated and/or emergent vegetation below OHWM to black cottonwood and/or Oregon ash trees above OHWM occurs along the riverbank wherever natural vegetation is present. The OHWM is at the lower limit of the tree line and upper limit of the shrub community. The line of vegetation shift was clearly visible when looking toward the shoreline from the river, as well as when evaluating vegetation communities along transects perpendicular to the waterline.

Sediment lines on riprap were present, but visible in only in a few locations. However, in many locations wrack lines comprised of large and small woody debris, trash, and other materials was present in piles. Sediment lines and stains on dolphins and other structures were present, where the OHWM was strongly indicated by changes in color and lack of sediment deposition.

Observations of OHWM indicators could not be evaluated for significant portions of inaccessible riverbank, including the areas occupied by the PECO Dock, Dock Warehouse, and Truck Dock, where the waterline is underneath the structures and no safe access was possible. In addition, some portions of the shoreline were not accessible due to excessively steep banks, such as the area adjacent to the Berger Crane foundation and Tug Dock.

The project is focused on removals of existing structures that straddle the OHWM, therefore the delineated OHWM elevation was evaluated to determine an average elevation that could be applied to the riverbank where structures are currently present. An elevation of +16.5 feet CRD was determined and the OHWM at that elevation was extended to cover the areas of each of the riverbank structures. This elevation was used for the purposes of calculating areas of impacts above and below OHWM, as well as determining the location of the Shoreline Area. This elevation was used to estimate the extent of increased riverbank once the riverbank is reshaped to shallower slopes following the Project.

Exhibit 5 SHOR23-01

3.10 Wetlands

The NWI has mapped the lower Columbia River and Camas Slough as a tidal riverine system, including unconsolidated shore areas (R1USQ), unconsolidated bottom (R1UBV) in the deeper channel areas, and riverine emergent persistent vegetation with seasonally flooded characteristics (REM1R) on limited portions of the riverbank (USFWS 2019a).

Mooring dolphins and other pilings to be removed are generally within areas mapped as unconsolidated shore, although a few deep-water dolphins in the Camas Slough are within the deeper unconsolidated bottom system.

Similar wetland mapping was provisionally shown on the City and County Critical Areas maps (City of Camas 2019a; Clark County 2019). On these maps, they areas are shown as estimated areas of narrow fringe wetlands along the riverbank in approximately the same locations as shown on the NWI.

Wetlands were identified and delineated along the portion of the main Mill parcel that was safely accessible. As stated, inaccessible riverbank areas included very steep slopes and areas beneath structures. Wetlands are not present at the south riverbank of Lady Island on the Columbia River.

Wetlands 1 through 7 were identified and delineated. These systems are similar to one another and occur along the base riverbank (**Table 12)**. **Appendix D** provides the completed Wetland Field Data Sheets along with supporting figures for each wetland.

None of the wetland areas were inundated during the low-flow conditions present in July during the field investigation. However, these wetland areas are seasonally inundated for long durations from November to June in most years, with the timing, duration, and depths dependent on that year's weather patterns.

All delineated wetlands were categorized as tidal riverine emergent wetlands under the Cowardin et al. (1979) classification, and as Tidal Riverine by the Hydrogeomorphic Classification system. Riverine wetlands extend waterward from land to the point where deep water prevents persistent rooted vegetation due to light limitations, usually at about 6 feet of water depth. From this point waterward, the aquatic system transitions from tidal riverine emergent to unconsolidated aquatic bed systems.

Wetland plant communities were characterized mainly with emergent sedge species (principally *Carex aquatilis*) at the lower shoreline, transitioning up-bank to the invasive shrub species indigo bush (*Amorpha fruticosa*). Indigo bush, which is a facultative wetland plant, was common at elevations above wetland boundaries throughout main Mill parcel and Lady Island riverbank, where the plant appears able to grow well from the spaces between riprap. These riprap areas were determined to not have wetland soils due to the preponderance of rock and were not considered to be wetland areas.

Long stretches of unvegetated gravel bar and rocky armored shore separate the wetlands from each other. While these locations met the definition for wetland hydrologic conditions, they were determined to not have hydric soils and not support hydrophytic vegetation, or in a few locations had hydrophytic vegetation (usually dominated by invasive indigo bush) but were either naturally or artificially rock armored and lacking in hydric soils and were thus determined to not meet the definition of wetland.

Exhibit 5 SHOR23-01

Table 12. Wetland Classification Summary

Wetland ID	Hydrogeomorphic Class	Cowardin Classification	Wetland Rating	Buffer
1	Tidal Riverine	Riverine Emergent Persistent vegetation, seasonally flooded (REM1R)	Category II	180 feet
2	Tidal Riverine	Riverine Emergent Persistent vegetation, seasonally flooded (REM1R)	Category II	180 feet
3	Tidal Riverine	Riverine Forested, seasonally inundated (RFO)	Category II	180 feet
4	Tidal Riverine	Riverine Emergent Persistent vegetation, seasonally flooded (REM1R)	Category II	180 feet
5	Tidal Riverine	Riverine Emergent Persistent vegetation, seasonally flooded (REM1R)	Category II	180 feet
6	Tidal Riverine	Riverine Emergent Persistent vegetation, seasonally flooded (REM1R)	Category II	180 feet
7	Tidal Riverine	Riverine Emergent Persistent vegetation, seasonally flooded (REM1R)	Category II	180 feet

3.10.1 Wetland 1

Wetland 1 is located immediately east (upriver) of the Riverbank Pumphouse on Camas Slough and extends along the riverbank approximately 400 feet starting from the pumphouse (**Appendix D; Wetland 1 Figures**).

In this location, the riverbank consists of rocky fill. The riverbank does not have a continuous face of boulder-sized riprap. Native deciduous trees (Oregon ash and cottonwood) grow at the top of the rocky riverbank and shade the wetland. The wetland was vegetated mainly with water sedge. The wetland/upland boundary was identified based on the change from hydric soil to rock-dominated fill riverbank as well as an increase in steepness. Note that a hydrophytic plant overstory community (Oregon ash and black cottonwood) occurs on the upland side of the boundary, with an understory of Himalayan blackberry and other upland weeds.

Wetland hydrologic conditions were supported primarily by river flows and overbank flow. Soils were saturated throughout the wetland area during the field investigation. This wetland continues upriver along the shoreline beyond the study area limits.

3.10.2 Wetland 2

Wetland 2 is located downriver from the Riverbank Pumphouse on the Camas Slough (**Appendix D, Wetland 2 Figures**). In this location, the riverbank consists of fill and is faced with riprap. The narrow wetland was located at the base of the riprap bank and was heavily grazed, although it appears to be vegetated with sedge. Indigo bush was present in the wetland. The wetland/upland boundary was identified based on a change from hydric soil to rock-dominated riverbank and the increase in slope.

Wetland hydrologic conditions were provided by river flows and overbank flow. During the July investigation, soils were saturated to the surface throughout the wetland area.

Exhibit 5 SHOR23-01

3.10.3 Wetland 3

Wetland 3 formed in a 30-foot by 30-foot depression on the riverbank, where the steep riprapped slope appears to have slumped (**Appendix D, Wetland 3 Figures**). This small area is vegetated with a few deciduous trees in the overstory, including Oregon ash and black cottonwood with abundant reed canarygrass (*Phalaris arundinacea*) and hedgenettle (*Stachys chamissonis*). The area is surrounded by large boulders with Himalyan blackberry growing between them.

Soil in the depression was hydric with indicators present. The wetland boundary was delineated based on soils and the transition to rock armoring. Soil was saturated to the surface at the time of the investigation. Hydrology is possibly supported by groundwater discharge from the riverbank in this location. Because of the slightly higher elevation, this location is inundated by river water when river water levels are moderate.

3.10.4 Wetland 4

Wetland 4 (**Appendix D, Wetland 4 Figures**) is a small, area is directly adjacent to the easternmost extent of the Truck Dock at the structure's bulkhead. Vegetation in the wetlands was heavily grazed and consisted primarily of sedges, with indigo bush present at the boundary. Landward of the wetland boundary, the riverbank is very steep, covered with riprap and allows for limited vegetation growth, although a few indigo bushes were present along with a few Himalayan blackberry between rocks. The wetland boundary was determined based on the transition from hydric soil to riprap rock-faced embankment.

3.10.5 Wetlands 5 and 6

Wetlands 5 and 6 are located along the riverbank upriver from the Truck Dock (**Appendix D, Wetland 5 &6 Figures**). Wetland 5's western extent lies on the upriver side of a small peninsula extending from the riverbank. The wetland continues upriver to a small rocky point. Wetland 6 starts upriver of this rocky point and extends upriver to a small second rocky point. Both are benched topographic areas.

Both wetland areas showed evidence of heavy grazing during the investigation, reducing the ability to identify vegetation to species. The wetalnds appear to be primarily vegetated with sedges as the dominant taxon along with other obligate and facultative wetland herbaceous vegetation.

Similar to the other wetlands in this area, the wetland boundary was determined by a transition from hydric soil to rock armored riverbank with support from the increase in slope. Indigo bush is abundant along much of the rocky area, especially in the lower elevations of the riprap.

Soil consisted of fill materials, river sediments, and rock. Field observations of soils confirmed profiles containing various fill materials without any consistency across the area, including areas of rock, wood, metal pieces, and areas of fine soil/sediment materials. Soil in areas where sedge was vigorously growing showed clear evidence of increased surface organic matter accumulation relative to soil outside sedge areas. In general, in areas without sedges and dominated by indigo bush, soils lacked an organic layer at the surface. Hydric indicators present included redox features, sulfur odors,

Exhibit 5 SHOR23-01

and gleyed subsurface horizons. The wetland boundary was determined based on the transition from hydric soil to riprap riverbank with the support of increased slopes.

3.10.6 Wetland 7

Wetland 7 is located on Lady Island, along the riverbank upriver (and across) from the Truck Dock and extends along the riverbank in this location (**Appendix D, Wetland 7 Figures**).

Evidence of heavy grazing by geese and deer was observed during the investigation, reducing the ability to identify vegetation to species. Vegetation appeared to be mainly water sedge and reed canarygrass, with limited other obligate and facultative wetland herbaceous vegetation. Indigo bush is abundant along most of the shoreline above the wetland edge, with scattered individuals present within the wetland as well. Native shrubs and trees (Oregon ash and black cottonwood) grow above the wetland boundary at elevations above the OHWM. Soils were also much rockier in this area than other portions.

Wetland hydrologic conditions are due to river flows and overbank flow. Soils were saturated throughout the wetland area during the field investigation, with the lower portions of the wetland inundated by river water.

Soil in the wetland area consisted of river sediments. Hydric indicators present included redox features, sulfur odors, and depleted subsurface horizons. The wetland boundary was determined by a transition from hydric soil to soil lacking hydric indicators, with support from increasing elevation and steeper topography. This wetland continues along the shoreline upriver beyond the study area limit.

3.11 Shoreline Area and Wetland Buffer Area

The *Shoreline Area* is defined as the area 200 feet landward of the OHWM. The OHWM and corresponding Shoreline Area on the main Mill parcel are described and shown in the *No-rise Report for Removal of Structures along Camas Slough* (Wood 2023c).

As stated previously, both the City of Camas (CMC 16.53.040) and Clark County (CCC 40.450.030) determine wetland buffer widths based on wetland rating scores (including habitat score) and the proposed land uses of the project site. Wetland rating categories for the purposes of determining buffers utilize the Ecology wetland rating system scores. The Wetland Rating forms are presented in **Appendix D.** The wetland ratings results are summarized in **Table 13**.

Following the definitions of the Land Use Intensity Matrix (CMC 16.53.040-4), land-use intensity is ranked as high in the study area due to industrial activities. All wetland areas were rated as Category II, with a habitat score of 6 points and a high-intensity land use; therefore, the standard buffer width of 180 feet is applied (CMC Table 16.53.040-1). Because of the location of the wetlands, the wetland buffer areas for all wetlands are almost completely within the 200-foot Shoreline Area.

Table 13. Wetland Rating Summary

Function		Wetland 1 Riverine	Wetland 2 Riverine	Wetland 3 Riverine	Wetland 4 Riverine	Wetlands 5 & 6 Riverine	Wetland 7 Riverine
Improving Water Quality Functions	Site potential	M	M	M	M	M	M
	Landscape potential	H	H	H	H	H	H
	Value	H	H	H	H	H	H
	Subtotal	8	8	8	8	8	8
Hydrologic Function	Site potential	L	L	M	L	L	L
	Landscape potential	M	M	M	M	M	M
	Value	H	H	H	H	H	H
	Subtotal	6	6	7	6	6	6
Habitat Function	Site potential	M	M	M	M	M	L
	Landscape potential	L	L	L	L	L	M
	Value	H	H	H	H	H	H
	Subtotal	6	6	6	6	6	6
Total Score		20	20	21	20	20	20
Wetland Category		Category II	Category II	Category II	Category II	Category II	Category II

Abbreviations:
H = High function (score of 3), M = Medium function (score of 2), L = Low function (score of 1).
Wetland ratings were conducted according to the Washington State Wetlands Rating System for Western Washington (Hruby 2014).

Exhibit 5 SHOR23-01

3.12 Wildlife and Habitat Conservation Areas

3.12.1 Riparian Habitats and Surface Waters

The City of Camas defines riparian habitats and surface waters as naturally occurring ponds under 20 acres that provide fish or wildlife habitat, waters of the state, and water bodies planted with game fish by government or tribal entities (CMC 16.61.010). Riparian habitats and surface waters were identified within the study area. Riparian habitats include the undeveloped portions of Lady Island and areas along natural riverbanks.

Many species of birds, including waterfowl, utilize the Columbia River. The river provides riparian habitats for migration and wintering Pacific flyway waterfowl. While no recent broad-scale surveys of species in the riparian habitats in the project area have been made, a study at the Steigerwald Wildlife Refuge, located approximately 5 miles upriver from the study area, indicated that the river and riparian area provides habitat for approximately 200 species of birds and 30 species of mammals, fish, reptiles, and amphibians (USFWS 2019b). Wildlife species generally include cottontail rabbit, nutria, mink, beaver, garter snake, painted turtle, and Pacific tree frog. Observations during the field survey included white tailed deer and Canada geese grazing along the riverbanks.

Bird species in the study area observed during the field efforts included American robin (*Turdus migratorius*), mallard (*Anas platyrhynchos*), American black swift (*Cypseloides niger*) least sandpiper (*Calidris minutilla*), Canada goose (*Brant canadensis*), red-tailed hawk, (*Buteo jamaicensis*), great blue heron (*Ardea herodias*), bald eagle (*Haliaeetus leucocephalus*), barn swallow (*Hirundo rustica*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), Brandt's cormorant (*Phalacrocorax penicillatus*), and Western osprey (*Pandion haliaetus*).

3.12.2 State and Federal Threatened and Endangered Species

A *Draft Biological Assessment* (Tetra Tech 2023) has been prepared to evaluate information on 16 ESA-listed species with the potential to occur in the study area. Summary information is provided here.

Six ESA-listed fish species and critical habitat occur in the Project vicinity:

- Chinook salmon, Lower Columbia River evolutionarily significant unit (ESU),
- Steelhead Lower Colorado distinct population segment (DPS),
- Chum salmon Columbia River ESU,
- Coho salmon Lower Columbia River ESU,
- Pacific eulachon Southern DPS (*Thaleichthys pacificus*), and
- Bull trout (*Salvelinus confluentus*).

Salmon, steelhead, and Pacific eulachon migrate as adults through the area to upriver spawning locations. Bull trout sea-run populations could migrate through the area. For ESA-listed fish species, specific spawning requirements are not met in the Project area (Tetra Tech 2023). Schools of juveniles would utilize the study area during out migrations for feeding and are anticipated to be abundant in the spring, where shallow and nearshore areas may provide high prey productivity.

Exhibit 5 SHOR23-01

Ten additional ESA-listed species identified by USFWS (2020) for the Project vicinity are known to not occur in the study area due to lack of suitable habitat: gray wolf (*Canis lupus*), yellow-billed cuckoo (*Coccyzus americanus*), streaked horned lark (*Eremophila alpestris strigata*), northern spotted owl (*Strix occidentalis caurina*), golden paintbrush (*Castilleja levisecta*), Willamette daisy (*Erigeron decumbens*), water howellia (*Howellia aquatilis*), Bradshaw's desert-parsley (*Lomatium bradshawii*), Kincaid's lupine (*Lupinus sulphureus* spp. *kincaidii*), and Nelson's checker-mallow (*Sidalcea nelsoniana*) (Tetra Tech 2023).

Appendix F provides the USFWS and NOAA Fisheries list of species of concern for the study area.

3.12.3 State priority habitats and species

The WDFW PHS database identified five items in the study area:

- Coho Salmon, Lower Columbia River ESU: Coho spawn in freshwater streams and migrate to sea to reach maturity. Coho salmon spawn in numerous small streams. Lower Columbia River stocks are much lower than historical levels currently. Coho pass through the fish ladders of Lower Columbia River dams between August and November, with peak run during September. WDFW *SalmonScape* documented occurrence of coho in the study area. Similar to salmonids discussed in the above section, coho salmon may pass through or occur within the study area during adult migration and juvenile feeding and migration.
- Dolly Varden trout (*Salvelinus malma*): PHS and *SalmonScape* documented Dolly Varden/bull trout occurring in the study area. Dolly Varden are similar and often confused with bull trout and are classified as a char. Similar to salmonids discussed in the above section, Dolly Varden are anadromous and spawn in habitats similar to those of bull trout. Dolly Varden may pass through or occur within the study area during adult migration.
- Purple martin (*Progne subis*): WDNR identified a purple martin breeding colony on Lady Island. Purple martin nest in cavities and prefer open to semi-open areas near water, with tree snags or other potential nest cavity sites. These migratory birds congregate to roost in groups of up to thousands of individuals during the summer. A large colony is known along the Washougal Dike, approximately 2.4 miles east of the study area.
- Biodiversity Area and Corridor (Terrestrial Habitat): WDNR identified the riparian zone on Lady Island as Columbia River cottonwood habitat. Biodiversity areas and corridors are areas of habitat that are relatively important to various species of native fish and wildlife.
- Caves or Cave-rich Areas: WDNR identified areas on Lady Island as cave or cave-rich areas, as these areas may provide habitat for sensitive species.

4.0 IMPACTS ASSESSMENT

The Project would have long-term benefits that result in improved functions in the Shoreline Area. However, impacts would occur during the removal of structures. The Columbia River, including Camas Slough and associated wetlands, would be temporarily impacted during the following removal activities:

- Removal of dolphins and piles;
- Dredging to allow barge access to Dock Warehouse piers for removal;
- Excavation/fill to reshape the riverbank to shallower contours; and
- Placement of fill to create bottom contours that match the natural riverbed covering the retained conrete Berger Crane foundation and restoring the dredge prisms.

Potential effects of the proposed Project on the Shoreline Area and critical areas resources would potentially include both direct and indirect, permanent, and short-term temporary effects. No permanent impacts to wetlands, buffers, or fish and wildlife habitat conservation areas are anticipated. Wetlands 1, 2, 3, 4, 5, 6, and 7 in the study area would be avoided by the proposed Project.

Vegetation disturbance would be minimal as there is limited vegetation associated with any of the structures. No trees are present in the Project area, and no trees would be disturbed by the Project.

Removal activities would result in short-term temporary increases in noise, human disturbance, and sediment disturbance. Construction BMPs, including temporal restrictions and stormwater management, would be implemented to prevent or minimize the effects of these short-term disturbances. BMPs for the Project are presented in **Appendix F.**

Additional details on potential impacts on wetlands, surface waters, buffers, Shoreline Area, and fish and wildlife habitat conservation areas are described in the following sections.

The activities required to complete the project would result in direct temporary impacts below the OHWM of the Columbia River and Camas Slough. The activities required to complete the project would result in direct, permanent impacts from placement of fill below the OHWM along the riverbank and on the riverbed (**Figure 3 and 4**).

4.1 Direct Impacts to Wetlands

No direct impacts to wetlands are anticipated.

4.2 Wetland Buffer Impacts

No impacts to wetlands buffers are anticipated.

4.3 Direct Impacts to Columbia River Including Camas Slough

Permanent impacts would result in the Columbia River and Camas Slough from dredging and placement of fill (**Table 14**). Placement of fill permanently below the OHWM is considered a

permanent impact even if the fill is placed for beneficial reasons. Locations of in-water impacts are shown on **Figures 2A through 2E**.

4.3.1 Dredging

Dredging would occur to provide access to the Dock Warehouse piers. However, removal of the over-water structures and supporting pilings and dolphins is expected to provide long-term benefits to aquatic habitats.

4.3.2 Riverbed and Riverbank Shaping

Excavation and fill placement would be needed to reshape an approximately 1,000-foot portion of the Camas Slough riverbank to new shallower slopes ranging from 4-to-1 to 5-to-1. At the completion of riverbank reshaping, the OHWM elevation will move horizontally toward the upland, such that new land area will be within the wetted area of the river because the reshaped riverbank would be topographically flatter than the existing steep riverbank. Amounts and areas of fill and excavation are provided in **Table 14.**

Fill would be placed below OHWM at the Berger Crane foundation to provide restored riverbed contours and cover the foundation remnant. The fill would be placed to create a new riverbed slope that re-creates the natural nearshore bed contours. Berger Crane foundation has an existing riverbed footprint of 300 SF, of which approximately 100 SF will be retained below the new sediment line at the end of the project. Area of disturbance here reflects the extent of the fill prism to create new riverbed topography covering the remnant 100 SF.

Table 14. Dredging, Fill, and Excavation Areas in the Columbia River and Camas Slough

Dredge, Excavate, and Fill Activities	Waterbody Name	Impact Location	Duration of Impact	Amount of Material to be Placed in or Removed from Waterbody (cubic yards)	Area of Waterbody Directly Affected (sq. ft.)
Fill – at Berger Crane Foundation, new riverbed nearshore contours	Columbia River (Camas Slough)	Below OHWM	Permanent	+3,500	19,018 sq. ft
Fill and Excavation – at riverbank structures (Wood Chip area, Truck Dock, Dock Warehouse, PECO Dock), reshape riverbank	Columbia River (Camas Slough)	Below OHWM	Permanent	+2,500 / -5,170	67,356 sq. ft.
Dredge – at Dock Warehouse Piers, deepening for access	Columbia River (Camas Slough)	Below OHWM	Temporary, short-term, <90 days	-10,500	59,153 sq. ft.
Total Project; net amount of material to be placed or removed; below OHWM				-9,670 cubic yards	

Notes:
Sums of individual values may not match totals presented due to rounding of significant figures.

Abbreviations:
sq = square
ft = feet
OHWM = ordinary high water mark

4.4 Shoreline Area (Buffer) Impacts

Project removals would occur within the Shoreline Area and would result in temporary impacts from the following activities:

- Demolition and excavation of the Dock Warehouse, Truck Dock, and PECO Dock; and
- Backfilling the South Wood Chip Storage Area to design grades.

Removal of structures (demolition) is not considered to be "development" under the Shoreline Management Act. Other activities regulated under the Shoreline Management plan would result in direct temporary impacts on Shoreline Area and results are presented in **Table 15**.

Following removal of the Dock Warehouse, Truck Dock, and PECO Dock, the riverbank will be reshaped and graded to slopes that match existing grades on either end.

Table 1516. Shoreline Area (Buffer) Impact Quantities and Areas

Excavate/Fill Activities	Associated waterbody	Location[1/]	Duration	Amount of materials to be placed or removed (Cubic Yard)	Area of disturbance (Sq. Ft.)
Excavate & Fill - South Wood Chip yard, Truck Dock, Dock Warehouse, PECO Dock; reshape slopes to 5:1 and 4:1	Columbia River (Camas Slough)	Above OHWM; Main Mill Parcel	Permanent	+18,300 / -17,100	168,312 sq. ft.
Total Project; Net Amount of material to be placed or removed; above OHWM:				+1,200 cubic yards	

Notes:
All Shoreline Areas are High Intensity classification.

Abbreviations:
sq = square
ft = feet
OHWM = ordinary high water mark

4.5 Fish and Wildlife Habitat Conservation Areas

Long-term effects of the Project are anticipated to be beneficial. The Project would include the permanent removal of structures that currently create artificial shading of the river, provide artificial perches for avian predators, and provide in-water refugia for aquatic predator species. The removal of these prey refugia would improve the habitat conditions for desirable native species, including salmonids and their forage and prey species. Overall, the removal of these artificial structures and encumbrances along the riverbank would result in a net increase in available potential fish and wildlife habitat.

The Project would result in the removal of approximately 18,000 SF (0.4 acre) of shade-producing structures from riverbank overwater areas. In addition, approximately 3,000 SF (0.1 acre) of riverbed structures, including dolphins and piles, that also generate shade within the riverbed would be removed.

Exhibit 5 SHOR23-01

Project activities including vegetation disturbance, excavation, and dredging within Camas Slough, the Columbia River, and the shoreline buffers may result short-term temporary effects on fish and wildlife habitat areas. Most of these would be indirect effects from noise and temporary water quality effects.

Operation of construction equipment may result in temporary disturbance of wildlife species behavior and may temporarily reduce wildlife habitat available for use in foraging, nesting, and migrating. Many species would temporarily avoid the immediate demolition area. Disturbance of species and habitat would be short term, occurring over days for the duration of demolition activities, and temporary as these effects would not extend beyond the demolition activities.

Short-term effects of demolition, excavation, dredging, and fill placement include temporary reduction in water quality parameters such as increased turbidity, which may result in temporary disturbance to aquatic species. When functional vegetated wetland areas are filled, immediate biological effects result from the loss of all sediment dwellers, including plants, invertebrates, and other fauna. However, placement of clean sediments within these areas post-dredging/excavation to match existing contours would allow for vegetation to re-establish.

4.6 Indirect Impacts

Elements of the Project that may cause indirect impacts include the following:

- Temporary increase in turbidity and/or pollutants due to sediment disturbance, inadvertent introduction of debris and/or contaminants into the action area (e.g., petroleum products from equipment);
- Temporary disturbance to prey/food sources down or upriver from in-water work activities; and
- Temporary disturbance to migration of adults and outmigration of juveniles using Camas Slough as a thoroughfare to reach the Washougal River.

Short-term impacts of excavation, demolition, dredging, and fill placement include temporary reduction in water quality parameters, such as increased turbidity.

4.7 Channel Hydraulics

Placement of fill within Camas Slough below the OHWM to restore riverbed contours may result in long-term changes that facilitate altered hydraulic flows. The altered flow regime could result in new current patterns to emerge or alter sediment deposition and resultant riverbank vegetation development.

Placement of fill within Camas Slough below the OHWM along the riverbank and at the Berger Crane may change the functional characteristics of the area. For example, the fill could facilitate hydraulic flows that are more closely related to natural flow and create a nearshore shallow area that may become vegetated over the long-term, increasing roughness and deposition. This placement of fill would restore nearshore shallow riverbed contours and might also result in long-term indirect effects to salmonids by facilitating altered hydraulic flows that could result in new current patterns, altered

Exhibit 5 SHOR23-01

sediment deposition, and establishment of riverbank vegetation and habitat for fauna and prey/food sources, resulting in a net increase in available potential habitat for vegetation and prey/food sources.

Access to areas below the OHWM in Camas Slough and Columbia River would be by barge, so equipment would conduct removal activities and place fill directly in the impact location.

Removal of pilings and structures may result in increased turbidity from disturbance of sediment and could result in increased sediment load from runoff that may enter the Columbia River or Camas Slough. Increased turbidity may result in prey/food sources avoiding area, which would indirectly affect salmonids by relocating their food source or screening food sources.

Sedimentation and turbidity can alter the riparian vegetative structure and primary food production, and could alter the prey/food source population for salmonids. For this project, sedimentation and turbidity impacts would be short term, occurring primarily during the construction phase. Following construction, the aquatic habitat would likely re-equilibrate within hours to conditions suitable for primary food production. Therefore, these potential impacts on water quality are considered temporary, transient indirect effects on salmonids and their habitat.

4.8 Water Quality

Removal of dolphins and pilings would result in temporary disturbance and water quality impacts such as increased sediment, as described above, but would also result in permanent habitat improvement. The action of removing treated wood pilings and dolphins may result in a temporary release of contaminants through disturbance of contaminated sediment and exposure of previously buried treated wood, which can act as fresh creosote upon exposure to oxygen in the water (Seattle Public Utilities 2015). Potential effects on aquatic habitats as a result of disturbance of contaminated sediments are expected to be insignificant based on the age of most of the pilings and would not be discernible on the individual level. Removal of treated pilings and dolphins would remove these sources of contamination. Over the long term, the concentration of contaminants in the sediment would decrease, water quality would improve, and the pathway of exposure for fish through contamination of prey and forage would be reduced. Removal of dolphins and pilings is expected to benefit aquatic habitats in the long term.

4.9 Human Disturbance

In-water disturbance due to human presence and vessels operations during demolition may disturb salmonids and cause them to avoid the Project area. Much of the work is proposed to occur during the approved in-water work window during low-flow conditions. However, salmonids have the potential to occur year-round in the action area and may be migrating through the area during the construction time frame. Therefore, there is potential to encounter and possibly injure individual salmonids during demolition of structures, and removal of debris. These could result in temporary direct impacts on salmonids during construction activities. This risk would be mitigated by performing the in-water work during open work windows when fish are less likely to be present.

4.10 Cumulative Effects

No future state, local, or private activities that are reasonably certain to occur within the action area were identified that would require a cumulative effects analysis. Following removal of the obsolete infrastructure, GP intends to continue to operate the mill located on the site.

Exhibit 5 SHOR23-01

5.0 MITIGATION SEQUENCING

The Project would reduce the number of riverbed obstructions, reshape a portion of the riverbank to more shallow slopes, reduce the area of over water shading, and remove piles containing creosote. Also, an area of shallow riverbed will be recreated to match original slopes. However, in accomplishing all of this, several areas will experience direct temporary impacts. Also as mentioned, indirect effects that may result in temporary water quality reduction and an increase in noise are possible.

Regulations protecting aquatic systems require that proposals evaluate approaches to avoid or, if avoidance is not possible, reduce the negative effects of a proposed action. The Project reviewed proposed actions and avoided unnecessary impacts.

5.1 Avoidance

Due to the location of some of the structures to be removed, there are no practicable alternatives that would completely avoid temporary impacts on wetlands or shorelines within the Project footprint.

5.2 Minimization and Best Management Practices

The amount and location of removal activities have been minimized to the extent possible while ensuring the Project implementation and safety objectives are achieved. The Project would be accomplished in a manner that is sensitive and protective of the environment. BMPs will be implemented throughout the Project by first identifying potential detrimental effects and implementing methods that eliminate or reduce the potential effect. These BMPs have been identified for dredging, dredged materials management, vessel operations, piling and dolphin removals, and structure demolition along the riverbank, including construction stormwater management. A list of BMPs, minimization measures, and stormwater management actions designed to avoid, minimize, and mitigate Project impacts to be implemented is provided in **Appendix F**.

5.3 Rectifying Impacts

Riverbed and riverbank reshaping provide new areas of shallow nearshore habitat. The downstream migration of salmon smolts to the ocean is considered a highly vulnerable phase in the Pacific salmon life cycle, accounting for a high proportion of mortality over a short window of time (Notch et al. 2020). Studies conducted upriver from the project in McNary Reservoir and the Hanford Reach found that subyearling Chinook salmon favored water less than 2 meters deep (about 6 feet) with low lateral bed slopes and water velocities less than 0.4 meters per second (Vendetti et al. 1997; Tiffan et al. 2002). These shallow shoreline habitats with low velocities and slopes likely provide refuge from predatory fish that may be too large to enter very shallow water. Subyearling Chinook salmon prefer sandy or small gravel/cobble substrate and avoid complex habitats such as bedrock cliffs and riprap (Key et al.1996; Garland and Tiffan 2002).

Placement of fill within Camas Slough below the OHWM to restore riverbed contours may result in long-term indirect positive effects to salmonids when it results in new riverbank vegetation

Exhibit 5 SHOR23-01

development and restored shallow habitat. Increased productive areas for fauna and prey/food sources provides a net increase in available potential habitat salmon.

Exhibit 5 SHOR23-01

6.0 SHORELINE CONDITIONAL USE EVALUATION

Should a Conditional Use Permit be required for Project activities where fill placement along the riverbank is considered structural, the Project must demonstrate consistency with the requirements of WAC 173-27-160.

In authorizing Conditional Use Permits, the applicant must demonstrate that the proposal:

- Is consistent with Washington State's Shoreline policy (RCW 58.030) and the master program;
- Will not interfere with the normal public use of public shorelines;
- Use of the site and design of the project is compatible with other authorized uses within the area, with uses planned for the area under the comprehensive plan, and shoreline master program,
- Will cause no significant adverse effect to the shoreline environment in which it is to be located; and
- That public interest suffers no substantial detrimental effect.

The following provides an evaluation of the Project for the above listed conditions.

6.1 Consistent with Washington State's Shoreline Policy and the City Master Program

The Project supports the principal goals of the State and City of Camas Shoreline Master Programs by managing shorelines use to support the natural character of the shoreline through removal of numerous man-made structures. The removal of these structures supports the natural resources and ecological functions of the shoreline, and also allows for continued use by water-dependent users by removing in-water and shoreline obstacles.

The Project meets the goal of maintaining long-term benefit over short-term benefit by removing artificial structures and supporting the return to natural conditions of the shoreline environment, including on public lands leased by WDNR. By removal of artificial structures, the Project will incorporate environmental protection of resources, such as wetlands, fish and wildlife habitat, and riverine watercourses.

The Project is in compliance with the City of Camas' Comprehensive Plan, which identifies requirements for removals of disused structures, and with the policies of the City's Shoreline Management Plan, which implements protections to the shoreline environment.

6.2 Will not interfere with the normal public use of public shorelines

The Project area is zoned for heavy industry, and normal public use of the shorelines is limited to in-water recreation, such as fishing. There are currently no public access points to the Columbia River from either the main Mill parcel or Lady Island. The Project will not create or remove a public access point. The Project will not alter or interfere with normal public use of the shoreline in the Project area.

Exhibit 5 SHOR23-01

6.3 Use of the site and design of the project is compatible with other authorized uses within the area, with uses planned for the area under the comprehensive plan, and shoreline master program

The Project is in a major industrial location with an operational paper mill. The Project would be implemented without disruption to mill operations.

Waterfront operations at the Mill have already ceased and no uses are currently planned. The Project does not propose new uses or redevelopment of any new structures. The Project removes the capability for industrial waterfront operations to resume in the future.

If any other plans are made in the future, those proposals would be subject to review and approvals under federal, state, and local regulations at that time.

6.4 Will cause no significant adverse effect to the shoreline environment in which it is to be located

The Project will cause no significant adverse effect as the Project will provide a benefit to the shoreline environment by removing river obstructions, removing creosote pilings, removing debris, reducing the amount of overwater shading, reducing avian predator perches and in-water predator refugia, and providing new shallow nearshore habitat. While some sediment disturbance is likely during structure removals and reestablishing topography, the effects would be temporary and transient and BMPs would be implemented to mitigate potential effects.

6.5 That public interest suffers no substantial detrimental effect

The welfare of the public is protected by implementation of the Project because the results are beneficial and are distributed to everyone. When obsolete and unused major infrastructure is removed from the river and its shoreline, long-term benefits accrue to the river ecosystem. Removal of infrastructure that is no longer used increases safety for the public accessing the waterway.

7.0 CONCLUSIONS

The proposed Project is located within the OHWM of the Columbia River and Camas Slough.

All Project areas are within the City of Camas and Clark County Shoreline Management Areas. The entire study area is within the floodway (in-water structures) or floodplain (overwater structures) of the Columbia River and Camas Slough.

The results of the OHWM determination indicated that the biological OHWM elevation along the shoreline was indicated by a shift in plant community, soil characteristics, and presence of wrack. An average elevation was estimated for OHWM for all areas covered by structures to be removed. The elevation was determined to be +16.5 feet (CRD).

Wetland conditions were observed within the proposed Project area. Seven wetlands were delineated within the study area. All wetland areas were classified as Class II, tidal riverine wetlands. Per CMC Table 16.53.040-1, given these wetlands were rated as Category II with habitat scores of 6 points and a high-intensity land use, the standard buffer width is 180 feet. Because of the location of the wetlands, the wetland buffer areas for all wetlands are entirely within the 200-foot Shoreline Area. No activities and no impacts are anticipated to occur within Wetlands 1, 2, 3, 4, 5, 6, or 7.

Structure removals, excavation/dredging, and vegetation disturbance activities would temporarily impact the Shoreline Area; however, most of this impacted area is currently covered by structures. Dredging and filling activities would occur below the OHWM within the Camas Slough for the demolition and removal of structures, as well as dolphins and piles; and below the OHWM of the Columbia River mainstem for the removal of dolphins and piles. Mitigation sequencing was followed to minimize the effects of the Project.

At the Berger Crane foundation location, clean materials will be used to cover the retained lower columns, creating river bottom contours that match the natural nearshore shallow riverbed in this previously dredged location. Following the removal of structures, the riverbank on the main Mill parcel will be reshaped to shallower slopes (5 to 1 and 4 to 1) replacing the covered steep riverbank.

Work would occur during Agency-approved construction work windows.

It is anticipated that the Project will require approvals from the City of Camas, Clark County, Ecology, WDNR, and WDFW, as well as permits and approvals to comply with the CWA Sections 404 and 401 and the Section 10 of the Rivers and Harbors Act through USACE and Ecology.

To be eligible for a Conditional Use approval for structural shoreline bank stabilization, the applicant must demonstrate consistency with WAC 173-27-160.

8.0 LIMITATIONS

Wetland and stream delineations and determinations are based upon protocols defined in manuals and publications produced by federal, state, and local agencies. The wetland methodology used in this report is consistent with methods described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2010) and the *Corps of Engineers Wetland Delineation Manual* (USACE 1987).

The wetland boundaries, classification, ratings, and jurisdictional assessments described herein are the professional opinion of Wood and Tetra Tech staff based on the circumstances and site conditions at the time of this study. These professional opinions have been developed in a manner consistent with the care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area, and in accordance with the terms and conditions set forth in our signed proposal.

These findings are considered preliminary until local, state, or federal jurisdictions make verification of jurisdiction and confirm the wetland determination, boundary locations, and classifications. No guarantees are given that determinations or functional assessments, or ratings will concur with those performed by regulatory agencies or other qualified professionals.

This report is provided for the use of GP and regulatory authorities with jurisdiction over the ecosystems, species, and geographic area covered herein. It is not intended for use by other parties for any other purpose.

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Exhibit 5 SHOR23-01

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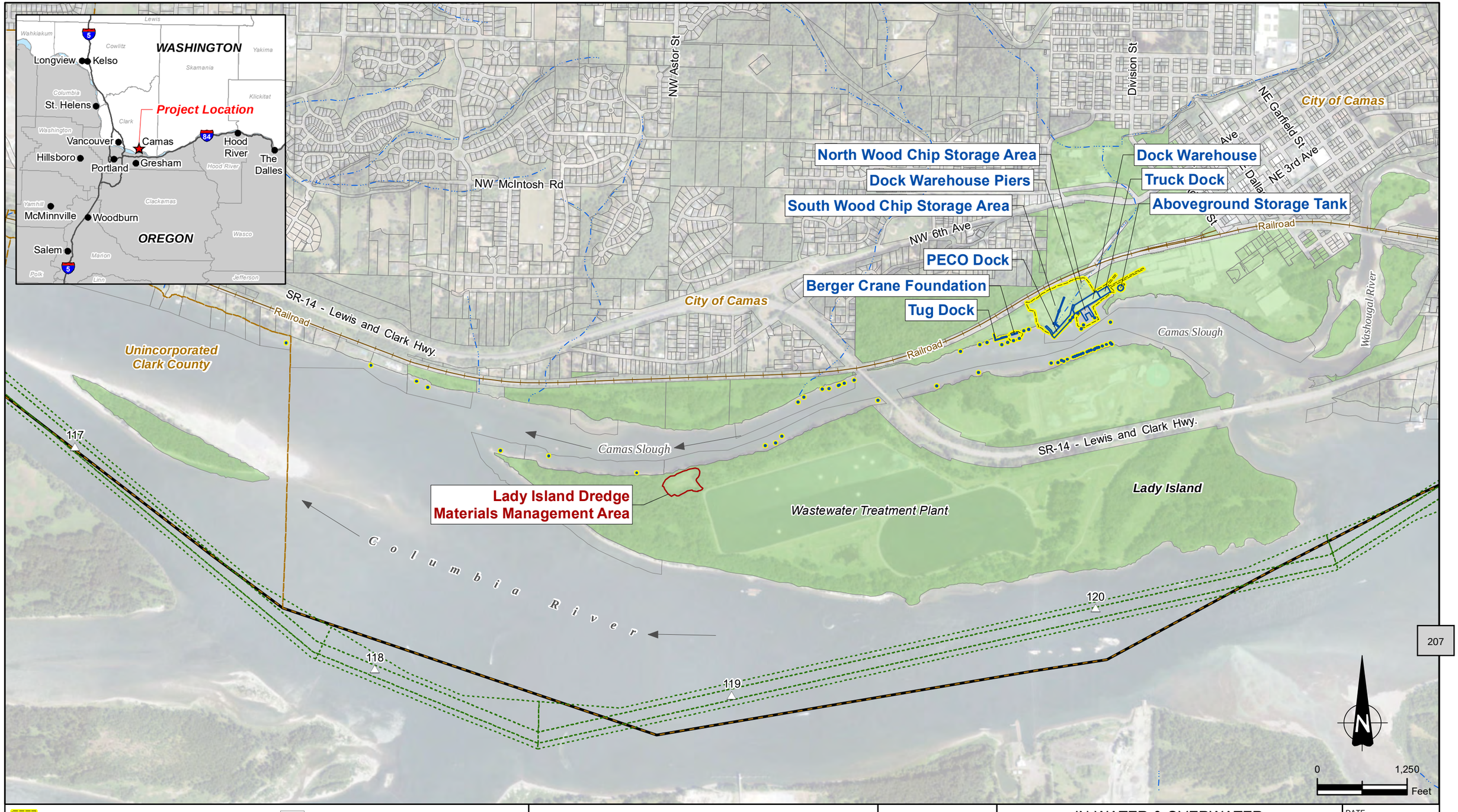
FIGURES



Project Limits	Tax Lot
Columbia River Mile Marker	Tax Lot Owned by Georgia-Pacific
Stream/River	City Boundary
Structure To Be Removed	County Boundary
Dolphin To Be Removed	Federal Navigation Channel
Lady Island Dredge Materials Management Area	

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

PROJECT LOCATION

DATE: OCTOBER 2022
SCALE: 1 " = 1,250 '
PROJECT NO.
FIGURE: 1

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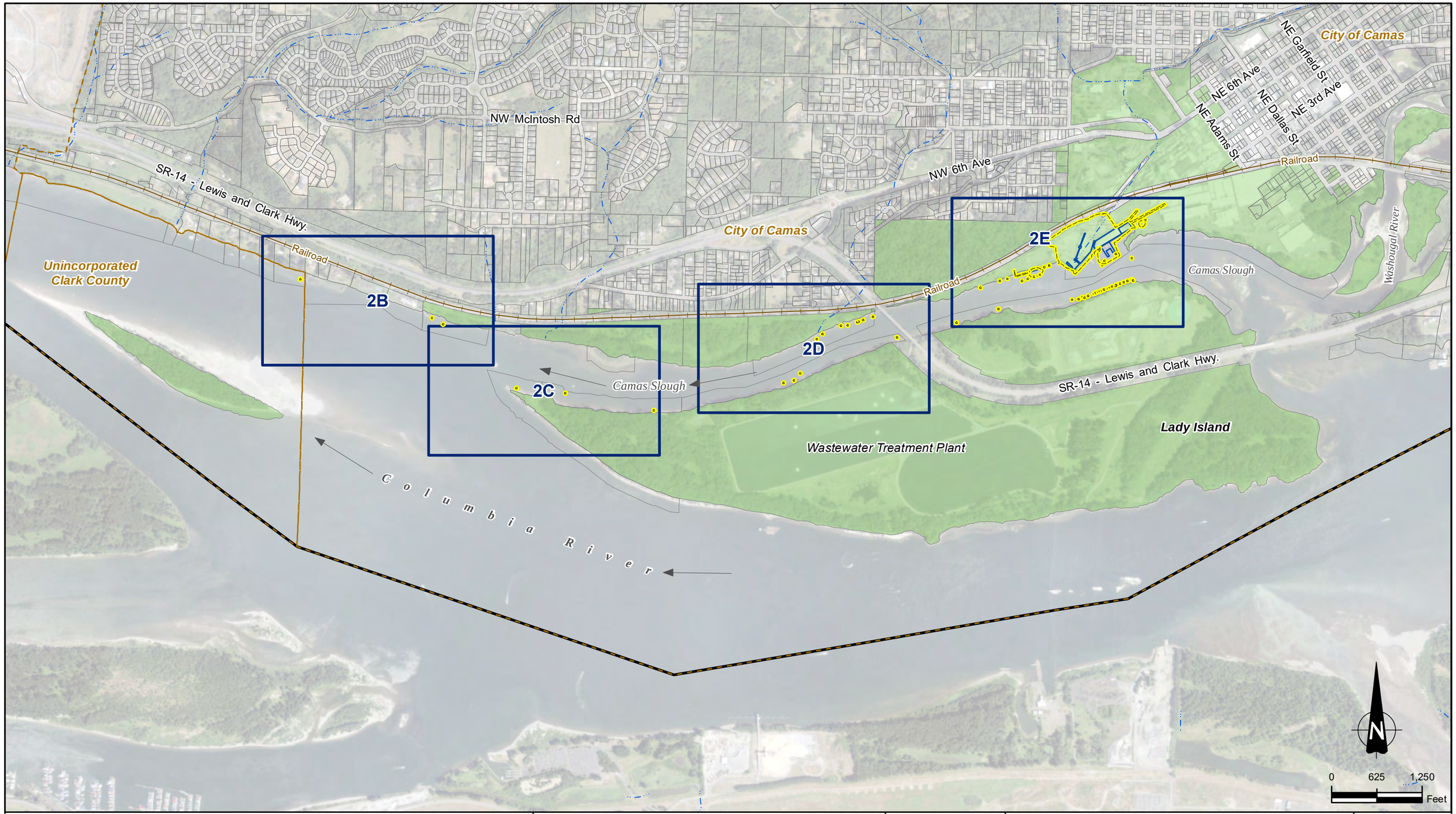

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Stream/River
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary
County Boundary

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP
OVERVIEW

DATE
OCTOBER 2022

SCALE
1 " = 1,250 '

PROJECT NO.

FIGURE
208

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2A - Study Area Map - Overview.mxd - sierra.marrs - 10/19/2022 - 3:36:05 PM

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE
OCTOBER 2022

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
209

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Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE
OCTOBER 2022

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
210

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Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE
OCTOBER 2022

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
211

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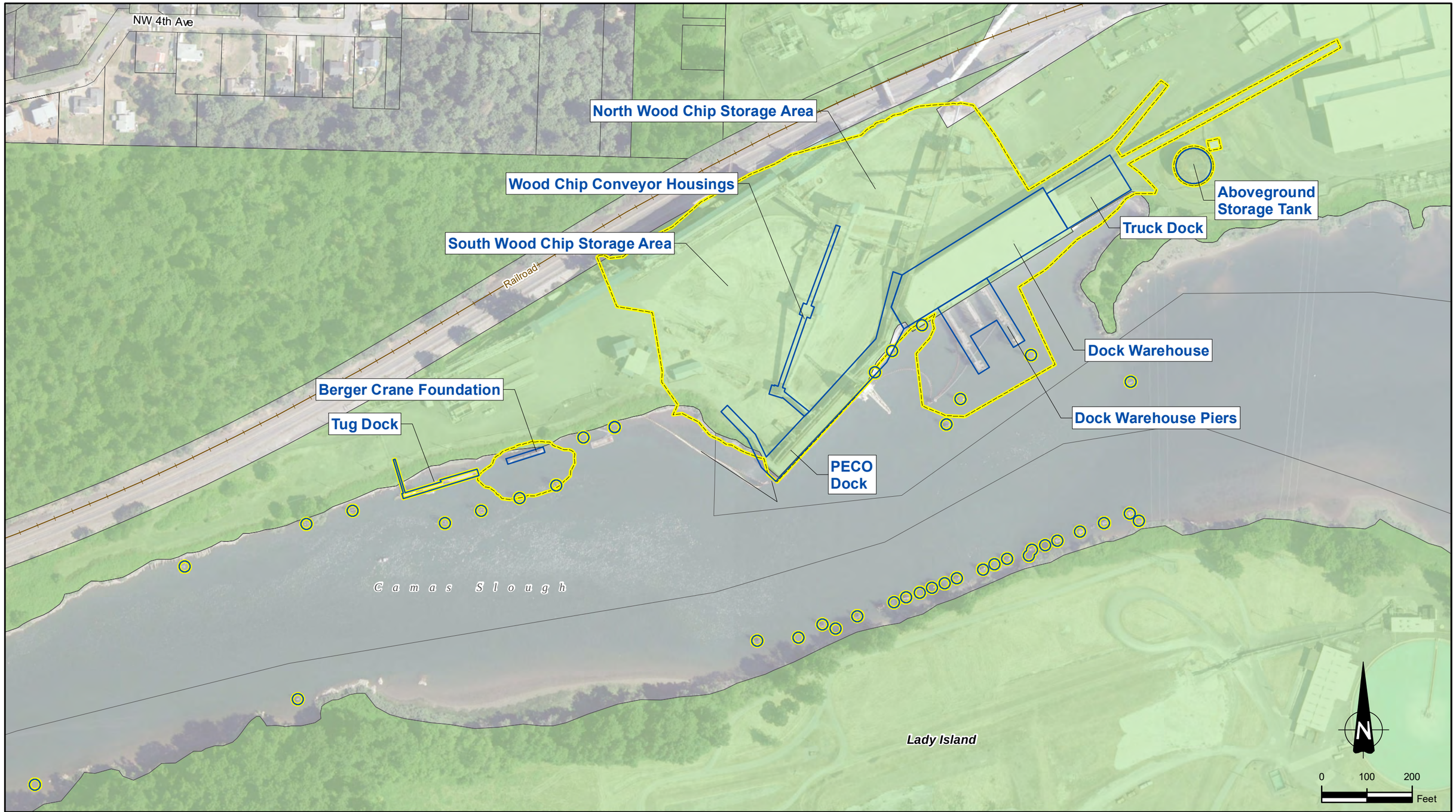

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE
OCTOBER 2022

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
212

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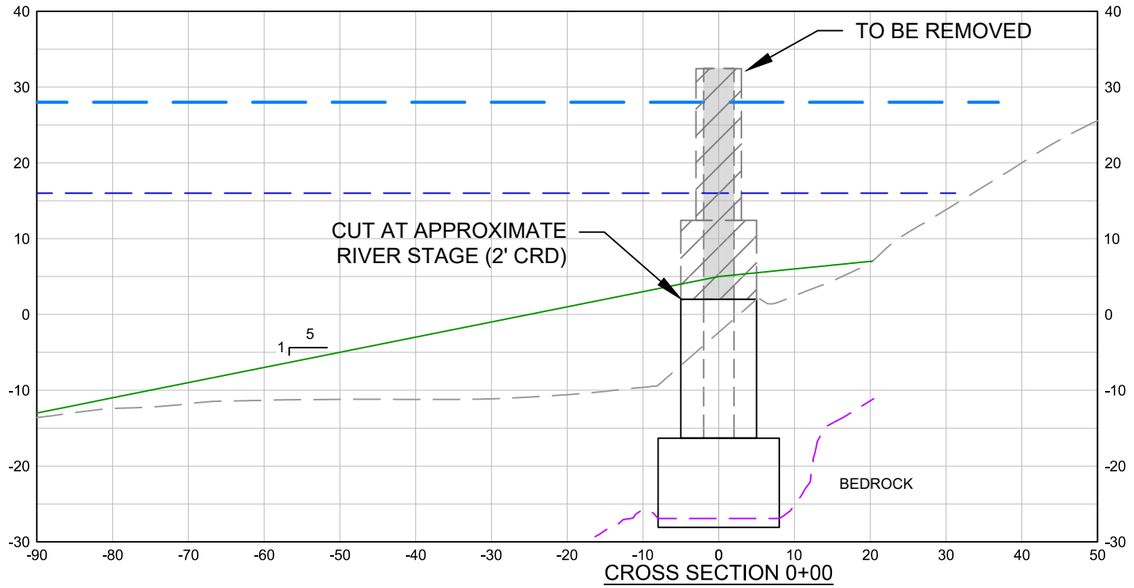
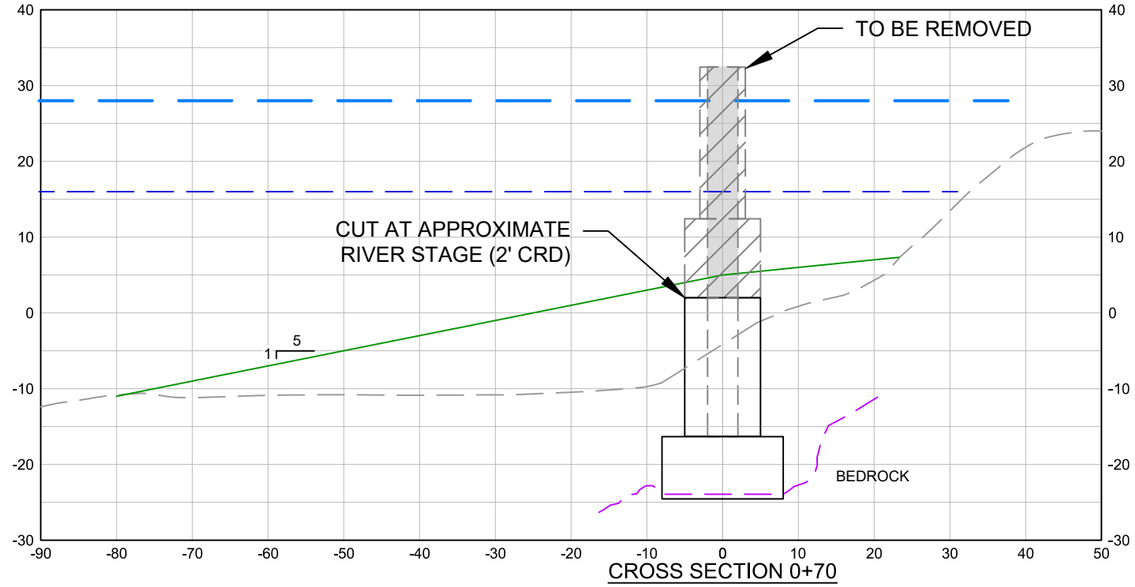


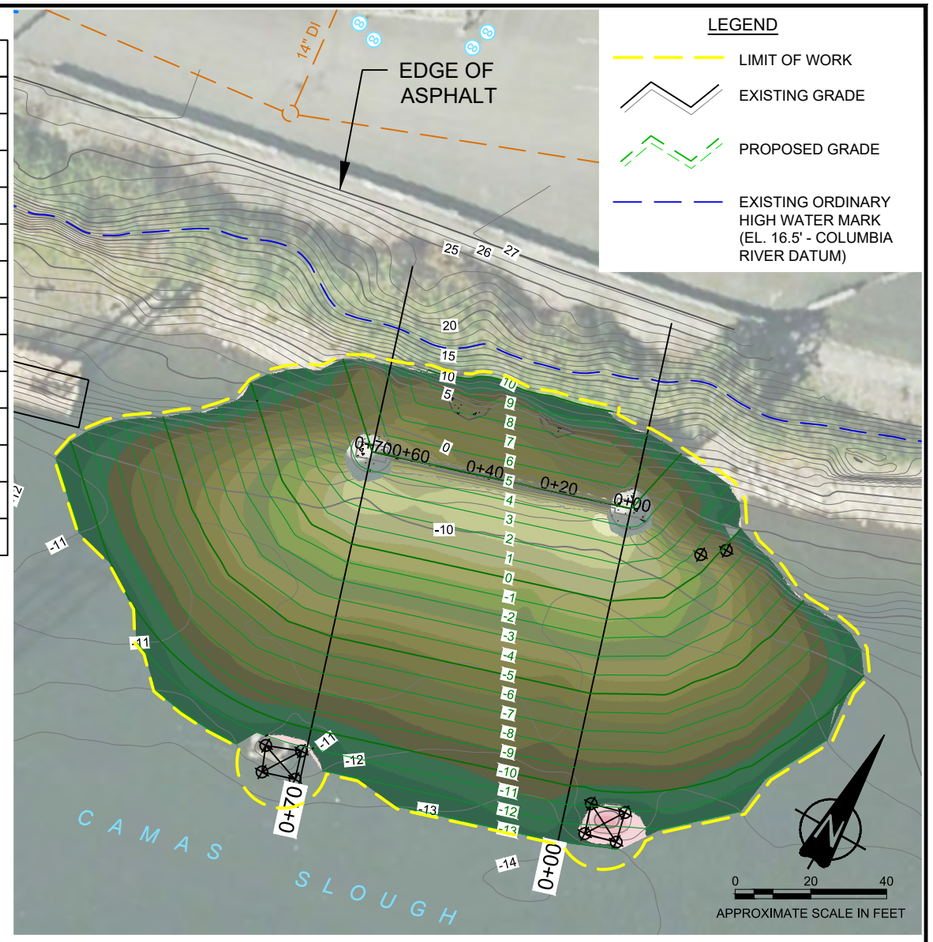
CROSS SECTION 0+00

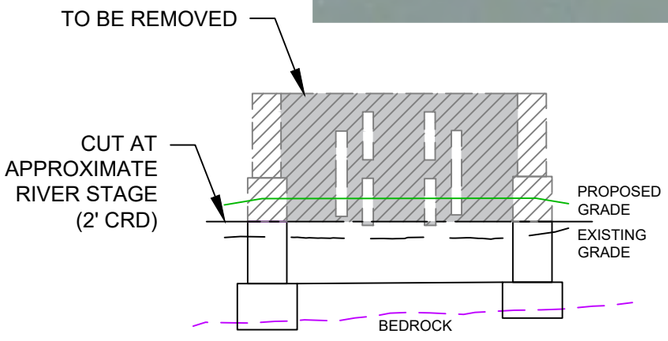


CROSS SECTION 0+70

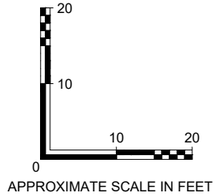
Depth Thickness Table in Ft		
MIN	MAX	Color
0	+1	
+1	+2	
+2	+3	
+3	+4	
+4	+5	
+5	+6	
+6	+7	
+7	+8	
+8	+9	
+9	+10	
+10	+11	
+11	+12	

3,500 cy FILL





BERGER CRANE FOUNDATION PHOTO



APPROXIMATE SCALE IN FEET

CROSS SECTION LEGEND

- ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING GRADE
- PROPOSED FINAL GRADE

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE: OCTOBER 2022
			SCALE: AS SHOWN
Tetra Tech		GRADING PLAN BERGER CRANE FOUNDATION	PROJECT NO.
			FIGURE 213

LEGEND

LIMIT OF WORK

EXISTING GRADE

PROPOSED GRADE

EXISTING ORDINARY HIGH WATER MARK
(EL. 16.5' - COLUMBIA RIVER DATUM)

UTILITY LEGEND

GRIT SUMP COLLECTION

KEY

FILL = 3,500 CY

BERGER CRANE FOUNDATION

GANGWAY

TUG DOCK

16" DI

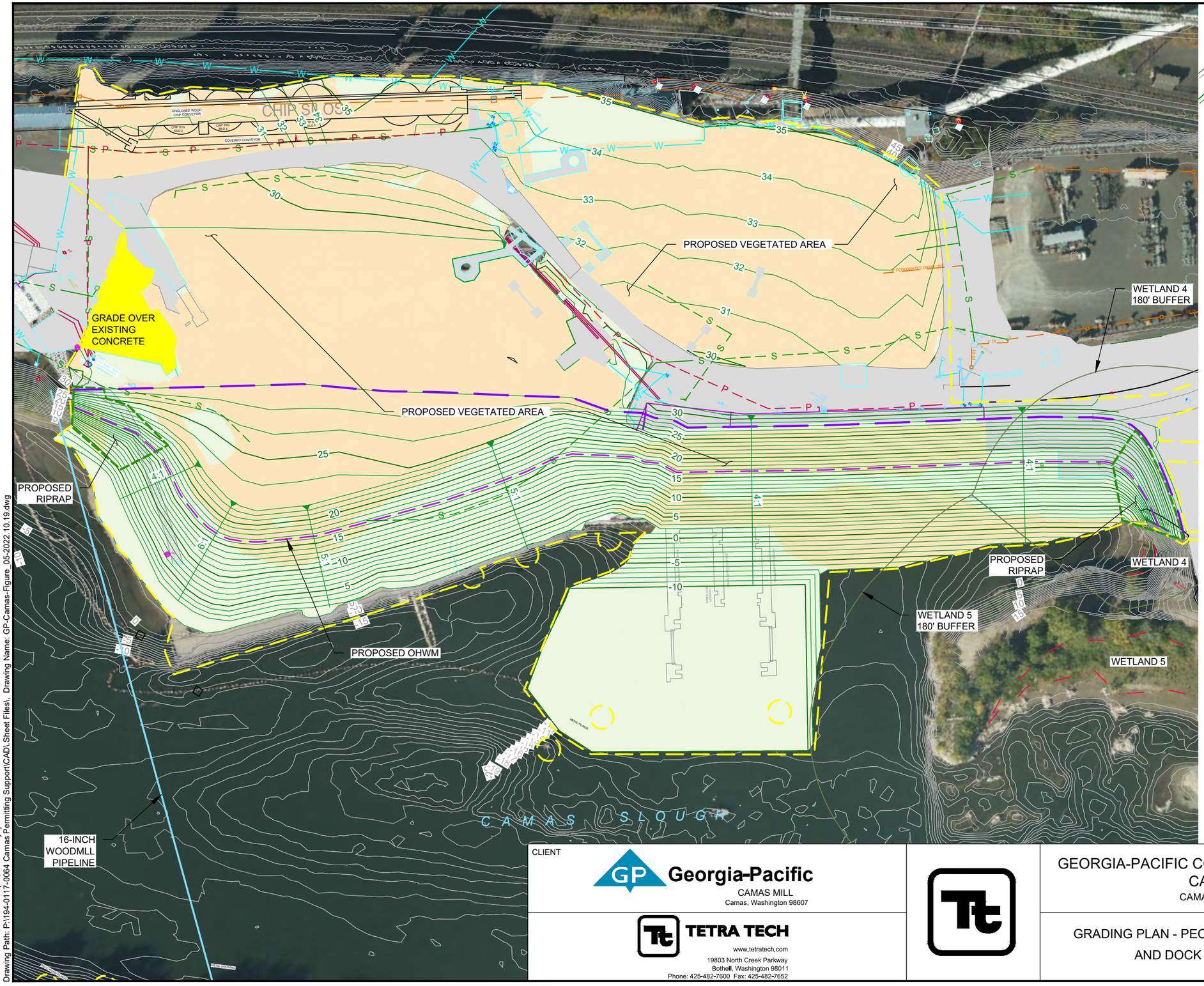
14" DI

N

0 20 40

APPROXIMATE SCALE IN FEET

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE: OCTOBER 2022
Tetra Tech		BERGER CRANE FOUNDATION RIVER BOTTOM RESTORATION	SCALE: AS SHOWN PROJECT NO. FIGURE: 214



LEGEND

- LIMIT OF WORK
- EXISTING GRADE CONTOURS (SITEWIDE LAND SURVEYING 7/07/20)
- PROPOSED FINAL GRADE CONTOURS
- PROPOSED ORDINARY HIGH WATER MARK (OHWM) (EL. 16.5' - COLUMBIA RIVER DATUM)
- PROPOSED 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING WETLAND

UTILITY LEGEND

- FIRE MAIN
- W — WATER
- S — PROCESS SEWER
- GRIT SUMP COLLECTION
- OL — OVERHEAD POWER LINE
- P — UNDERGROUND POWER LINE
- NATURAL GAS

EARTHWORK QUANTITIES

NORTH WOOD CHIP AREA:
130,730 SF (3.00 ACRE)

CUT =	5,678 CY
FILL =	32,943 CY

SOUTH WOOD CHIP AREA, PECO DOCK, WAREHOUSE, AND PIERS:
340,088 SF (7.81 ACRE)

CUT =	32,676 CY
FILL =	20,788 CY

DRAFT

0 50 100
APPROXIMATE SCALE IN FEET

CLIENT

Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

TETRA TECH
www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

GRADING PLAN - PECO DOCK, DOCK WAREHOUSE, AND DOCK WAREHOUSE PIERS

DATE 10/19/22
SCALE AS SHOWN
PROJECT No. 194-0117
FIGURE 215

Plot Date: 10/19/22 - 5:03pm, Plotted by: joel.cameron
Drawing Path: P:\194-0117-0064 Camas Permitting Support\CAD\ Sheet Files\, Drawing Name: GP-Camas-Figure_05-2022.10.19.dwg

APPENDIX A: SITE AND STRUCTURES PHOTOGRAPHS

Appendix A

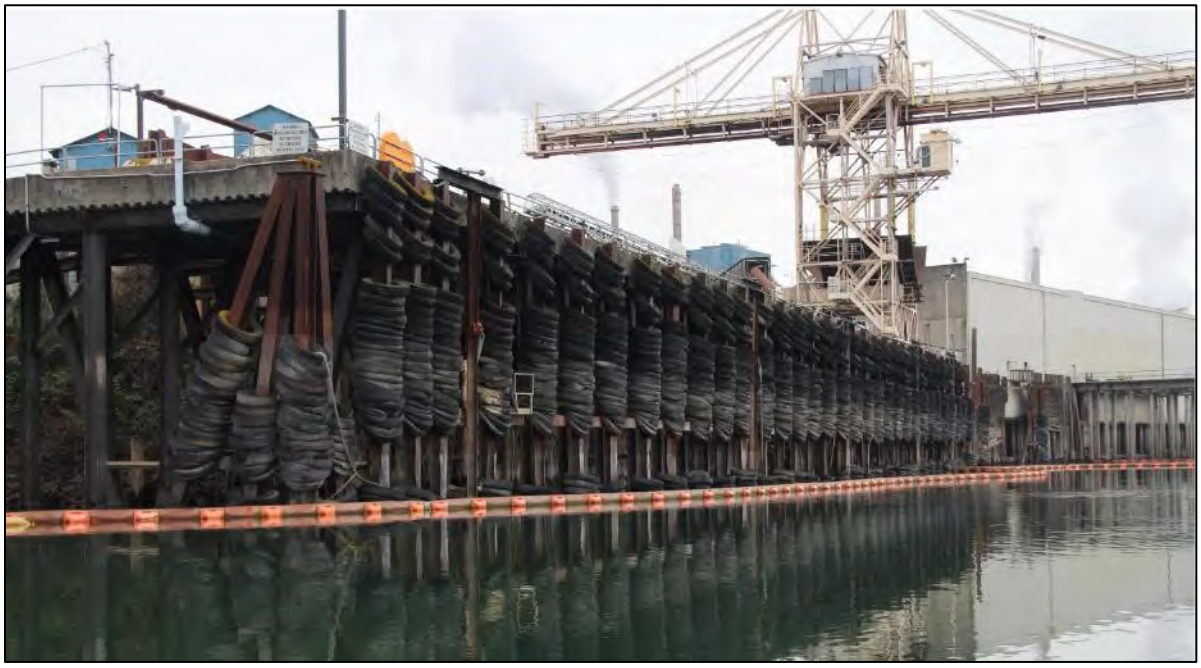
Site and Structure Photographs

Photograph 1. Truck Dock which is supported by approximately 220 pilings constructed from wood and pipe.

Photograph 2. Conveyer housing in the vicinity of the Truck Dock, PECO Dock, and Dock Warehouse

Photograph 3. Dock Warehouse situated between the Truck Dock and PECO Dock and supported by approximately 800 piles, with foundations on the riverbank side.

Photograph 4. Three piers extend from the Dock Warehouse that are supported by 54 concrete piles along with 21 carbon steel pipe piles. Three guidance dolphins are arranged at the end of the piers.



Photograph 5. The PECO Dock, supported by approximately 400 wood piles.

Photograph 6. Concrete footing from the Berger Crane gantry.

Photograph 7. Typical HP pile dolphin with tire bumpers attached.

Photograph 8. Typical timber head dolphin.

Photograph 9. Aboveground storage tank, a 40,000-gallon steel oil tank that has been previously cleaned and disconnected.

APPENDIX B: WETLAND FIELD INVESTIGATION METHODOLOGY

Exhibit 5 SHOR23-01

WETLAND INVESTIGATION METHODS

Wetland invetigation methods follow requirements of the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual (1987) along with the Regional Supplement to the manual for western mountains, valleys, and coastal regions (2010). Also, the City of Camas Shoreline Code was reviewed and requirements followed.

Prior to the field investigation, available site information was reviewed to identify documented wetlands, streams, or other site characteristics (e.g., vegetation patterns, topography, soils, or aquatic areas) that would indicate the presence of critical areas and shoreline areas within the study area.

Wetlands were identified and compared with wetlands mapped by the National Wetlands Inventory (NWI; USFWS 2019), and City of Camas and Clark County databases (City of Camas 2019a; Clark County 2019). Characteristics of wetlands in the study area, if any, were recorded.

Wetlands were rated following the Washington State Department of Ecology Wetland Rating System (Hruby 2014).

Wetlands in the study area were identified and delineated based on the parameters described in **Table B-1**.

Wetland Plant Community

Wetland plant communities were identified following standard procedures. Individual plant species were identified and the relative percent cover for each species was evaluated. The indicator status, prevalence test, and 50/20 Rule were used to determine the presence of wetland vegetation. An area was considered to have wetland vegetation if more than 50 percent of the dominant species had an indicator status of FAC, FACW, or OBL. Definitions of indicator status are presented in **Table B-2**. Scientific nomenclature of all plant species follows that of the PLANTS database (NRCS 2019).

Hydric Soil

Hydric soils are defined as being saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile. Hydric soils exhibit certain characteristics that can be observed in the field (see **Table B-1**).

Soil samples were obtained in representative areas by digging a pit to a depth of at least 18 inches. Soil samples were then examined for hydric indicators. Organic content was estimated visually and texturally. Sulfidic material was determined by the presence of sulfide gases (rotten-egg odor), and soil colors were evaluated against a Munsell soil color chart (Munsell Color 2018).

Wetland Hydrologic Conditions

While wetlands are defined in part by the presence of water, water does not need to be present throughout the entire year for an area to be considered a wetland. Wetland hydrologic conditions are present when an area is either permanently or temporarily inundated, or when the soil is saturated for a significant period (usually a week or more) during the growing season under normal conditions (USACE 1987).

Table B-1. Wetland Indicators

Parameter	Definition and Indicators
Wetland vegetation	Dominant vegetation consists of wetland-adapted plant species, based on one or more of the following indicators: • Dominance Test: more than 50 percent of dominant vegetation is of facultative, facultative wetland, or obligate status as determined from the National List of Plant Species Occurring in Wetlands, or • Prevalence Index: Prevalence index is 3.0 or less. The prevalence index is a weighted average that takes into account plant abundance and indicator status; or • Plant morphological conditions are evident, or • More than 50 percent of the total coverage of bryophytes consists of wetland-associated species.
Hydric soils	A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding that persist long enough during the growing season to develop anaerobic conditions in the upper part. Hydric soils generally exhibit one or more of the following characteristics: • Histosol (highly organic soil); • Histic epipedon (organic soil surface layer); • Sulfidic material (rotten-egg odor); and • Soil iron and manganese reduction, translocation, and accumulation.
Wetland hydrologic conditions	Wetland hydrologic conditions are indicated by one or more of the following: • Surface inundation visible on ground or aerial imagery; • Standing water or saturated soils in a soil pit at or above a depth of 12 inches for fine-textured soil; • Oxidized rhizospheres along living roots; • Presence of reduced iron; • Dry-season water table between 12 and 24 inches, or shallow aquitard; • Iron deposits; • Surface soil cracks; • Water marks on vegetation; • Drift lines; • Waterborne sediment deposits; • Water-stained or surface-scoured leaves; • Algal mats; • Sparsely vegetated concave surface; • Geomorphic position; • FAC-neutral test; • Salt crust; • Hydrogen sulfide odor; • Aquatic invertebrates; • Raised ant mounds; • Wetland drainage patterns; and • Stunted or stressed plants.

Source: USACE 1987, 2010.

Table B-2. Definitions of Indicator Status

Indicator Symbol	Definition
OBL	*Obligate*. Species that usually occur in wetlands (estimated probability >99%) under natural conditions.
FACW	*Facultative wetland*. Species that usually occur in wetlands (estimated probability 67 to 99%), but occasionally are found in uplands.
FAC	*Facultative*. Species that are equally likely to occur in wetlands or uplands (estimated probability 34 to 66%).
FACU	*Facultative upland*. Species that usually occur in uplands (estimated probability 67 to 99%), but occasionally are found in wetlands.
UPL	*Upland*. Species that usually occur in uplands under normal conditions (estimated probability >99%).
NL	*Not Listed*. Species was not included in evaluation and does not have an indicator status. More often occurs with plant species that would be categorized as UPL if they had been included in the evaluation.
NI	*No indicator*. Species for which insufficient information was available to determine an indicator status.

Source: Melvin et al. (2016)

Exhibit 5 SHOR23-01

Primary indicators of wetland hydrology generally include areas of ponding or soil saturation, and evidence of previous water inundation or saturation (i.e., watermarks, drift lines, sediment deposits, and oxidized root channels). Secondary indicators include, but are not limited to, wetland drainage patterns, geomorphic position, and raised ant mounds (see **Table B-1**). Where positive indicators were observed, wetland hydrology was assumed to occur during the growing season long enough to result in wetland conditions.

Growing Season

Vegetation and hydrologic indicators are dependent upon conditions during the growing season. The growing season, as defined by the Regional Supplement (USACE 2010), is when non-evergreen plants show biological activity (plant growth) and/or soil temperature at 12 inches below ground surface is 41 degrees Fahrenheit or higher (USACE 2010). The field investigation occurred in July during the growing season for this location.

WETLAND IDENTIFICATION AND DELINEATION REFERENCES

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APPENDIX C: WETLAND FIELD DATA SHEETS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project Site: GP Camas Mill City/County: Camas/Clark Sampling Date: 7/22/20
Applicant/Owner: Georgia-Pacific Consumer Operations LLC Camas State: WA Sampling Point: WL 7
Investigator(s): Theresa Price, Cheyenne Ginther Section, Township, Range: S11, T1N, R3E
Landform (hillslope, terrace, etc.): Riverbank Local relief (concave, convex, none): none Slope (%): 1%
Subregion (LRR): LRR A Lat: 45.579623 Long: -122.409093 Datum: _____
Soil Map Unit Name: NbB - Newberg Silt Loam, 3-8% slopes NWI classification: PEM1R
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?**	**Yes ☒**	**No ☐**
Hydric Soil Present?	Yes ☒	No ☐			
Wetland Hydrology Present?	Yes ☒	No ☐			

Remarks: Riverbank at water's edge (Camas Slough), wetland extended into river (permanent flow) and included saturated area further up bank at time of site visit.

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 10 x 10)	Absolute % Cover	Dominant Species?	Indicator Status
1. *N/A*			
2.			
3.			
4.			
50% = _____, 20% = _____	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5 x 5)			
1. *Amorpha fruiticosa*	10	yes	FACW
2.			
3.			
4.			
5.			
50% = 5, 20% = 2	10	= Total Cover	
Herb Stratum (Plot size: 3 x 3)			
1. *Phalaris arundinacea*	90	yes	FACW
2. *Polygonum lapathifolium*	1	no	FACW
3. *Equisetum L.*	1	no	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
50% = 45, 20% = 18	92	= Total Cover	
Woody Vine Stratum (Plot size: 5 x 5)			
1. *N/A*			
2.			
50% = _____, 20% = _____	0	= Total Cover	

% Bare Ground in Herb Stratum 5

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☒ 1 – Rapid Test for Hydrophytic Vegetation
- ☒ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒** **No ☐**

Remarks: Common spikerush in lower elevation - currently inundated 11:30 AM.

Project Site: GP Camas Mill

SOIL

Sampling Point: WL 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10 YR 3/1	25	10 YR 4/3	10	C	M	Clay-Loam	Roots
0-7	10 YR 2/1	65					Clay-loam	
7-18	10 YR 3/1	65	10 YR 4/3	30	C	M	Clay-loam	Roots
7-18	10 YR 2/1	5					Clay-loam	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☒ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soils Present? **Yes** ☒ **No** ☐

Remarks: Riverbank deposited sediments. Very fine grit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☒ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stresses Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes	☒	No	☐	Depth (inches):	
Water Table Present?	Yes	☒	No	☐	Depth (inches):	6
Saturation Present? (includes capillary fringe)	Yes	☒	No	☐	Depth (inches):	1

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Wetland fringe along Camas Slough. Embayment on shore (semi protected from flows)

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Camas Mill – Along Camas Slough, Columbia River City/County: Camas Sampling Date: July 16, 2019

Applicant/Owner: Georgia Pacific, Inc. State: WA Sampling Point: DP1

Investigator(s): Kristie Dunkin & Gregory McCormick Section, Township, Range: Section 47, Township 1N, Range 3E, Washington Meridian

Landform (hillslope, terrace, etc.): Riverbank Local relief (concave, convex, none): Concave to flat Slope (%): 0 – 15%

Subregion (LRR): A2 – Willamette and Puget Sound Valleys Lat: 45.5801 Long: -122.4036 Datum: NAD 83

Soil Map Unit Name: Sauvie Silt Loam, Sandy Substratum, 0 to 3 percent slopes/Water/Fill land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation ____ Soil ____ or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	**Is the Sampled Area within a Wetland?** Yes X No
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks: Wetland is a sedge wetland at the base of a steep bank. Invasive false indigo shrubs are present. Upland deciduous forested vegetation overhangs wetland. A few Oregon Ash present in wetland and data plot taken beneath one of these; however this is the exception and the wetland is classified as emergent. Adjacent upland is has a stripe of Cottonwood trees and weedy species before becoming asphalt.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus latifolia*	100	Yes	FacW
2. *Populus balsamifera ssp. trichocarpa* (rooted outside)	30		
3.			
4.			
	130 = Total Cover		
Sapling/Shrub Stratum (Plot size: 10 ft)			
1. *Amorpha fruticosa*	30	Yes	FacW
2.			
3.			
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: 5 ft)			
1. *Carex aquatilis*	50	Yes	Obl
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 = Total Cover		
Woody Vine Stratum (Plot size:)			
1. none present			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 1	x 1 = 1
FACW species 2	x 2 = 4
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: 3 (A)	5 (B)

Prevalence Index = B/A = 5/3 =1.66

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: Vegetated wetland area located riverbank of Camas Slough. Indigo bush, an invasive species is present. Above wetland, riverbank is steeply sloped and formed of rock/fill with blackberry and cottonwood trees. Other species present, but not within data plot, include sneeze weed and a patch of redosier dogwood.

SOIL

Sampling Point: DP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 – 8”	2.5Y 6/1 & 4/1	80	10 YR 5/3	10	C	PL, M	SiL	Silt Loam
			10 YR 8/1	10	C	PL, M	SiL	
8 - 12”	2.5Y 5/3	100					SiL	Silt Loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 12”

Hydric Soil Present? Yes X No ____

Remarks: Soil is formed from a mixture of fill and sediments deposited by river action. Redox features are clear and abundant with several colors of concentrations. Indictor F3, Depleted Matrix is met. Soil texture contains a large fraction of silt, but fine and very fine sand are a noticeable (less than 50%) contribution. Organic matter not over abundant at data plot however, where sedges are very abundant a 1 to 5 inch organic layer above the mineral layer is present. This organic layer appears to be washed away wherever indigo bush has taken hold and shades out sedge. Rocky substratum present below 12 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- X Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): River

Water Table Present? Yes X No ____ Depth (inches): 12 inches

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): At surface

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: Aerial photographs do not show sedge wetland due to overhanging upland trees in this reach of the slough. Surface water of slough less than 2 feet from data plot center.

Remarks:

Wetland 1 is a narrow, riverine, sedge dominated wetland on the Camas Slough. Sedges are present except in locations where false indigo bush has taken hold. Camas Slough is a large side-slough channel formed by Lady Island on the Columbia River. In this reach, water elevations are primarily controlled by upriver releases at the Bonneville dam, especially during the summer. Diurnal tidal range is approximately 1 foot.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Camas Mill – Along Camas Slough, Columbia River City/County: Camas Sampling Date: July 16, 2019

Applicant/Owner: Georgia-Pacific Consumer Operations, LLC State: WA Sampling Point: DP2

Investigator(s): Kristie Dunkin & Gregory McCormick Section, Township, Range: Section 47, Township 1N, Range 3E, Washington Meridian

Landform (hillslope, terrace, etc.): Riverbank Local relief (concave, convex, none): Concave to flat Slope (%): 0 – 15%

Subregion (LRR): A2 – Willamette and Puget Sound Valleys Lat: 45.5810 Long: -122.4047 Datum: WGS 84

Soil Map Unit Name: Sauvie Silt Loam, Sandy Substratum, 0 to 3 percent slopes/Water/Fill land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes X No _____**
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks: Riverine wetland vegetated with sedge and indigo bush on Camas Slough.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 10 ft.)			
1. *Amorpha fruticosa*	10	Yes	FacW
2.			
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. *Helenium autumnale*	5		FacW
2. *Carex aquatilis*	60	Yes	Obl
3. Carex sp.	20		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	85 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 25

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species 1	x 1 =	1
FACW species 1	x 2 =	2
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: 2 (A)		3 (B)

Prevalence Index = B/A = 3/2 = 1.5

Hydrophytic Vegetation Indicators:

X 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No _____**

Remarks: Vegetated wetland area on riverbank of Camas Slough. Indigo bush, an invasive species is present. Above wetland, bank is armored with large rock and supports limited weedy vegetation. Few trees grow between the old armoring. Sedge wetland vegetation currently dense in patches only. One 4- to 6-inch high finely leafed sedge not in bloom and unable to ID. Browse by deer and geese common based on conditions of vegetation.

SOIL

Sampling Point: DP 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 to 3"	10 Y 4/1	90	10 YR 4/3	10	C	Pl, M	SiL	
3 to 10"	10 YR 4/3	75	10 YR 5/1 & 6/1	25	D	Pl, M	SiL	
10"+								Too rocky to dig

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rocks

Depth (inches): 10 inches

Hydric Soil Present? Yes X No ___

Remarks: Soils show clear pattern of reduction/oxidation of iron and other minerals. Soil is fine materials (silts) with less than 50% fine sands. Soil at data plot appears to be largely from river deposition, other portions of wetland appear to have soil derived or influenced by adjacent upland fill. Little to no organic buildup in the soils except at locations where sedges are dense. Rocks at 10 inches prevent deeper exploration.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- X Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): River

Water Table Present? Yes X No ___ Depth (inches): 10 inches

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): At Surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: Aerial photos where river is at low elevation show bench clearly.

Remarks: Wetland 2 is a narrow riverbank sedge wetland on mainland side of Camas Slough. Sedges grow in patches between indigo bush. River surface approximately 2 feet from data plot center on day and time of investigation. Narrow bench is backed by steep armored shoreline comprised of boulders and fill materials. Area is wetland.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Camas Mill – Along Camas Slough, Columbia River City/County: Camas Sampling Date: July 16, 2019

Applicant/Owner: Georgia Pacific, Inc. State: WA Sampling Point: DP3

Investigator(s): Kristie Dunkin & Gregory McCormick Section, Township, Range: Section 47, Township 1N, Range 3E, Washington Meridian

Landform (hillslope, terrace, etc.): Riverbank Local relief (concave, convex, none): Concave to flat Slope (%): 0 – 30%

Subregion (LRR): A2 – Willamette and Puget Sound Valleys Lat: 45.5813 Long: -122.4062 Datum: WGS 84

Soil Map Unit Name: Sauvie Silt Loam, Sandy Substratum, 0 to 3 percent slopes/Water/Fill land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	**Is the Sampled Area within a Wetland?** **Yes X No**
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks: Wetland is small area in a bowl-shaped depression along embankment approximately 10 feet above the Slough's water level on day of investigation.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera ssp. trichocarpa* (outside wetland)	25	Yes	FacW
2. *Fraxinus latifolia (rooted outside wetland)*	10		FacW
3.			
4.			
	35	= Total Cover	
Sapling/Shrub Stratum (Plot size: 10 ft.)			
1. *Rubus armeniacus*	10		FacU
2. *Symphoricarpos albus*	5		FacU
3.			
4.			
5.			
	15	= Total Cover	
Herb Stratum (Plot size: 5 ft.)			
1. *Phalaris arundinacea*	90	Yes	FacW
2. *Stachys cooleyae*	10		FacW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. None			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species 2	x 2 =	4
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: 2 (A)		4 (B)

Prevalence Index = B/A = 4/2= 2

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No**

Remarks: Palustrine emergent wetland approximately 6 to 8 feet higher than river on a bench on riverbank. Drift debris from previous flooding is present. Stacys not blooming, so this was best guess based on vegetative character. This small depression demonstrated obvious difference within wetland in comparison to surrounding upland weedy species.

SOIL

Sampling Point: DP 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 to 18"	10 Y 4/1	60	5Y 4/1	40	D/C	Pl, M	Silt	Dry in July

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

Soils show deposition layers of fine material to at least 18 inches deep. Soil has clear pattern of reduction/oxidation of iron and other minerals. Soil is dry in this bench location in July, however the area would flood at high river levels. as well as collect overland flows and precipitation. Possible groundwater discharge on this slope location may occur seasonally as well.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- X Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- X Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): <12 inches

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: None

Remarks: Wetland 3 is a small bowl-shaped depression on a bench approximately 10 feet above the current summertime water level of the Camas Slough. The area appears to hold water for a duration long enough in early growing season to support wetland conditions. Vegetation is dominated by reed canarygrass with cottonwood trees. The area is backed by steep rock armored slope comprised of fill materials and supporting Himalayan blackberry and other weedy plant species. Evidence of wetland hydraulic conditions included deposits, waterstained leaves and geomorphic position. Area is wetland.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Camas Mill – Along Camas Slough, Columbia River City/County: Camas Sampling Date: July 17, 2019

Applicant/Owner: Georgia Pacific, Inc. State: WA Sampling Point: DP5

Investigator(s): Kristie Dunkin & Gregory McCormick Section, Township, Range: Section 11, Township 1N, Range 3E, Washington Meridian

Landform (hillslope, terrace, etc.): Riverbank Local relief (concave, convex, none): Concave to flat Slope (%): 0 – 15%

Subregion (LRR): A2 – Willamette and Puget Sound Valleys Lat: 45.5814 Long: -122.4105 Datum: WGS 84

Soil Map Unit Name: Sauvie Silt Loam, Sandy Substratum, 0 to 3 percent slopes/Water/Fill land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes X No _____**
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks: Small wetland in sheltered cove adjacent to major riverfront infrastructure. Heavily browsed by geese and deer. At time of investigation vegetation much reduced, but area would be well vegetated area without grazing pressure.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. *Amorpha fruticosa*	10	Yes	FacW
2.			
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Phalaris arundinacea*	15	Yes	FacW
2. *Polygonum lapathifolium*	5		FacW
3. *Carex* sp.	T		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	20 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 70

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species 2	x 2 = 4
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = 4/2 = 2.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

_X_ 2 - Dominance Test is >50%

_X_ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No _____**

Remarks: Heavily browsed small wetland at the head of the cove adjacent to Truck Dock. Sedges browsed to small stumps with no significant leaf area cover and unable to identify, look similar to *Aquatilis* in leaf type. Other plant stubble also present. No evidence of browse on Indigo bush.

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 to 18"	10 YR 3/1	95	10 YR 6/8	5	C	PL	Silt	Silt and organic debris throughout

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: Soil formed from deposition of silts and other fine organic materials that likely settle out from river water in this sheltered cove location. Soil texture mainly fine material, but larger pieces of organic debris distributed unevenly throughout. Soil color and redox indicate hydric soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- X Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes X No _____ Depth (inches): River

Water Table Present? Yes X No _____ Depth (inches): at Surface

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): at Surface

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: None

Remarks: Small, narrow, wetland area that receives heavy browsing located at head of shallow, narrow cove. Vegetation reduced so much that sedges are just short stems of 1 to 2 inches. Indigo bush growing within wetland and among riprap on bank above wetland. Wetlands clearly flooded at higher river levels with watermarks visible on adjacent infrastructure and on boulders.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Camas Mill – Along Camas Slough, Columbia River City/County: Camas Sampling Date: July 17, 2019

Applicant/Owner: Georgia Pacific, Inc. State: WA Sampling Point: DP5

Investigator(s): Kristie Dunkin & Gregory McCormick Section, Township, Range: Section 11, Township 1N, Range 3E, Washington Meridian

Landform (hillslope, terrace, etc.): Riverbank Local relief (concave, convex, none): Concave to flat Slope (%): 0 – 15%

Subregion (LRR): A2 – Willamette and Puget Sound Valleys Lat: 45.5812 Long: -122.4104 Datum: WGS 84

Soil Map Unit Name: Sauvie Silt Loam, Sandy Substratum, 0 to 3 percent slopes/Water/Fill land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes X No _____**
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks: Wetland 5 is a 10- to 20-foot-wide, riverbank wetland along a broad cove of the Camas Slough. Vegetation includes areas of abundant obligate herbaceous species, as well as patches of dense sedges. Invasive indigo bush is present. Area heavily grazed by geese with abundant droppings present.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. *Amorpha fruticosa*	10	Yes	FacW
2.			
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Carex aquatilis*	100	Yes	Obl
2. *Polygonum lapathifolium*	20	Yes	FacW
3. *Mentha arvensis*	20	Yes	FacW
4. *Veronica americana*	40	Yes	Obl
5. *Stachys Cooleyae*	20	Yes	FacW
6.			
7.			
8.			
9.			
10.			
11.			
	200 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 2	x 1 = 2
FACW species 3	x 2 = 6
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 5 (A)	8 (B)

Prevalence Index = B/A = 8/5 = 1.6

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No _____**

Remarks: Heavily browsed, emergent wetland with line of shrubs and trees occurring at wetland boundary. Near current river waterline, abundant obligate herbaceous species with minimal shrubs are present. Other species in wetland include a single line of willow, ash, and black cottonwood at wetland boundary, where landscape transitions to hardened steep slopes made of fill materials. Indigo bush occurs in small patches throughout with larger shrubs growing at rocks where area because upland. Also present but not in data plot, small juncus (not id'd), one or two *Carex* sp., and small flowered forget-me-not (but not blooming).

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 1”	10 YR 2/1	100					OM/Silt	Silt and organics
1 – 10”	7.5 YR 2.5/1	50	7.5 YR 4/6	50	C	Pl	SiL	Silt with sand
10 – 18”	10 YR 3/2	60	7.5 YR 4/6	40	C	Pl	SiL	Silt with sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
_X_ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): _____

Hydric Soil Present? Yes _X_ No _____

Remarks: Shoreline with wetland with soils comprised of depositional fine materials. Thin organic layer held by abundant obligate species.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

_X_ Surface Water (A1)
___ High Water Table (A2)
_X_ Saturation (A3)
___ Water Marks (B1)
_X_ Sediment Deposits (B2)
_X_ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _X_ No _____ Depth (inches): River

Water Table Present? Yes _X_ No _____ Depth (inches): surface

Saturation Present? (includes capillary fringe) Yes _X_ No _____ Depth (inches): 10”

Wetland Hydrology Present? Yes _X_ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Large portion of wetland area inundated by river at least daily and supports obligate herbaceous species, other portions supporting shrubs and trees with less frequent inundation (Facw). River approximately 4 feet lower and 10 feet distant from data plot location at time of sampling. Soil in data plot moist at surface and saturated at 10 inches. Evidence of frequent inundation included sediment deposits and drift deposits.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Camas Mill – Along Camas Slough, Columbia River City/County: Camas Sampling Date: July 17, 2019

Applicant/Owner: Georgia Pacific, LLC. State: WA Sampling Point: DP7

Investigator(s): Kristie Dunkin & Gregory McCormick Section, Township, Range: Section 11, Township 1N, Range 3E, Willamette Meridian

Landform (hillslope, terrace, etc.): Riverbank Local relief (concave, convex, none): Concave to flat Slope (%): 0 – 15%

Subregion (LRR): A2 – Willamette and Puget Sound Valleys Lat: 45.5815 Long: -122.4073 Datum: WGS 84

Soil Map Unit Name: Sauvie Silt Loam, Sandy Substratum, 0 to 3 percent slopes/Water/Fill land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes X No _____**
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks: Wetland 6 is an emergent wetland on the Camas Slough on the mainland bank. Wetland is located on a low bench along the riverbank. Area has received heavy grazing based on vegetation conditions. Indigo bush, an invasive species, is present throughout and grows most abundantly at the margin of the bench within riprapped slope.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. *Amorpha fruticosa*	30	Yes	FacW
2.			
3.			
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Carex aquatilis*	50	Yes	Obl
2. *Eleocharis palustris*	30	Yes	Obl
3. *Phalaris arundinacea*	10		FacW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 60

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 2	x 1 = 2
FACW species 1	x 2 = 2
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 3 (A)	4 (B)

Prevalence Index = B/A = 4/3 = 1.3

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No _____**

Remarks: Vegetation is heavily grazed. Indigo bush grows abundantly along margins of wetland with a few smaller shrubs scattered across wetland. Where this shrub is present other native species appear to have been shaded out. Wetland community is present.

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 – 5"	7.5 YR 3/1	40	7.5 YR 5/8	30	C	Pl	SiL	Silt with less than 50% sand
			7.5 YR 4/1	30	D	PL		
5 – 18"	G1 N	80	7.5 YR 5/8	20	C	PL	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: Soil is depositional silts with minimal organics matter present. Layer below 5 inches clearly gleied. Hydric soil conditions met.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- X Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes X No _____ Depth (inches): River

Water Table Present? Yes X No _____ Depth (inches): Surface

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 8 inches

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: None

Remarks: Wetland 6 is a narrow, riverbank emergent wetland on Camas Slough on the mainland side. It extends from the base of steep slopes formed by fill out to the river. Vegetation includes emergent and shrubs species. Area is a wetland.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Camas Mill – Along Camas Slough, Columbia River City/County: Camas Sampling Date: July 17, 2019

Applicant/Owner: Georgia Pacific, LLC. State: WA Sampling Point: DP7

Investigator(s): Kristie Dunkin & Gregory McCormick Section, Township, Range: Section 11, Township 1N, Range 3E, Willamette Meridian

Landform (hillslope, terrace, etc.): Riverbank Local relief (concave, convex, none): Concave to flat Slope (%): 0 – 15%

Subregion (LRR): A2 – Willamette and Puget Sound Valleys Lat: 45.5812 Long: -122.4009 Datum: WGS 84

Soil Map Unit Name: Sauvie Silt Loam, Sandy Substratum, 0 to 3 percent slopes/Water/Fill land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes X No _____**
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks: Wetland 6 is a emergent fringing wetland on the Camas Slough on the mainland bank. Wetland is located on a low bench along the riverbank. Area has received heavy grazing based on vegetation conditions. False indigo bush, an invasive species is present throughout and grows most abundantly at the margin of the bench with riprapped slope.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. *Amorpha fruticosa*	30	Yes	FacW
2.			
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Carex aquatilis*	50	Yes	Obl
2. *Eleocharis palustris*	30	Yes	Obl
3. *Phalaris arundinacea*	10		FacW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 60

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 2	x 1 = 2
FACW species 1	x 2 = 2
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 3 (A)	4 (B)

Prevalence Index = B/A = 4/3 = 1.3

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No _____**

Remarks: Vegetation is heavily grazed. False indigo bush grows abundantly along margins of wetland with a few smaller shrubs of same scattered across wetland. Where this shrub is present other native species have been shaded out.

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 – 5"	7.5 YR 3/1	40	7.5 YR 5/8	30	C	Pl	SiL	Silt with less than 50% sand
			7.5 YR 4/1	30	D	PL		
5 – 18"	G1 N	80	7.5 YR 5/8	20	C	PL	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: Soil is depositional silts with minimal organics matter present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- X Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes X No _____ Depth (inches): River

Water Table Present? Yes X No _____ Depth (inches): Surface

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 8 inches

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: None

Remarks: Wetland 6 is a narrow, fringing emergent wetland on Camas Slough on the mainland side. It extends from the base of steep slopes formed by fill to the river. Vegetation includes emergent and shrubs species.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Camas Mill – Along Camas Slough, Columbia River City/County: Camas Sampling Date: July 16, 2019

Applicant/Owner: Georgia Pacific, Inc. State: WA Sampling Point: UPL 1

Investigator(s): Kristie Dunkin & Gregory McCormick Section, Township, Range: Section 47, Township 1N, Range 3E, Washington Meridian

Landform (hillslope, terrace, etc.): Riverbank Local relief (concave, convex, none): Concave to flat Slope (%): 0 – 15%

Subregion (LRR): A2 – Willamette and Puget Sound Valleys Lat: 45.5812 Long: -122.4009 Datum: WGS 84

Soil Map Unit Name: Sauvie Silt Loam, Sandy Substratum, 0 to 3 percent slopes/Water/Fill land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No X	**Is the Sampled Area within a Wetland?** **Yes _____ No X**
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks: Rocky bench. 10 to 15 feet wide at current river levels.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. *Amorpha fruticosa*	2		FacW
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Chamerion angustifolium*	2		NL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 98

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes _____ No X**

Remarks: Vegetation is less than 5% areal cover over area. Area in the shoreline is too rocky for vegetation establishment.

UPL 1

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 – 1”	10 YR 3/3	100					Silt	Sediment between rocks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No __X__

Remarks: Shallow sediment in some locations between rocks.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __X__ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes __X__ No _____ Depth (inches): River

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes __X__ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Bench area inundated by river seasonally, but no wetland soil or wetland vegetation present. Area is within Ordinary High water, but area does not meet criteria for wetland.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project Site: GP Camas Mill City/County: Camas/Clark Sampling Date: 7/22/20
Applicant/Owner: Georgia-Pacific Consumer Operations LLC Camas State: WA Sampling Point: UP 7
Investigator(s): Theresa Price, Cheyenne Ginther Section, Township, Range: S11, T1N, R3E
Landform (hillslope, terrace, etc.): Riverbank slope Local relief (concave, convex, none): none Slope (%): 4%
Subregion (LRR): LRR A Lat: 45.579623 Long: -122.409093 Datum: _____
Soil Map Unit Name: NbB - Newburg Silt Loam, 3-8% slopes NWI classification: n/a
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?**	**Yes** ☐	**No** ☒
Hydric Soil Present?	Yes ☐	No ☒			
Wetland Hydrology Present?	Yes ☐	No ☒			

Remarks: Riparian corridor along Camas Slough. Amorpha dominant shrub in riparian and wetland areas.

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 10 x 10)	Absolute % Cover	Dominant Species?	Indicator Status
1. *N/A*			
2.			
3.			
4.			
50% = _____, 20% = _____	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5 x 5)			
1. *Amorpha fruiticosa*	35	yes	FACW
2.			
3.			
4.			
5.			
50% = 17, 20% = 7	35	= Total Cover	
Herb Stratum (Plot size: 3 x 3)			
1. *Phalaris arundinacea*	60	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
50% = 30, 20% = 12	60	= Total Cover	
Woody Vine Stratum (Plot size: 5 x 5)			
1. *N/A*			
2.			
50% = _____, 20% = _____	0	= Total Cover	

% Bare Ground in Herb Stratum 15

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x1 =	_____
FACW species	_____	x2 =	_____
FAC species	_____	x3 =	_____
FACU species	_____	x4 =	_____
UPL species	_____	x5 =	_____
Column Totals:	_____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

☒ 1 – Rapid Test for Hydrophytic Vegetation
☐ 2 - Dominance Test is >50%
☐ 3 - Prevalence Index is ≤3.0[1]
☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ 5 - Wetland Non-Vascular Plants[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks: Amorpha dominant shrub - further east and west Dogwood (cornus sericea) scattered.

Project Site: GP Camas Mill

SOIL Sampling Point: UP 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10 YR 3/2	70	10 YR 4/3	30	C	M	Clay-Loam	Very fine grit, not heavy clay.
0-1	10 YR 3/1	10					Clay-Loam	Very fine grit.
12-18	10 YR 3/2	65	10 YR 4/3	35	C	M	Clay-Loam	Very fine grit, somewhat more clayey

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks: No indicators observed, soil did not meet indicators as we obsered soil pil located ~ 1-ft higher than WL 1 pit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stresses Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):	_____
Water Table Present?	Yes	☐	No	☒	Depth (inches):	_____
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):	_____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Riparian corridor along Camas Slough. May get occasional flow during very high flow periods, except Slough/Columbia are controlled somewhat by upstream Dam outfalls.

APPENDIX D: WETLAND RATING FORMS AND SUPPORTING FIGURES

Wetland 1 Information Sheet
Wetland Name: Wetland 1
Location: Camas Mill Riverbank, upriver of Fire Water Pumphouse

Local Jurisdiction	City of Camas
WRIA	28
Ecology Rating 2014	Category II
Buffer Width	180 feet
Cowardin Classification	REM1R
HGM Classification	Riverine

Wetland name or number Wetland 1

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland 1 Date of site visit: 716-17/2019

Rated by Dunkin, K Trained by Ecology? X Yes ___No Date of training 2015

HGM Class used for rating Riverine Wetland has multiple HGM classes? ___Y X N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map GoogleEarth 2018

OVERALL WETLAND CATEGORY II (based on functions X or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

__X__**Category II** – Total score = 20 - 22

_____**Category III** – Total score = 16 - 19

_____**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			TOTAL
	Circle the appropriate ratings									
Site Potential	H	(M)	L	H	M	(L)	H	(M)	L	
Landscape Potential	(H)	M	L	H	(M)	L	H	M	(L)	
Value	(H)	M	L	(H)	M	L	(H)	M	L	
Score Based on Ratings	8			6			6			20

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	**I** **II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I** **II**
Interdunal	**I** **II** **III** **IV**
None of the above	X

Wetland name or number Wetland 1

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number Wetland 1

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 **YES –** the wetland class is **Tidal Fringe –** go to 1.1

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**

   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 **YES** – The wetland class is **Flats**

   *If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

   ___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;

   ___At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

   ___The wetland is on a slope (*slope can be very gradual*),

   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,

   ___The water leaves the wetland **without being impounded.**

   NO – go to 5 **YES –** The wetland class is **Slope**

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,

   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number Wetland 1

NO **–** go to 6 **YES –** The wetland class is **Riverine**
NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO **–** go to 7 **YES –** The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Wetland 1

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

R 1.0. Does the site have the potential to improve water quality?	
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: Depressions cover > $^3/_4$ area of wetland points = 8 Depressions cover > ½ area of wetland points = 4 Depressions present but cover < ½ area of wetland points = 2 No depressions present points = 0	0
R 1.2. Structure of plants in the wetland (areas with >90% cover at person height, **not** Cowardin classes) Trees or shrubs > $^2/_3$ area of the wetland points = 8 Trees or shrubs > $^1/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^2/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^1/_3$ area of the wetland points = 3 Trees, shrubs, and ungrazed herbaceous < $^1/_3$ area of the wetland points = 0	6
Total for R 1 Add the points in the boxes above	6

Rating of Site Potential If score is: ___**12-16 = H** X **6-11 = M** ___**0-5 = L** *Record the rating on the first page*

R 2.0. Does the landscape have the potential to support the water quality function of the site?	
R 2.1. Is the wetland within an incorporated city or within its UGA? Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area? Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? Yes = 1 No = 0	0
R 2.4. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources Upstream industrial areas Yes = 1 No = 0	1
Total for R 2 Add the points in the boxes above	5

Rating of Landscape Potential If score is: X **3-6 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

R 3.0. Is the water quality improvement provided by the site valuable to society?	
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Yes = 1 No = 0	1
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens? Yes = 1 No = 0	0
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (*answer YES if there is a TMDL for the drainage in which the unit is found*) Yes = 2 No = 0	2
Total for R 3 Add the points in the boxes above	3

Rating of Value If score is: X **2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 1

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

R 4.0. Does the site have the potential to reduce flooding and erosion?	
R 4.1. Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).* If the ratio is more than 20 points = 9 If the ratio is 10-20 points = 6 If the ratio is 5-<10 points = 4 If the ratio is 1-<5 points = 2 If the ratio is < 1 points = 1	1
R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).* Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area points = 7 Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area points = 4 Plants do not meet above criteria points = 0	4
Total for R 4 Add the points in the boxes above	5

Rating of Site Potential If score is: ___ **12-16 = H** ___ **6-11 = M** X **0-5 = L** *Record the rating on the first page*

R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
R 5.1. Is the stream or river adjacent to the wetland downcut? Yes = 0 No = 1	0
R 5.2. Does the up-gradient watershed include a UGA or incorporated area? Yes = 1 No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams? Yes = 0 No = 1	0
Total for R 5 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ **3 = H** X **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?	
R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site*. The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	2
R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for R 6 Add the points in the boxes above	2

Rating of Value If score is: X **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number Wetland 1

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

_X_ Aquatic bed	4 structures or more: points = 4
_X_ Emergent	3 structures: points = 2
____ Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points = 1
____ Forested (areas where trees have > 30% cover)	1 structure: points = 0

If the unit has a Forested class, check if:

____ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

1

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

____ Permanently flooded or inundated	4 or more types present: points = 3
____ Seasonally flooded or inundated	3 types present: points = 2
____ Occasionally flooded or inundated	2 types present: points = 1
____ Saturated only	1 type present: points = 0
____ Permanently flowing stream or river in, or adjacent to, the wetland	
____ Seasonally flowing stream in, or adjacent to, the wetland	
____ **Lake Fringe wetland**	**2 points**
_X_ **Freshwater tidal wetland**	**2 points**

2

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.

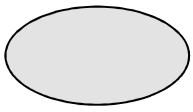
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted: > 19 species	points = 2
5 - 19 species	points = 1
< 5 species	points = 0

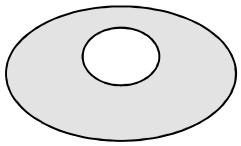
1

H 1.4. Interspersion of habitats

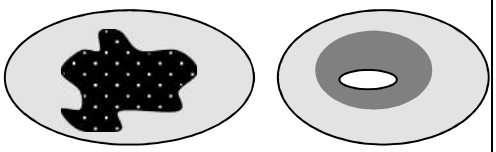
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

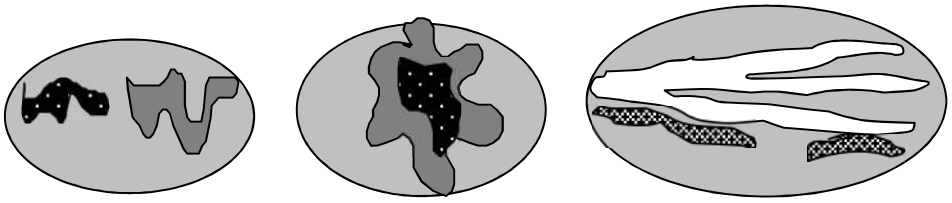


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3points



2

Wetland name or number Wetland 1

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* __X__ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____ Standing snags (dbh > 4 in) within the wetland __X__ Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* __X__ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ____ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	3
Total for H 1 Add the points in the boxes above	9

Rating of Site Potential If score is:___**15-18 = H** __X__**7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	0
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	-2
Total for H 2 Add the points in the boxes above	-2

Rating of Landscape Potential If score is:___**4-6 = H** ___**1-3 = M** __X__**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 ___ It has 3 or more priority habitats within 100 m (see next page) __X__ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ___ It is mapped as a location for an individual WDFW priority species ___ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ___ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan X Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If score is:__X__ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 1

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

X **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

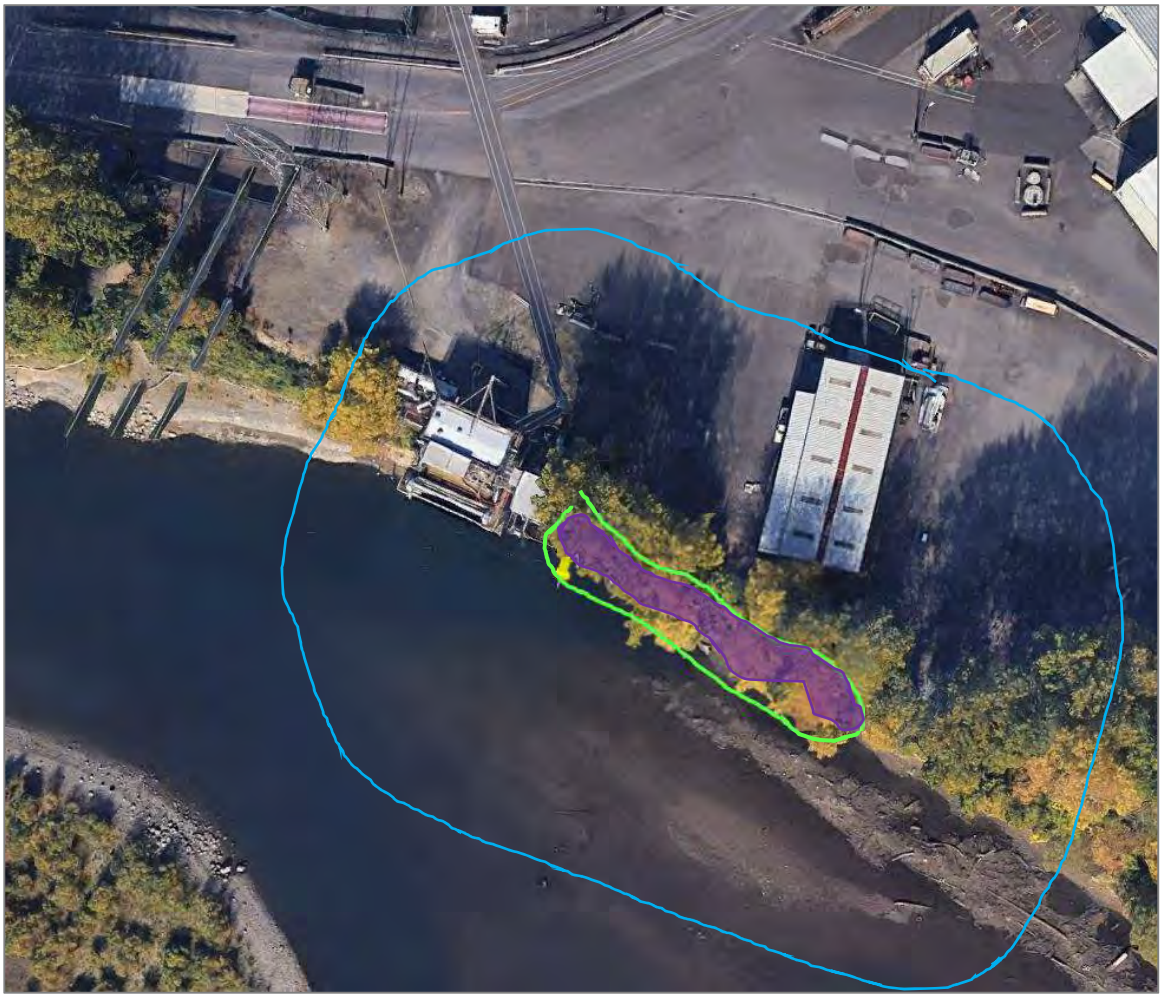
— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.



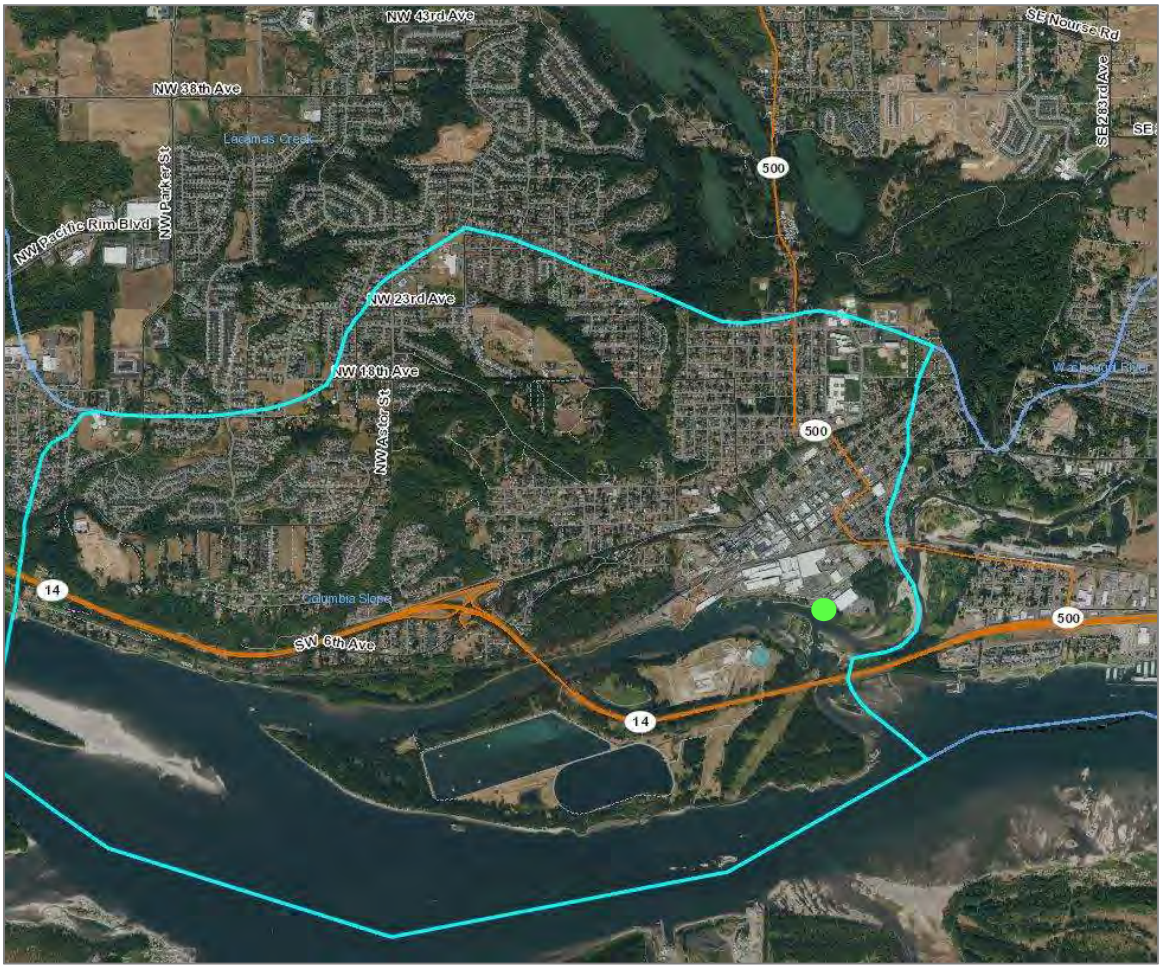
Wetland boundary (approximate)

150-foot buffer around wetland

Herbaceous plants > 6 inches high (not Cowardin classes)

Map 1. Plant Cover

R 1.2, 2.4, 4.1, 4.2

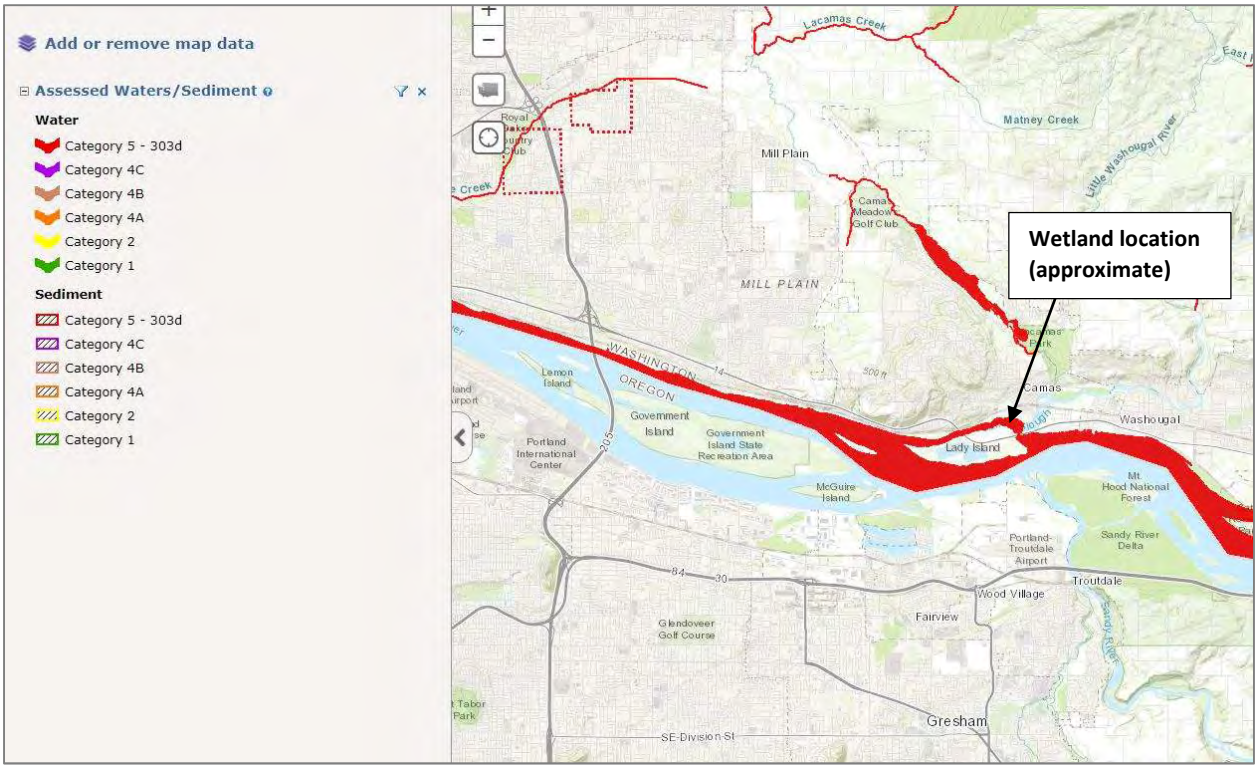


Wetland location (approximate)

Contributing Basin

Map 2. Contributing Basin

R 2.2, 2.3



Map 3. 303(d) List Waters

R 3.1

Wetland boundary (approximate)

Aquatic bed

Emergent

Map 4. Cowardin Plant Classes

H 1.1, 1.4

Wetland boundary (approximate)

1-kilometer buffer around wetland (white line)

Relatively Undisturbed Land Use

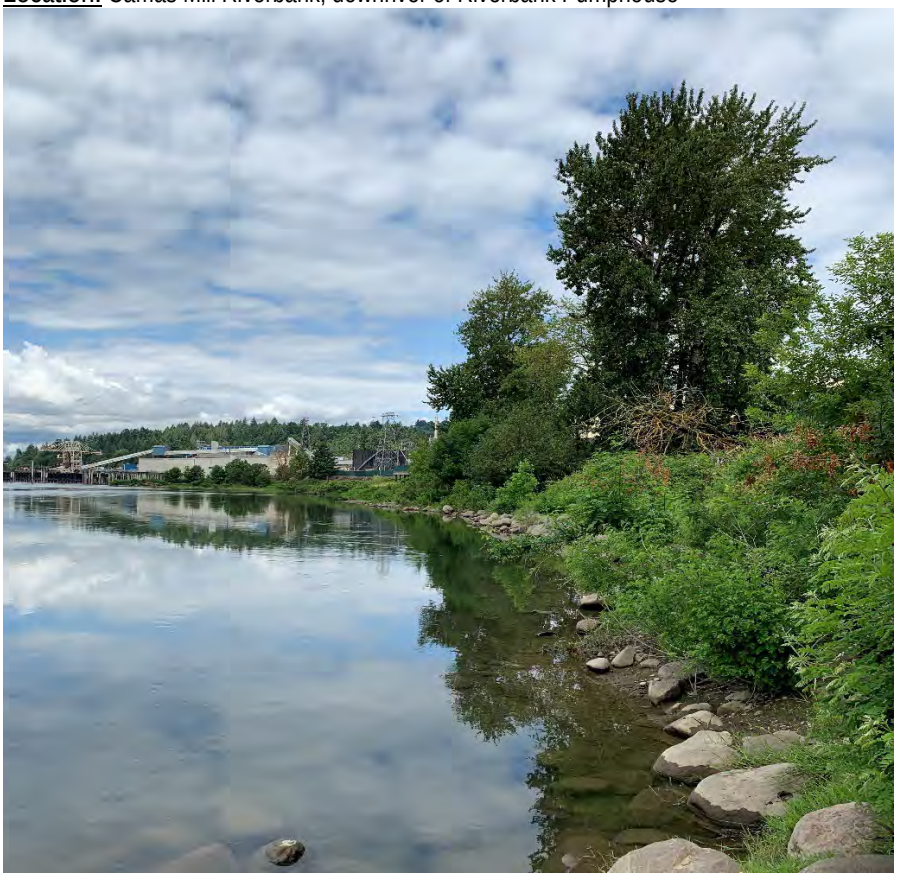
Low or Moderate Intensity Land Use

High Intensity Land Use

Map 5. 1 Land Use Intensity

H. 2.1, 2.2, 2.3

Wetland 2 Information Sheet
Wetland Name: Wetland 2
Location: Camas Mill Riverbank, downriver of Riverbank Pumphouse



Local Jurisdiction	City of Camas
WRIA	28
Ecology Rating 2014	Category II
Buffer Width	180 feet
Cowardin Classification	REM1R
HGM Classification	Riverine

Wetland name or number Wetland 2

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland 2 Date of site visit: 716-17/2019

Rated by Dunkin, K Trained by Ecology? X Yes ___No Date of training 2015

HGM Class used for rating Riverine Wetland has multiple HGM classes? ___Y X N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map GoogleEarth 2018

OVERALL WETLAND CATEGORY II (based on functions X or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

__X__**Category II** – Total score = 20 - 22

_____**Category III** – Total score = 16 - 19

_____**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			TOTAL
	Circle the appropriate ratings									
Site Potential	H	(M)	L	H	M	(L)	H	(M)	L	
Landscape Potential	(H)	M	L	H	(M)	L	H	M	(L)	
Value	(H)	M	L	(H)	M	L	(H)	M	L	
Score Based on Ratings	8			6			6			20

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	**I** **II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I** **II**
Interdunal	**I** **II** **III** **IV**
None of the above	X

Wetland name or number Wetland 2

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number Wetland 2

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 **YES –** the wetland class is **Tidal Fringe –** go to 1.1

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**

   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 **YES** – The wetland class is **Flats**

   *If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

   ___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;

   ___At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

   ___The wetland is on a slope (*slope can be very gradual*),

   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,

   ___The water leaves the wetland **without being impounded.**

   NO – go to 5 **YES –** The wetland class is **Slope**

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,

   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number Wetland 2

NO – go to 6 **YES –** The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES –** The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Wetland 2

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

R 1.0. Does the site have the potential to improve water quality?	
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: Depressions cover > $^3/_4$ area of wetland points = 8 Depressions cover > ½ area of wetland points = 4 Depressions present but cover < ½ area of wetland points = 2 No depressions present points = 0	0
R 1.2. Structure of plants in the wetland (areas with >90% cover at person height, **not** Cowardin classes) Trees or shrubs > $^2/_3$ area of the wetland points = 8 Trees or shrubs > $^1/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^2/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^1/_3$ area of the wetland points = 3 Trees, shrubs, and ungrazed herbaceous < $^1/_3$ area of the wetland points = 0	6
Total for R 1 Add the points in the boxes above	6

Rating of Site Potential If score is: ___**12-16 = H** X **6-11 = M** ___**0-5 = L** *Record the rating on the first page*

R 2.0. Does the landscape have the potential to support the water quality function of the site?	
R 2.1. Is the wetland within an incorporated city or within its UGA? Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area? Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? Yes = 1 No = 0	0
R 2.4. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources Upstream industrial areas Yes = 1 No = 0	1
Total for R 2 Add the points in the boxes above	5

Rating of Landscape Potential If score is: X **3-6 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

R 3.0. Is the water quality improvement provided by the site valuable to society?	
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Yes = 1 No = 0	1
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens? Yes = 1 No = 0	0
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (*answer YES if there is a TMDL for the drainage in which the unit is found*) Yes = 2 No = 0	2
Total for R 3 Add the points in the boxes above	3

Rating of Value If score is: X **2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 2

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

R 4.0. Does the site have the potential to reduce flooding and erosion?	
R 4.1. Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).* If the ratio is more than 20 points = 9 If the ratio is 10-20 points = 6 If the ratio is 5-<10 points = 4 If the ratio is 1-<5 points = 2 If the ratio is < 1 points = 1	1
R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).* Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area points = 7 Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area points = 4 Plants do not meet above criteria points = 0	4
Total for R 4 Add the points in the boxes above	5

Rating of Site Potential If score is: ___ **12-16 = H** ___ **6-11 = M** _X_ **0-5 = L** *Record the rating on the first page*

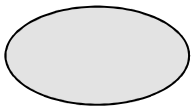
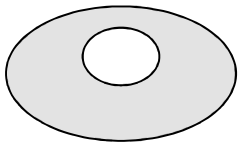
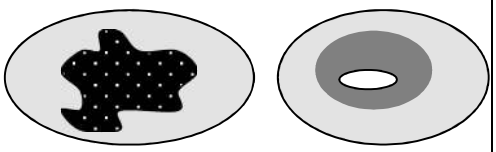
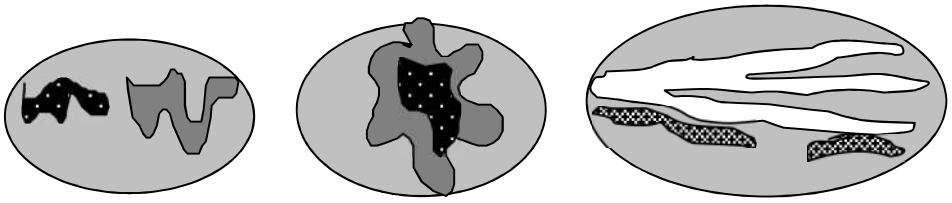
R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
R 5.1. Is the stream or river adjacent to the wetland downcut? Yes = 0 No = 1	0
R 5.2. Does the up-gradient watershed include a UGA or incorporated area? Yes = 1 No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams? Yes = 0 No = 1	0
Total for R 5 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ **3 = H** _X_ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?	
R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site*. The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	2
R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for R 6 Add the points in the boxes above	2

Rating of Value If score is: _X_ **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number Wetland 2

These questions apply to wetlands of all HGM classes. **HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat	
H 1.0. Does the site have the potential to provide habitat?	
H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.* _X_ Aquatic bed — 4 structures or more: points = 4 _X_ Emergent — 3 structures: points = 2 ____ Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points = 1 ____ Forested (areas where trees have > 30% cover) — 1 structure: points = 0 *If the unit has a Forested class, check if:* ____ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon	1
H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*). ____ Permanently flooded or inundated — 4 or more types present: points = 3 ____ Seasonally flooded or inundated — 3 types present: points = 2 ____ Occasionally flooded or inundated — 2 types present: points = 1 ____ Saturated only — 1 type present: points = 0 ____ Permanently flowing stream or river in, or adjacent to, the wetland ____ Seasonally flowing stream in, or adjacent to, the wetland ____ **Lake Fringe wetland** — **2 points** _X_ **Freshwater tidal wetland** — **2 points**	2
H 1.3. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. *Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle*** If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0	1
H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points  **Low** = 1 point  **Moderate** = 2 points All three diagrams in this row are **HIGH** = 3points 	2

Wetland name or number Wetland 2

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* __X__Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland __X__Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* __X__At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	3
Total for H 1 Add the points in the boxes above	9

Rating of Site Potential If score is:___**15-18 = H** __X__**7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	0
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	-2
Total for H 2 Add the points in the boxes above	-2

Rating of Landscape Potential If score is:___**4-6 = H** ___**1-3 = M** __X__**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 __ It has 3 or more priority habitats within 100 m (see next page) __X__ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) __ It is mapped as a location for an individual WDFW priority species __ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources __ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan X Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If score is: __X__ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 2

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

X **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

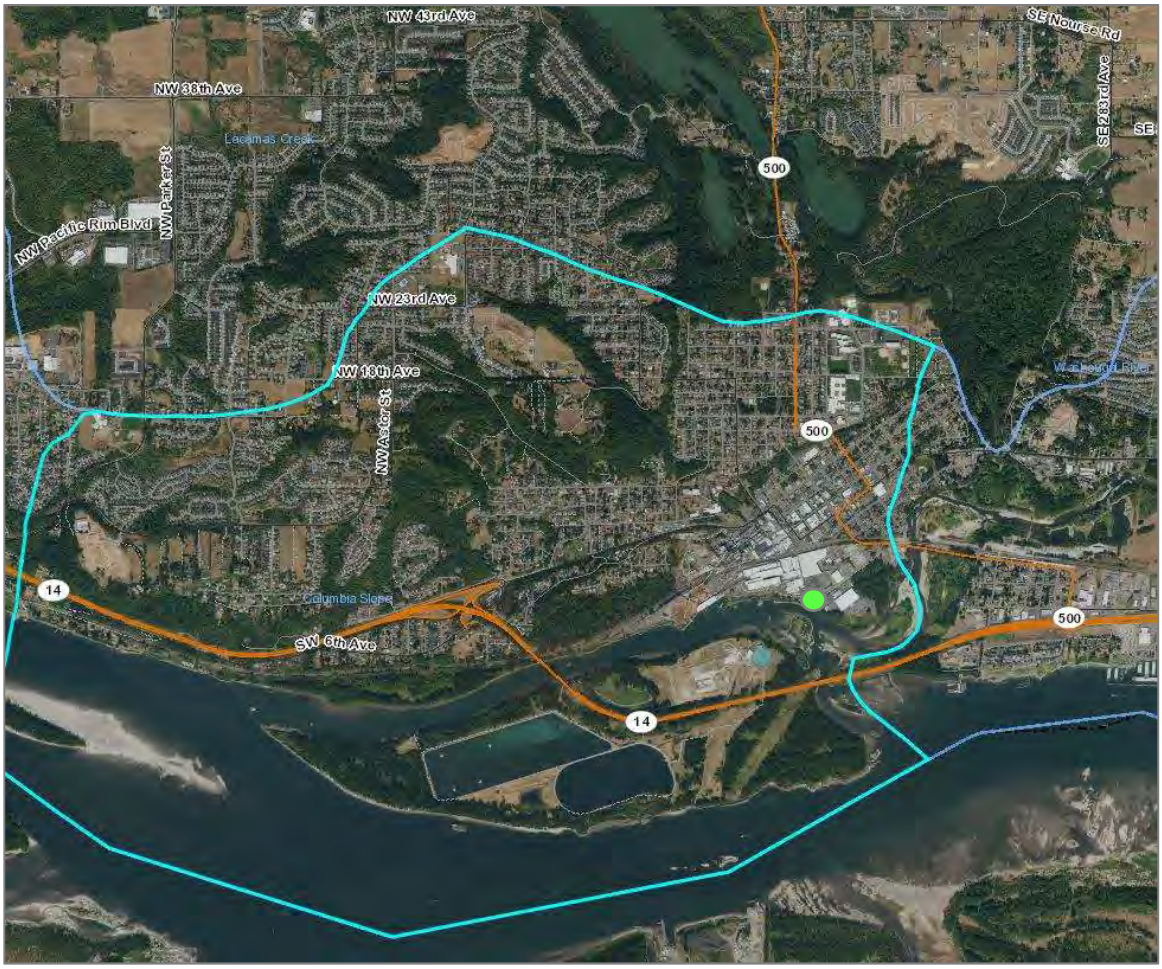
Wetland boundary (approximate)

150-foot buffer around wetland

Herbaceous plants > 6 inches high (not Cowardin classes)

Map 1. Plant Cover

R 1.2, 2.4, 4.1, 4.2

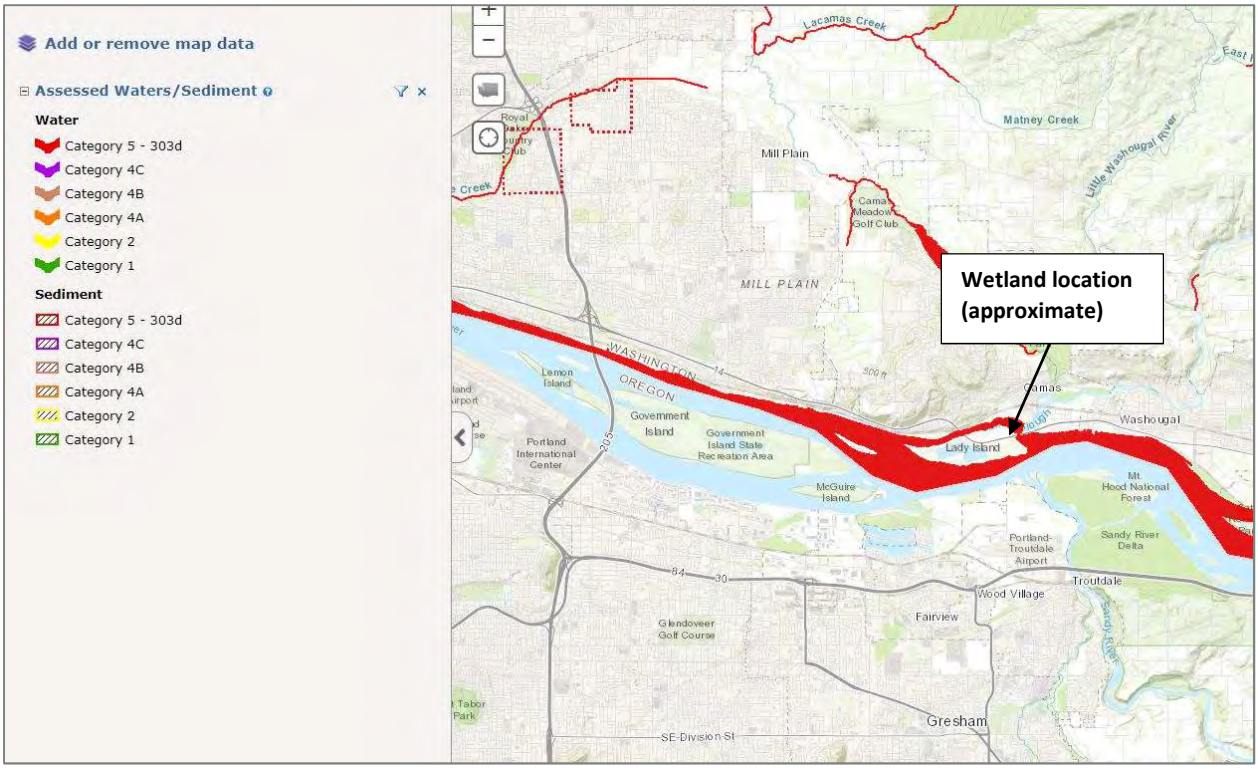


Wetland location (approximate)

Contributing Basin

Map 2. Contributing Basin

R 2.2, 2.3



Map 3. 303(d)

R 3.1

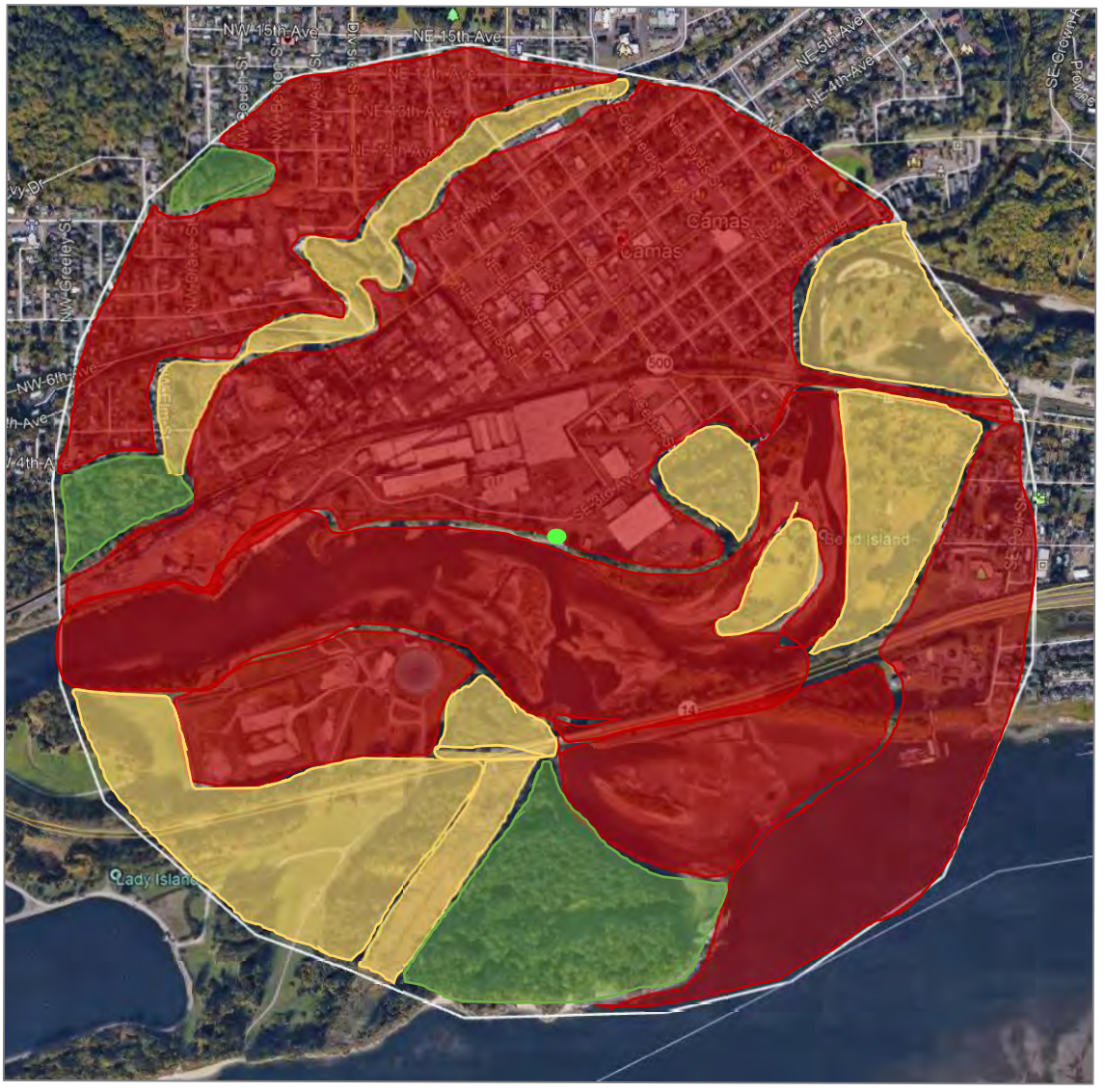
Wetland boundary (approximate)

Aquatic bed

Emergent

Map 4. Cowardin Plant Classes

H. 1.1, 1.4



Wetland boundary (approximate)

1-kilometer buffer around wetland (white line)

Relatively Undisturbed Land Use

Low or Moderate Intensity Land Use

High Intensity Land Use

Map 5. Land Use Intensity

H. 2.1, 2.2, 2.3

Wetland 3 Information Sheet
Wetland Name: Wetland 3
Location: Camas Mill Riverbank.

Local Jurisdiction	City of Camas
WRIA	28
Ecology Rating 2014	Category II
Buffer Width	180 feet
Cowardin Classification	PFO
HGM Classification	Riverine

Wetland name or number Wetland 3

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland 3 Date of site visit: 716-17/2019

Rated by Dunkin, K Trained by Ecology? X Yes ___No Date of training 2015

HGM Class used for rating Riverine Wetland has multiple HGM classes? ___Y X N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map GoogleEarth 2018

OVERALL WETLAND CATEGORY II (based on functions X or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

__X__**Category II** – Total score = 20 - 22

_____**Category III** – Total score = 16 - 19

_____**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			TOTAL
	Circle the appropriate ratings									
Site Potential	H	(M)	L	H	(M)	L	H	(M)	L	
Landscape Potential	(H)	M	L	H	(M)	L	H	M	(L)	
Value	(H)	M	L	(H)	M	L	(H)	M	L	
Score Based on Ratings	8			7			6			21

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	**I** **II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I** **II**
Interdunal	**I** **II** **III** **IV**
None of the above	X

Wetland name or number Wetland 3

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number Wetland 3

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

NO – go to 2 **YES –** the wetland class is **Tidal Fringe –** go to 1.1

1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO – go to 3 **YES** – The wetland class is **Flats**
*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
___At least 30% of the open water area is deeper than 6.6 ft (2 m).

NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
___The wetland is on a slope (*slope can be very gradual*),
___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
___The water leaves the wetland **without being impounded.**

NO – go to 5 **YES –** The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
___The overbank flooding occurs at least once every 2 years.

Wetland name or number Wetland 3

NO – go to 6 **YES –** The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES –** The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Wetland 3

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

R 1.0. Does the site have the potential to improve water quality?	
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: Depressions cover > $^3/_4$ area of wetland points = 8 Depressions cover > ½ area of wetland points = 4 Depressions present but cover < ½ area of wetland points = 2 No depressions present points = 0	4
R 1.2. Structure of plants in the wetland (areas with >90% cover at person height, **not** Cowardin classes) Trees or shrubs > $^2/_3$ area of the wetland points = 8 Trees or shrubs > $^1/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^2/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^1/_3$ area of the wetland points = 3 Trees, shrubs, and ungrazed herbaceous < $^1/_3$ area of the wetland points = 0	6
Total for R 1 Add the points in the boxes above	10

Rating of Site Potential If score is: ___**12-16 = H** X **6-11 = M** ___**0-5 = L** *Record the rating on the first page*

R 2.0. Does the landscape have the potential to support the water quality function of the site?	
R 2.1. Is the wetland within an incorporated city or within its UGA? Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area? Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? Yes = 1 No = 0	0
R 2.4. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources Upstream industrial areas Yes = 1 No = 0	1
Total for R 2 Add the points in the boxes above	5

Rating of Landscape Potential If score is: X **3-6 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

R 3.0. Is the water quality improvement provided by the site valuable to society?	
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Yes = 1 No = 0	1
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens? Yes = 1 No = 0	0
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (*answer YES if there is a TMDL for the drainage in which the unit is found*) Yes = 2 No = 0	2
Total for R 3 Add the points in the boxes above	3

Rating of Value If score is: X **2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 3

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

R 4.0. Does the site have the potential to reduce flooding and erosion?	
R 4.1. Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).* If the ratio is more than 20 points = 9 If the ratio is 10-20 points = 6 If the ratio is 5-<10 points = 4 If the ratio is 1-<5 points = 2 If the ratio is < 1 points = 1	1
R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).* Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area points = 7 Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area points = 4 Plants do not meet above criteria points = 0	7
Total for R 4 Add the points in the boxes above	8

Rating of Site Potential If score is: ___ **12-16 = H** X **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
R 5.1. Is the stream or river adjacent to the wetland downcut? Yes = 0 No = 1	0
R 5.2. Does the up-gradient watershed include a UGA or incorporated area? Yes = 1 No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams? Yes = 0 No = 1	0
Total for R 5 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ **3 = H** X **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?	
R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site*. The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	2
R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for R 6 Add the points in the boxes above	2

Rating of Value If score is: X **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number Wetland 3

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

____Aquatic bed
_X_Emergent
____Scrub-shrub (areas where shrubs have > 30% cover)
_X_Forested (areas where trees have > 30% cover)

4 structures or more: points = 4
3 structures: points = 2
2 structures: points = 1
1 structure: points = 0

If the unit has a Forested class, check if:

____The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

1

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

____Permanently flooded or inundated
_X_Seasonally flooded or inundated
____Occasionally flooded or inundated
_X_Saturated only
____Permanently flowing stream or river in, or adjacent to, the wetland
____Seasonally flowing stream in, or adjacent to, the wetland
____**Lake Fringe wetland**
____**Freshwater tidal wetland**

4 or more types present: points = 3
3 types present: points = 2
2 types present: points = 1
1 type present: points = 0

2 points
2 points

1

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.

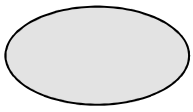
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted: > 19 species — points = 2
5 - 19 species — points = 1
< 5 species — points = 0

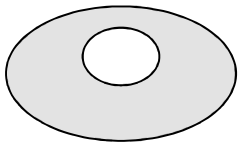
1

H 1.4. Interspersion of habitats

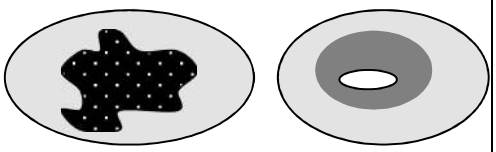
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

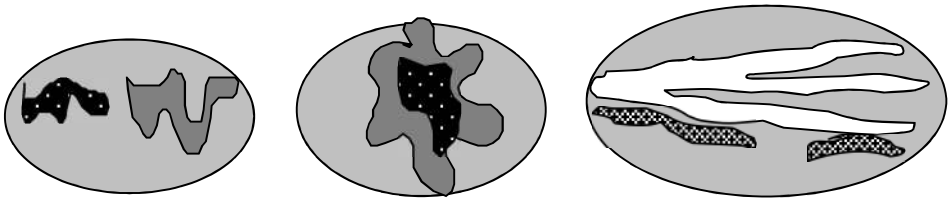


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3points



2

Wetland name or number Wetland 3

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* __X__Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* __X__At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	2
Total for H 1 Add the points in the boxes above	7

Rating of Site Potential If score is:___**15-18 = H** __X__**7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	0
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	-2
Total for H 2 Add the points in the boxes above	-2

Rating of Landscape Potential If score is:___**4-6 = H** ___**1-3 = M** __X__**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 ___ It has 3 or more priority habitats within 100 m (see next page) __X__ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ___ It is mapped as a location for an individual WDFW priority species ___ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ___ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan X Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If score is: __X__ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 3

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

X **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

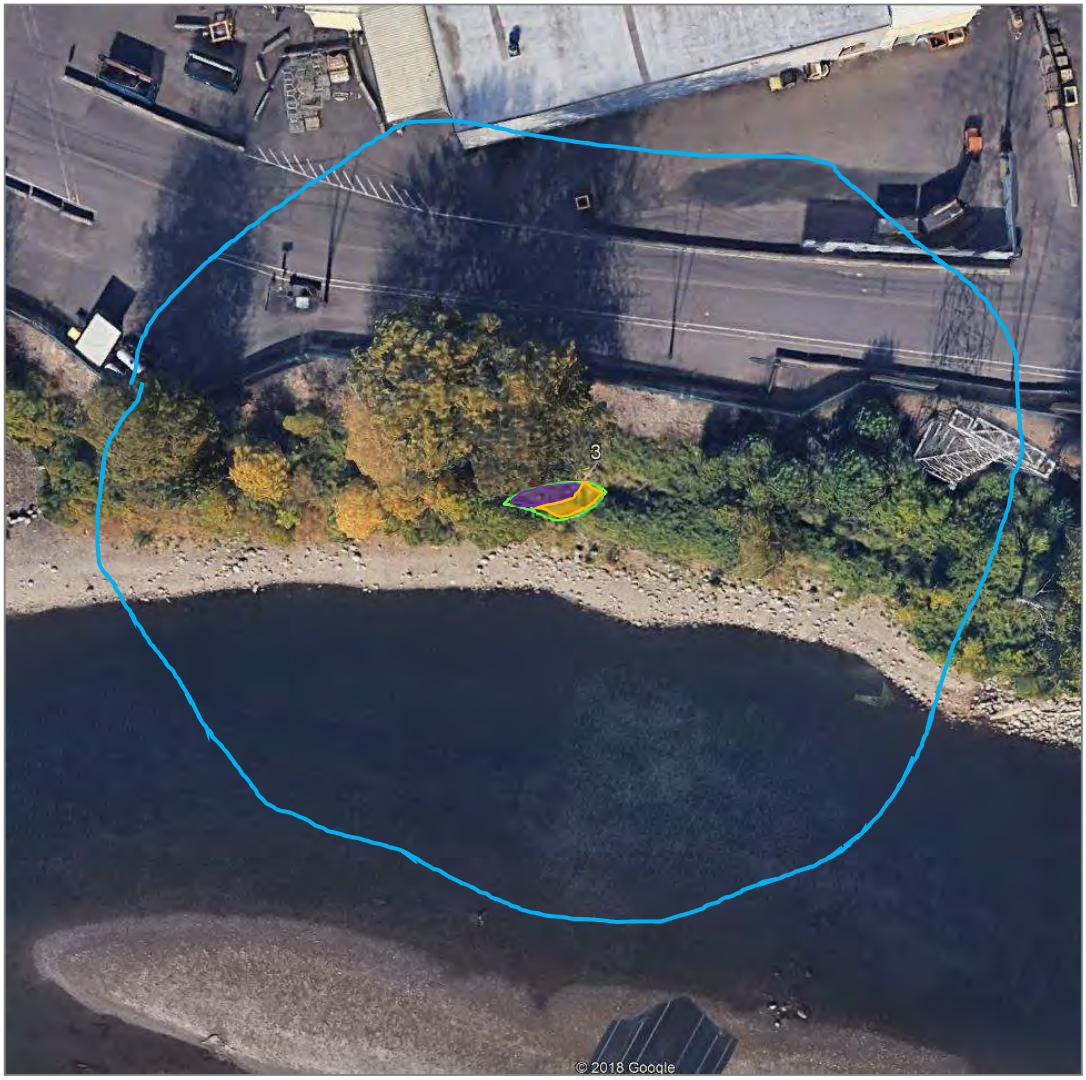
— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.



Wetland boundary (approximate)

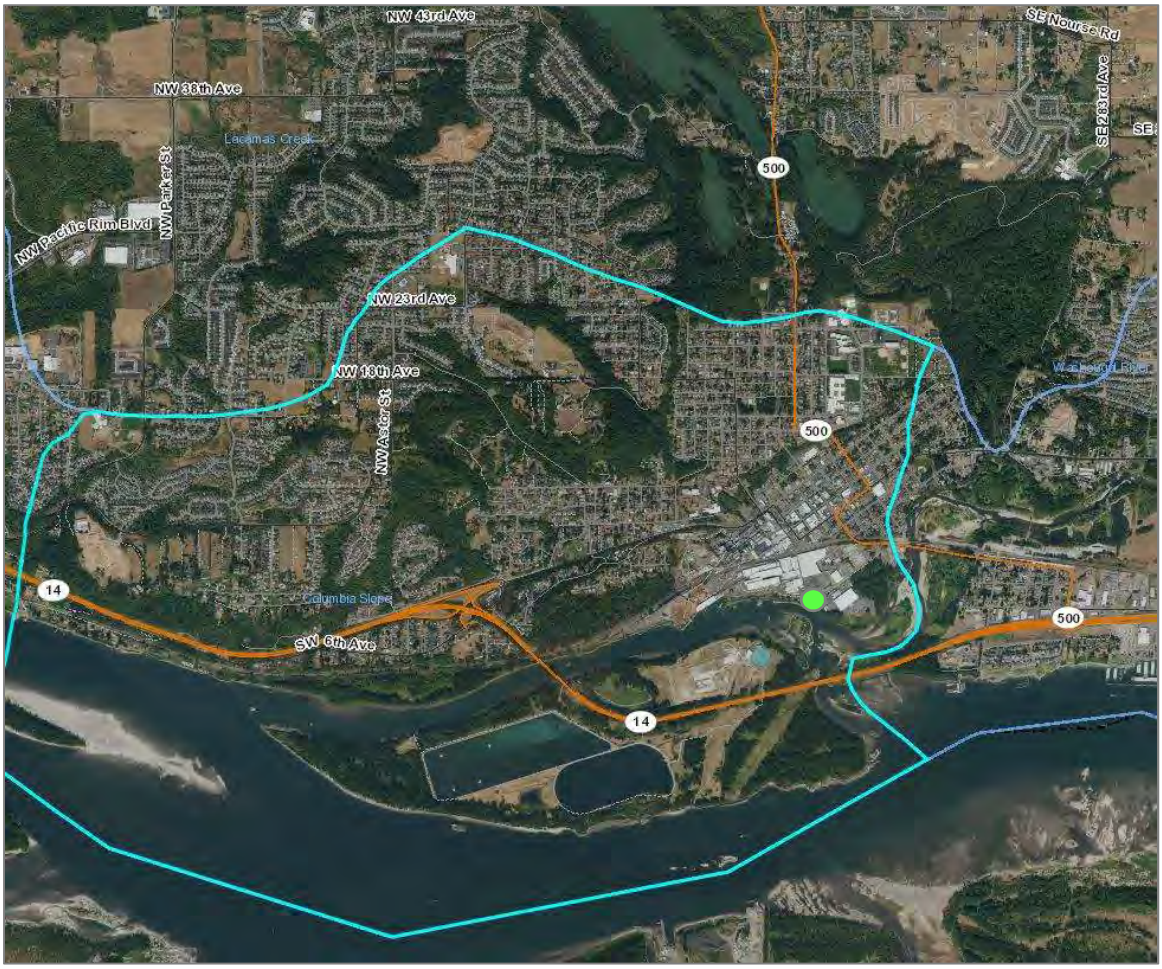
150-foot buffer around wetland

Trees or shrubs (not Cowardin classes)

Herbaceous plants > 6 inches high (not Cowardin classes)

Map 1. Plant Cover

R 1.2, 2.4, 4.1, 4.2

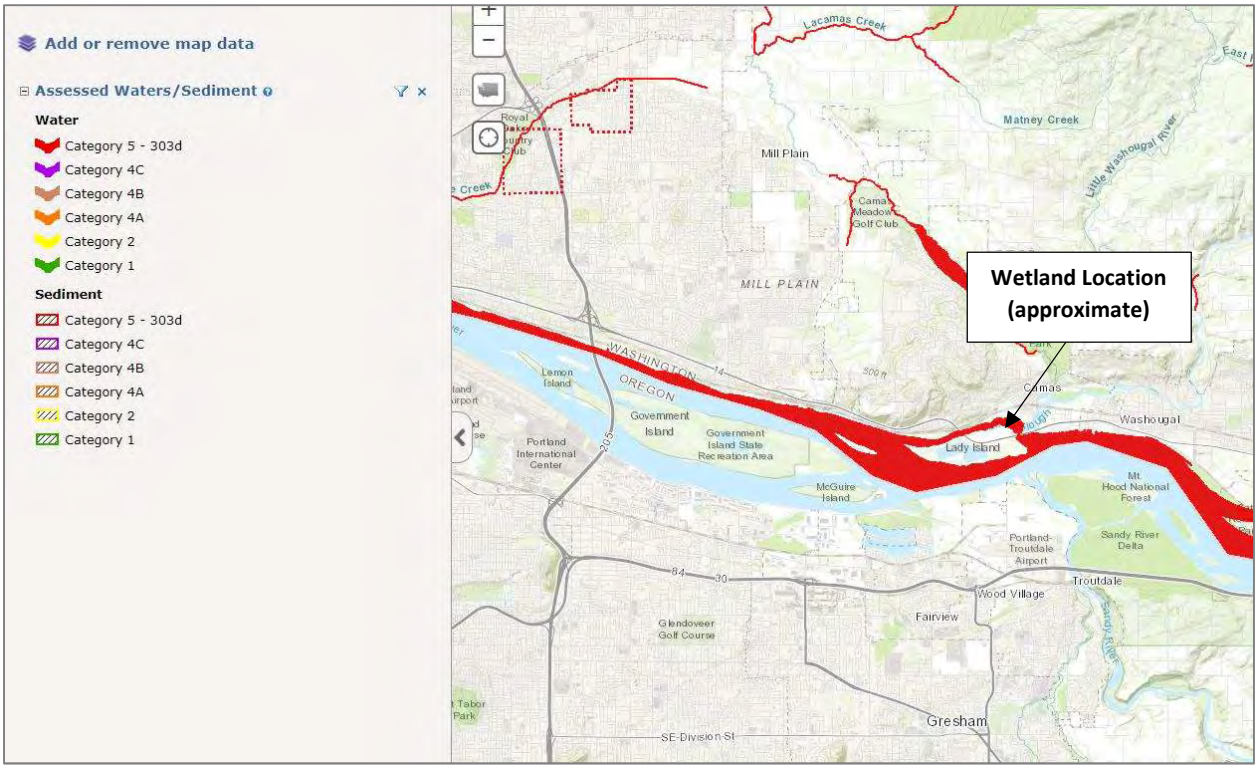


Wetland location (approximate)

Contributing Basin

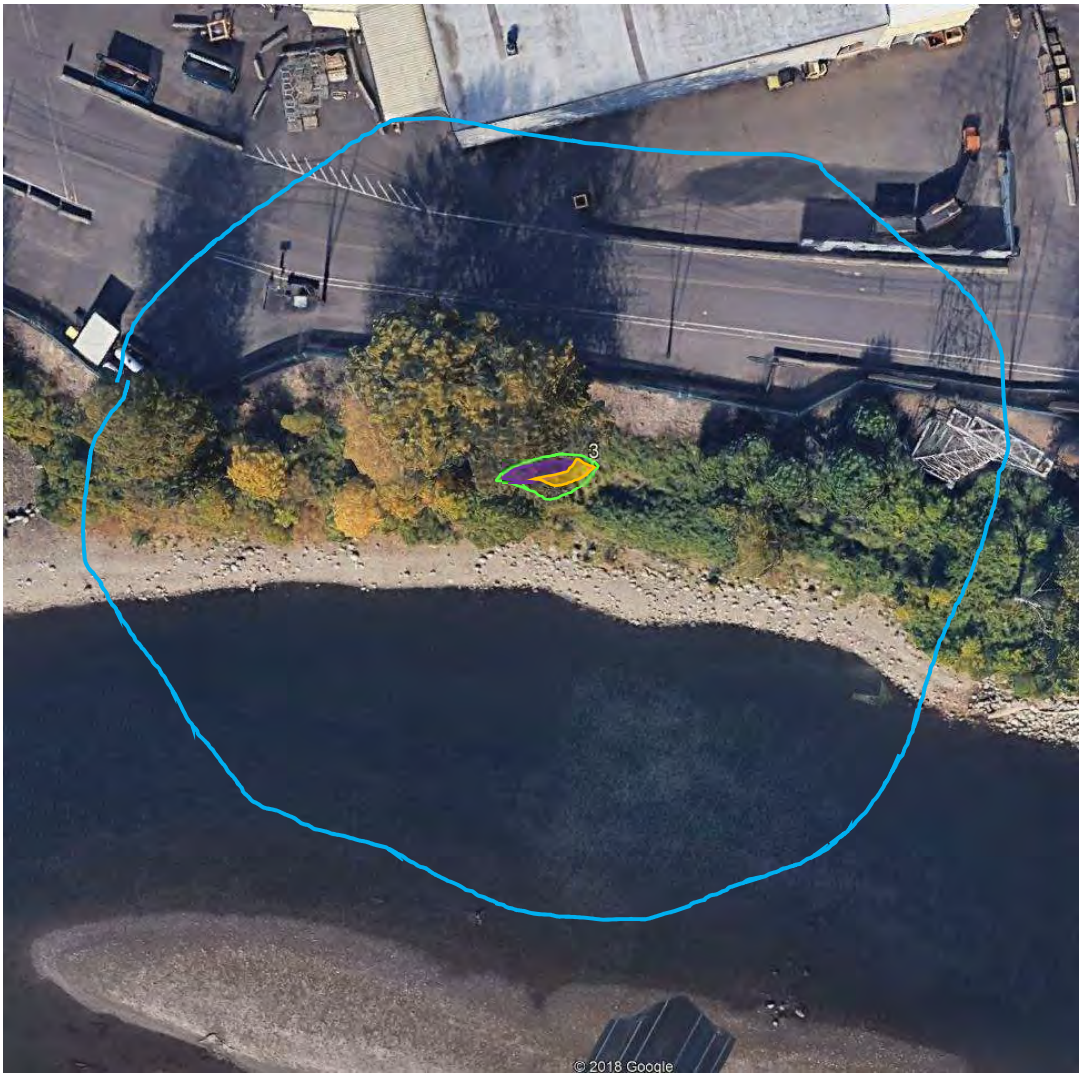
Map 2. Contributing Basin

R 2.2, 2.3



Map 3. 303(d)

R 3.1



Wetland boundary (approximate)

Emergent

Forested

Map 4. Cowardin Plant Classes

H. 1.1, 1.4

Wetland boundary (approximate)

1-kilometer buffer around wetland (white line)

Relatively Undisturbed Land Use

Low or Moderate Intensity Land Use

High Intensity Land Use

Map 5. Land Use Intensity

H. 2.1, 2.2, 2.3

Wetland 4 Information Sheet
Wetland Name: Wetland 4
Location: Camas Mill Riverbank

Local Jurisdiction	City of Camas
WRIA	28
Ecology Rating 2014	Category II
Buffer Width	180 feet
Cowardin Classification	REM1R
HGM Classification	Riverine

Wetland name or number Wetland 4

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland 4 Date of site visit: 716-17/2019

Rated by Dunkin, K Trained by Ecology? X Yes ___No Date of training 2015

HGM Class used for rating Riverine Wetland has multiple HGM classes? ___Y X N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map GoogleEarth 2018

OVERALL WETLAND CATEGORY II (based on functions X or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

__X__**Category II** – Total score = 20 - 22

_____**Category III** – Total score = 16 - 19

_____**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			
	Circle the appropriate ratings									
Site Potential	H	(M)	L	H	M	(L)	H	(M)	L	
Landscape Potential	(H)	M	L	H	(M)	L	H	M	(L)	
Value	(H)	M	L	(H)	M	L	(H)	M	L	**TOTAL**
Score Based on Ratings	8			6			6			20

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	**I** **II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I** **II**
Interdunal	**I** **II** **III** **IV**
None of the above	X

Wetland name or number Wetland 4

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number Wetland 4

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 **YES –** the wetland class is **Tidal Fringe –** go to 1.1

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 **YES** – The wetland class is **Flats**
   *If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
   ___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   ___At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
   ___The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___The water leaves the wetland **without being impounded.**

   NO – go to 5 **YES –** The wetland class is **Slope**

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number Wetlan44 4

NO **–** go to 6 **YES –** The wetland class is **Riverine**
NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO **–** go to 7 **YES –** The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Wetland 4

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

R 1.0. Does the site have the potential to improve water quality?	
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: Depressions cover > $^3/_4$ area of wetland points = 8 Depressions cover > ½ area of wetland points = 4 Depressions present but cover < ½ area of wetland points = 2 No depressions present points = 0	0
R 1.2. Structure of plants in the wetland (areas with >90% cover at person height, **not** Cowardin classes) Trees or shrubs > $^2/_3$ area of the wetland points = 8 Trees or shrubs > $^1/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^2/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^1/_3$ area of the wetland points = 3 Trees, shrubs, and ungrazed herbaceous < $^1/_3$ area of the wetland points = 0	6
Total for R 1 Add the points in the boxes above	6

Rating of Site Potential If score is: ___**12-16 = H** X **6-11 = M** ___**0-5 = L** *Record the rating on the first page*

R 2.0. Does the landscape have the potential to support the water quality function of the site?	
R 2.1. Is the wetland within an incorporated city or within its UGA? Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area? Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? Yes = 1 No = 0	0
R 2.4. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources Upstream industrial areas Yes = 1 No = 0	1
Total for R 2 Add the points in the boxes above	5

Rating of Landscape Potential If score is: X **3-6 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

R 3.0. Is the water quality improvement provided by the site valuable to society?	
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Yes = 1 No = 0	1
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens? Yes = 1 No = 0	0
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (*answer YES if there is a TMDL for the drainage in which the unit is found*) Yes = 2 No = 0	2
Total for R 3 Add the points in the boxes above	3

Rating of Value If score is: X **2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 4

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

R 4.0. Does the site have the potential to reduce flooding and erosion?	
R 4.1. Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).* If the ratio is more than 20 points = 9 If the ratio is 10-20 points = 6 If the ratio is 5-<10 points = 4 If the ratio is 1-<5 points = 2 If the ratio is < 1 points = 1	1
R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).* Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area points = 7 Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area points = 4 Plants do not meet above criteria points = 0	4
Total for R 4 Add the points in the boxes above	5

Rating of Site Potential If score is: ___ **12-16 = H** ___ **6-11 = M** X **0-5 = L** *Record the rating on the first page*

R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
R 5.1. Is the stream or river adjacent to the wetland downcut? Yes = 0 No = 1	0
R 5.2. Does the up-gradient watershed include a UGA or incorporated area? Yes = 1 No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams? Yes = 0 No = 1	0
Total for R 5 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ **3 = H** X **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?	
R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site*. The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	2
R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for R 6 Add the points in the boxes above	2

Rating of Value If score is: X **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number Wetland 4

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

_X_ Aquatic bed	4 structures or more: points = 4
_X_ Emergent	3 structures: points = 2
____ Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points = 1
____ Forested (areas where trees have > 30% cover)	1 structure: points = 0

If the unit has a Forested class, check if:

____ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

1

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

____ Permanently flooded or inundated	4 or more types present: points = 3
____ Seasonally flooded or inundated	3 types present: points = 2
____ Occasionally flooded or inundated	2 types present: points = 1
____ Saturated only	1 type present: points = 0
____ Permanently flowing stream or river in, or adjacent to, the wetland	
____ Seasonally flowing stream in, or adjacent to, the wetland	
____ **Lake Fringe wetland**	**2 points**
_X_ **Freshwater tidal wetland**	**2 points**

2

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.

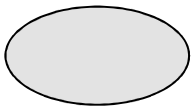
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted: > 19 species	points = 2
5 - 19 species	points = 1
< 5 species	points = 0

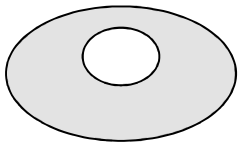
1

H 1.4. Interspersion of habitats

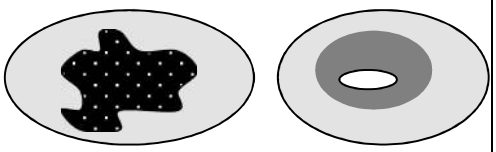
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

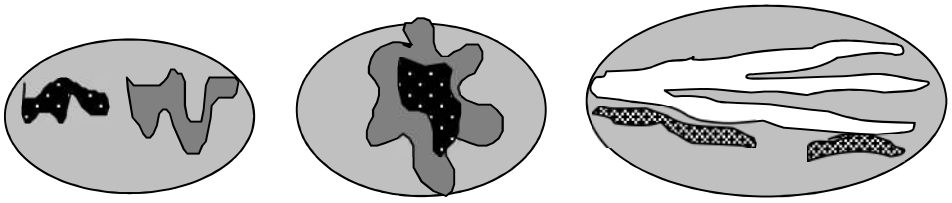


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3points



2

Wetland name or number 4

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* __X__Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland __X__Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* __X__At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	3
Total for H 1 Add the points in the boxes above	9

Rating of Site Potential If score is:___**15-18 = H** __X__**7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	0
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	-2
Total for H 2 Add the points in the boxes above	-2

Rating of Landscape Potential If score is:___**4-6 = H** ___**1-3 = M** __X__**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 ___ It has 3 or more priority habitats within 100 m (see next page) __X__ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ___ It is mapped as a location for an individual WDFW priority species ___ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ___ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan X Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If score is:__X__ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 4

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

X **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland boundary (approximate)

150-foot buffer around wetland

Herbaceous Plants >6 inches (not Cowardin classes)

Map 1. Plant Cover

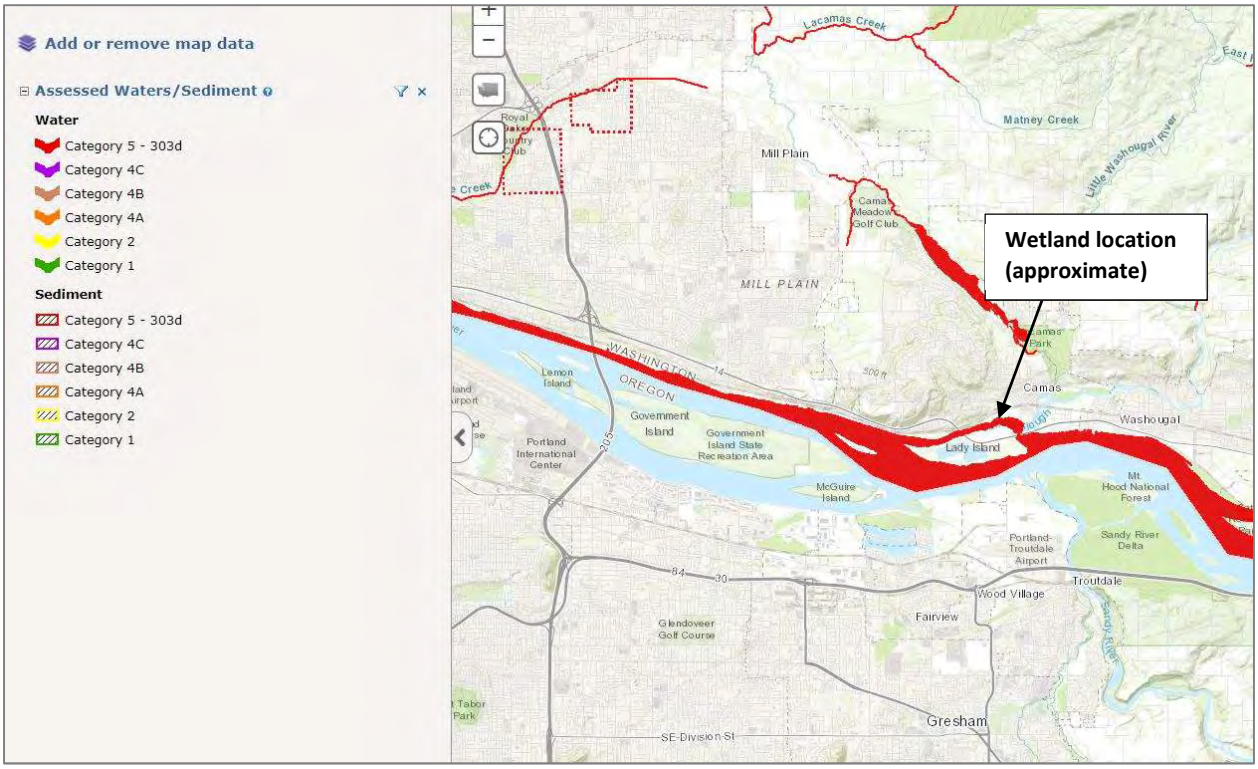
R 1.2, 2.4, 4.1, 4.2

Wetland location (approximate)

Contributing Basin

Map 2. Contributing Basin

R 2.2, 2.3



Map 3. 303(d) List Waters

R 3.1

Wetland boundary (approximate)

Aquatic bed

Emergent

Map 4. Cowardin Plant Classes

H 1.1, 1.4

Wetland boundary (approximate)

1-kilometer buffer around wetland (white line)

Relatively Undisturbed Land Use

Low or Moderate Intensity Land Use

High Intensity Land Use

Map 5. Land Use Intensity

H. 2.1, 2.2, 2.3

Wetlands 5 & 6 Information Sheet
Wetland Name: Wetland 5 and Wetland 6
Location: Camas Mill Riverbank, upriver of Truck Dock

Local Jurisdiction	City of Camas
WRIA	28
Ecology Rating 2014	Category II
Buffer Width	180 feet
Cowardin Classification	REM1R
HGM Classification	Riverine

Wetland name or number Wetland 5&6

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland 5 & 6 Date of site visit: 716-17/2019

Rated by Dunkin, K Trained by Ecology? X Yes ___No Date of training 2015

HGM Class used for rating Riverine Wetland has multiple HGM classes? ___Y X N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map GoogleEarth 2018

OVERALL WETLAND CATEGORY II (based on functions X or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

__X__**Category II** – Total score = 20 - 22

_____**Category III** – Total score = 16 - 19

_____**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			
	Circle the appropriate ratings									
Site Potential	H	(M)	L	H	M	(L)	H	(M)	L	
Landscape Potential	(H)	M	L	H	(M)	L	H	M	(L)	
Value	(H)	M	L	(H)	M	L	(H)	M	L	**TOTAL**
Score Based on Ratings	8			6			6			20

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	**I** **II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I** **II**
Interdunal	**I** **II** **III** **IV**
None of the above	X

Wetland name or number Wetland 5&6

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number Wetland 5&6

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 **YES –** the wetland class is **Tidal Fringe –** go to 1.1

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**

   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 **YES** – The wetland class is **Flats**

   *If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
   ___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   ___At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
   ___The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___The water leaves the wetland **without being impounded.**

   NO – go to 5 **YES –** The wetland class is **Slope**

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number Wetland5&65&6

NO – go to 6 **YES –** The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES –** The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Wetland 5&6

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

R 1.0. Does the site have the potential to improve water quality?	
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: Depressions cover > $^3/_4$ area of wetland points = 8 Depressions cover > ½ area of wetland points = 4 Depressions present but cover < ½ area of wetland points = 2 No depressions present points = 0	0
R 1.2. Structure of plants in the wetland (areas with >90% cover at person height, **not** Cowardin classes) Trees or shrubs > $^2/_3$ area of the wetland points = 8 Trees or shrubs > $^1/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^2/_3$ area of the wetland points = 6 Herbaceous plants (> 6 in high) > $^1/_3$ area of the wetland points = 3 Trees, shrubs, and ungrazed herbaceous < $^1/_3$ area of the wetland points = 0	6
Total for R 1 Add the points in the boxes above	6

Rating of Site Potential If score is: ___**12-16 = H** X **6-11 = M** ___**0-5 = L** *Record the rating on the first page*

R 2.0. Does the landscape have the potential to support the water quality function of the site?	
R 2.1. Is the wetland within an incorporated city or within its UGA? Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area? Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? Yes = 1 No = 0	0
R 2.4. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources Upstream industrial areas Yes = 1 No = 0	1
Total for R 2 Add the points in the boxes above	5

Rating of Landscape Potential If score is: X **3-6 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

R 3.0. Is the water quality improvement provided by the site valuable to society?	
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Yes = 1 No = 0	1
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens? Yes = 1 No = 0	0
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (*answer YES if there is a TMDL for the drainage in which the unit is found*) Yes = 2 No = 0	2
Total for R 3 Add the points in the boxes above	3

Rating of Value If score is: X **2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 5&6

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

R 4.0. Does the site have the potential to reduce flooding and erosion?	
R 4.1. Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).* If the ratio is more than 20 points = 9 If the ratio is 10-20 points = 6 If the ratio is 5-<10 points = 4 If the ratio is 1-<5 points = 2 If the ratio is < 1 points = 1	1
R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).* Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area points = 7 Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area points = 4 Plants do not meet above criteria points = 0	4
Total for R 4 Add the points in the boxes above	5

Rating of Site Potential If score is: ___ **12-16 = H** ___ **6-11 = M** X **0-5 = L** *Record the rating on the first page*

R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
R 5.1. Is the stream or river adjacent to the wetland downcut? Yes = 0 No = 1	0
R 5.2. Does the up-gradient watershed include a UGA or incorporated area? Yes = 1 No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams? Yes = 0 No = 1	0
Total for R 5 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ **3 = H** X **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?	
R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site*. The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	2
R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for R 6 Add the points in the boxes above	2

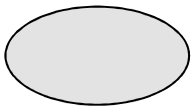
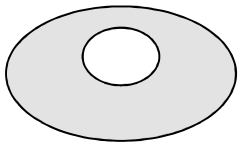
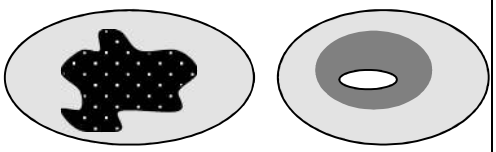
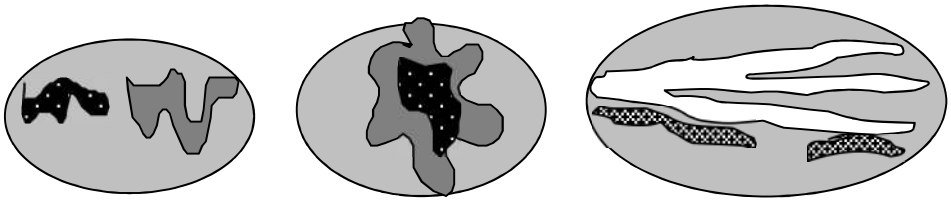
Rating of Value If score is: X **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number Wetland 5&6

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.* _X_ Aquatic bed — 4 structures or more: points = 4 _X_ Emergent — 3 structures: points = 2 ____ Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points = 1 ____ Forested (areas where trees have > 30% cover) — 1 structure: points = 0 *If the unit has a Forested class, check if:* ____ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon	1
H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*). ____ Permanently flooded or inundated — 4 or more types present: points = 3 ____ Seasonally flooded or inundated — 3 types present: points = 2 ____ Occasionally flooded or inundated — 2 types present: points = 1 ____ Saturated only — 1 type present: points = 0 ____ Permanently flowing stream or river in, or adjacent to, the wetland ____ Seasonally flowing stream in, or adjacent to, the wetland ____ **Lake Fringe wetland** — **2 points** _X_ **Freshwater tidal wetland** — **2 points**	2
H 1.3. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. *Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle*** If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0	1
H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points  **Low** = 1 point  **Moderate** = 2 points All three diagrams in this row are **HIGH** = 3points 	2

Wetland name or number Wetland 5&6

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* __X__Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland __X__Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* __X__At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	3
Total for H 1 Add the points in the boxes above	9

Rating of Site Potential If score is:___**15-18 = H** __X__**7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	0
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	-2
Total for H 2 Add the points in the boxes above	-2

Rating of Landscape Potential If score is:___**4-6 = H** ___**1-3 = M** __X__**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 ___ It has 3 or more priority habitats within 100 m (see next page) __X__ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ___ It is mapped as a location for an individual WDFW priority species ___ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ___ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan X Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If score is:__X__**2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland 5&6

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

X **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

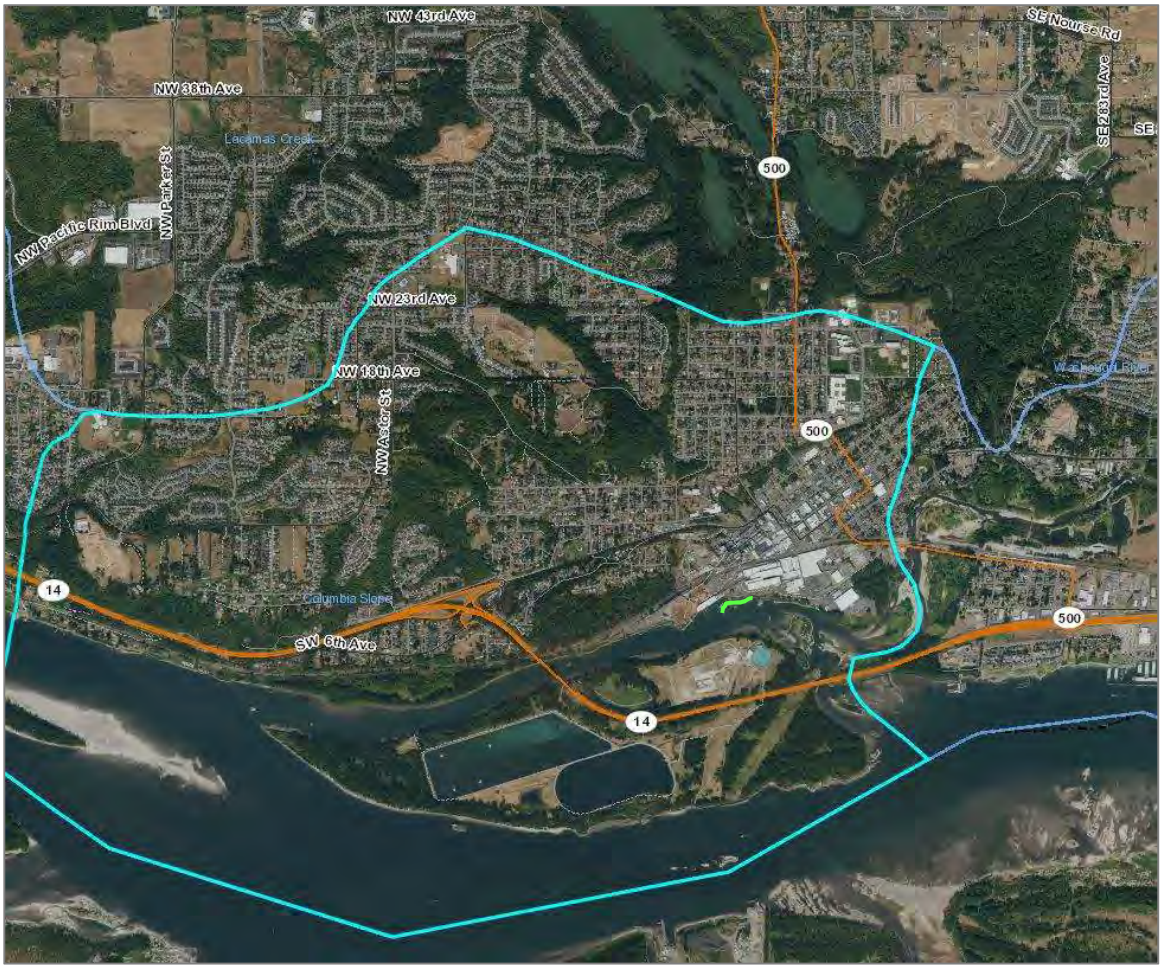
Wetland boundary (approximate)

150-foot buffer around wetland

Herbaceous Plants (not Cowardin classes)

Map 1. Plant Cover

R 1.2, 2.4, 4.1, 4.2

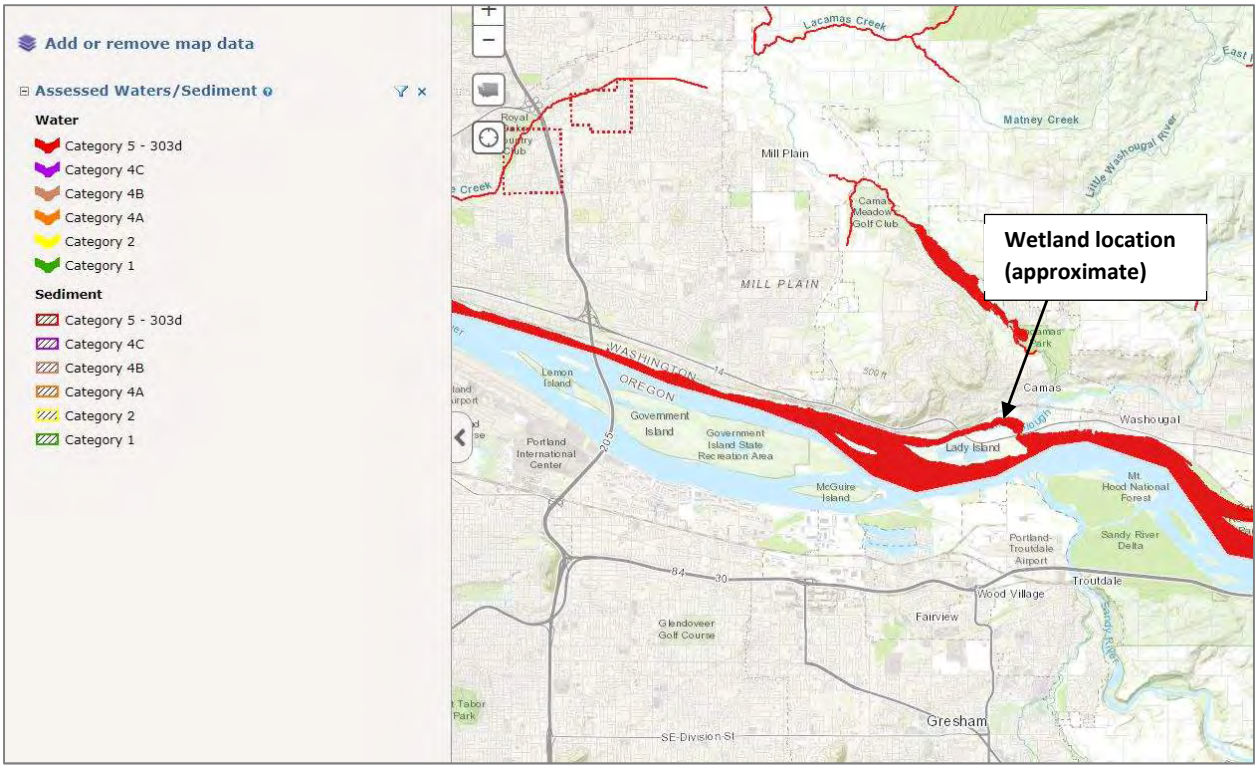


Wetland location (approximate)

Contributing Basin

Map 2. Contributing Basin

R 2.2, 2.3



Map 3. 303(d) List Waters

R 3.1

Wetland boundary (approximate)

Aquatic bed

Emergent

Map 4. Cowardin Plant Classes

H 1.1, 1.4

Wetland boundary (approximate)

1-kilometer buffer around wetland (white line)

Relatively Undisturbed Land Use

Low or Moderate Intensity Land Use

High Intensity Land Use

Map 5. Land Use Intensity

H. 2.1, 2.2, 2.3

Wetland boundary (approximate)

150-foot buffer around wetland

Herbaceous Plants (not Cowardin classes)

Map 1. Plant Cover

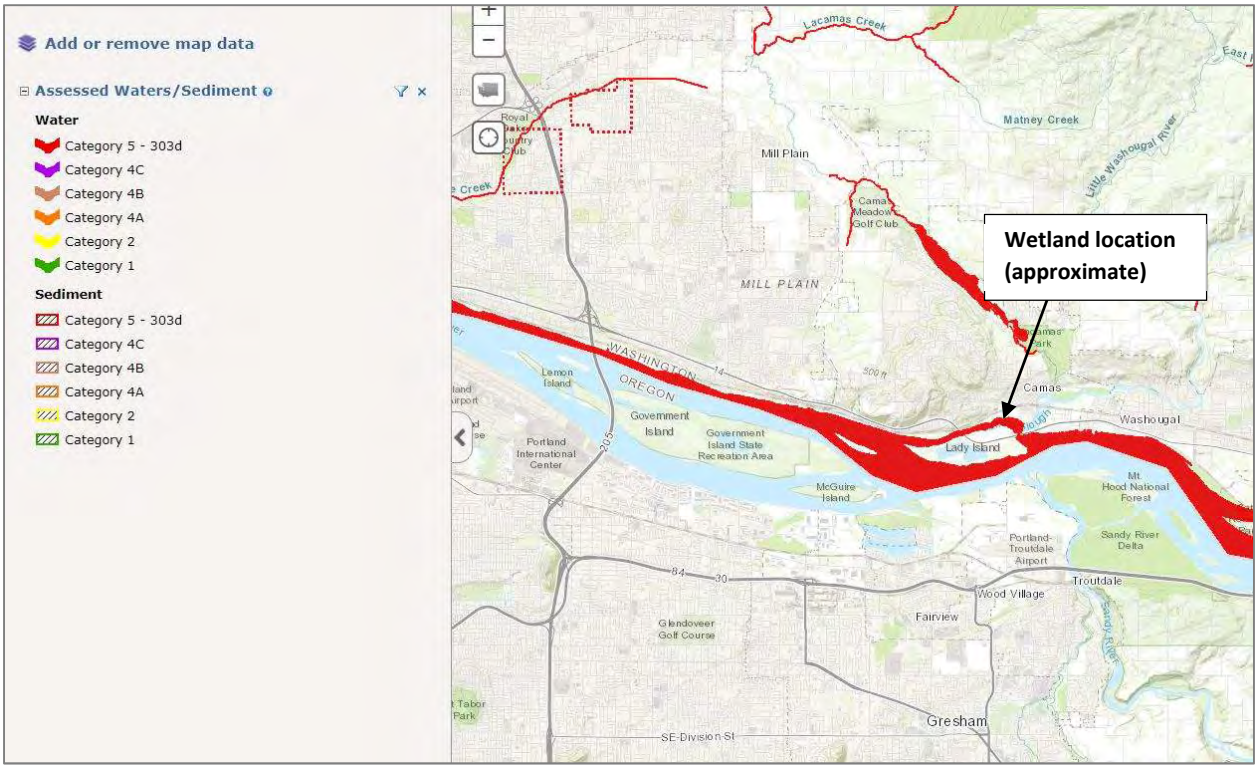
R 1.2, 2.4, 4.1, 4.2

Wetland location (approximate)

Contributing Basin

Map 2. Contributing Basin

R 2.2, 2.3



Map 3. 303(d) List Waters

R 3.1

Wetland boundary (approximate)

Aquatic bed

Emergent

Map 4. Cowardin Plant Classes

H 1.1, 1.4

Wetland boundary (approximate)

1-kilometer buffer around wetland (white line)

Relatively Undisturbed Land Use

Low or Moderate Intensity Land Use

High Intensity Land Use

Map 5. Land Use Intensity

H. 2.1, 2.2, 2.3

Wetland 7 Information Sheet
Wetland Name: Wetland 7
Location: Lady Island, Camas Slough Riverbank, upriver from Truck Dock

Local Jurisdiction	City of Camas
WRIA	28
Ecology Rating 2014	Category II
Buffer Width	180 feet
Cowardin Classification	REM1R
HGM Classification	Riverine

Wetland name or number WL 7

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland 7 (WL 7) Date of site visit: 7/22/20

Rated by Cheyenne Ginther Trained by Ecology? __ Yes _x_ No Date of training_____

HGM Class used for rating Riverine Wetland has multiple HGM classes? ___Y _x_ N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map _____

OVERALL WETLAND CATEGORY ____ (based on functions___ or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

_x_**Category II** – Total score = 20 - 22

_____**Category III** – Total score = 16 - 19

_____**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			TOTAL
	Circle the appropriate ratings									
Site Potential	H	**M**	L	H	M	**L**	H	M	**L**	
Landscape Potential	**H**	M	L	H	**M**	L	H	**M**	L	
Value	**H**	M	L	**H**	M	L	**H**	M	L	**TOTAL**
Score Based on Ratings	8			6			6			20

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	**I** **II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I** **II**
Interdunal	**I** **II** **III** **IV**
None of the above	

Wetland name or number WL 7

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	2
Hydroperiods	H 1.2	4
Ponded depressions	R 1.1	1
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	1
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	2
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	1
Map of the contributing basin	R 2.2, R 2.3, R 5.2	6
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	5
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	7

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number WL 7

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 **YES** – the wetland class is **Tidal Fringe** – go to 1.1

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 **YES** – The wetland class is **Flats**
   *If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
   ___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   ___At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
   ___The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___The water leaves the wetland **without being impounded**.

   NO – go to 5 **YES –** The wetland class is **Slope**

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number WL 7

NO – go to 6 **YES** – The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number _____

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions).* Yes = 4 No = 0	
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^1/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^1/_{10}$ of area points = 0	
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	
Total for D 1 Add the points in the boxes above	

Rating of Site Potential If score is: ___**12-16 = H** ___**6-11 = M** ___**0-5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source_____ Yes = 1 No = 0	
Total for D 2 Add the points in the boxes above	

Rating of Landscape Potential If score is: ___**3 or 4 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	
Total for D 3 Add the points in the boxes above	

Rating of Value If score is: ___**2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number _____

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?

D 4.1. Characteristics of surface water outflows from the wetland:

Wetland is a depression or flat depression with no surface water leaving it (no outlet)	points = 4
Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet	points = 2
Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch	points = 1
Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing	points = 0

D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.*

Marks of ponding are 3 ft or more above the surface or bottom of outlet	points = 7
Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet	points = 5
Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet	points = 3
The wetland is a "headwater" wetland	points = 3
Wetland is flat but has small depressions on the surface that trap water	points = 1
Marks of ponding less than 0.5 ft (6 in)	points = 0

D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.*

The area of the basin is less than 10 times the area of the unit	points = 5
The area of the basin is 10 to 100 times the area of the unit	points = 3
The area of the basin is more than 100 times the area of the unit	points = 0
Entire wetland is in the Flats class	points = 5

Total for D 4 — Add the points in the boxes above

Rating of Site Potential If score is: ___**12-16 = H** ___**6-11 = M** ___**0-5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?

D 5.1. Does the wetland receive stormwater discharges?	Yes = 1 No = 0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff?	Yes = 1 No = 0
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)?	Yes = 1 No = 0

Total for D 5 — Add the points in the boxes above

Rating of Landscape Potential If score is: ___**3 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?

D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.*

The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds):

- Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2
- Surface flooding problems are in a sub-basin farther down-gradient. points = 1

Flooding from groundwater is an issue in the sub-basin. points = 1

The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ points = 0

There are no problems with flooding downstream of the wetland. points = 0

D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0

Total for D 6 — Add the points in the boxes above

Rating of Value If score is: ___**2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number WL 7

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

R 1.0. Does the site have the potential to improve water quality?		
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event:		
Depressions cover > 3/4 area of wetland	points = 8	0
Depressions cover > ½ area of wetland	points = 4	
Depressions present but cover < ½ area of wetland	points = 2	
No depressions present	points = 0	
R 1.2. Structure of plants in the wetland (areas with >90% cover at person height, **not** Cowardin classes)		
Trees or shrubs > 2/3 area of the wetland	points = 8	6
Trees or shrubs > 1/3 area of the wetland	points = 6	
Herbaceous plants (> 6 in high) > 2/3 area of the wetland	points = 6	
Herbaceous plants (> 6 in high) > 1/3 area of the wetland	points = 3	
Trees, shrubs, and ungrazed herbaceous < 1/3 area of the wetland	points = 0	
Total for R 1	Add the points in the boxes above	6

Rating of Site Potential If score is: ___**12-16 = H** _X_ **6-11 = M** ___**0-5 = L** *Record the rating on the first page*

R 2.0. Does the landscape have the potential to support the water quality function of the site?		
R 2.1. Is the wetland within an incorporated city or within its UGA?	Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area?	Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years?	Yes = 1 No = 0	0
R 2.4. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants?	Yes = 1 No = 0	1
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources Waterfowl use and deer grazing (indicated by prints)	Yes = 1 No = 0	1
Total for R 2	Add the points in the boxes above	6

Rating of Landscape Potential If score is: _X_ **3-6 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

R 3.0. Is the water quality improvement provided by the site valuable to society?		
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi?	Yes = 1 No = 0	1
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens?	Yes = 1 No = 0	1
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (*answer YES if there is a TMDL for the drainage in which the unit is found*)	Yes = 2 No = 0	2
Total for R 3	Add the points in the boxes above	4

Rating of Value If score is: _X_ **2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number WL 7

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

R 4.0. Does the site have the potential to reduce flooding and erosion?		
R 4.1. Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).* If the ratio is more than 20 — 23 meters/195 meters — points = 9 If the ratio is 10-20 — points = 6 If the ratio is 5-<10 — points = 4 If the ratio is 1-<5 — points = 2 If the ratio is < 1 — points = 1		1
R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).* Forest or shrub for > 1/3 area OR emergent plants > 2/3 area — points = 7 Forest or shrub for > 1/10 area OR emergent plants > 1/3 area — points = 4 Plants do not meet above criteria — points = 0		4
Total for R 4	Add the points in the boxes above	5

Rating of Site Potential If score is: ___ **12-16 = H** ___ **6-11 = M** X **0-5 = L** *Record the rating on the first page*

R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?		
R 5.1. Is the stream or river adjacent to the wetland downcut?	Yes = 0 No = 1	1
R 5.2. Does the up-gradient watershed include a UGA or incorporated area?	Yes = 1 No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams?	Yes = 0 No = 1	0
Total for R 5	Add the points in the boxes above	2

Rating of Landscape Potential If score is: ___ **3 = H** X **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?		
R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site.* The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) — points = 2 Surface flooding problems are in a sub-basin farther down-gradient — points = 1 No flooding problems anywhere downstream — points = 0		2
R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan?	Yes = 2 No = 0	0
Total for R 6	Add the points in the boxes above	2

Rating of Value If score is: X **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number _____

LAKE FRINGE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

L 1.0. Does the site have the potential to improve water quality?	
L 1.1. Average width of plants along the lakeshore *(use polygons of Cowardin classes)*: Plants are more than 33 ft (10 m) wide — points = 6 Plants are more than 16 ft (5 m) wide and <33 ft — points = 3 Plants are more than 6 ft (2 m) wide and <16 ft — points = 1 Plants are less than 6 ft wide — points = 0	
L 1.2. Characteristics of the plants in the wetland: Choose the appropriate description that results in the highest points, and do not include any open water in your estimate of coverage. The herbaceous plants can be either the dominant form or as an understory in a shrub or forest community. *These are not Cowardin classes. Area of cover is total cover in the unit, but it can be in patches. Herbaceous does not include aquatic bed.* Cover of herbaceous plants is >90% of the vegetated area — points = 6 Cover of herbaceous plants is >$^{2}/_{3}$ of the vegetated area — points = 4 Cover of herbaceous plants is >$^{1}/_{3}$ of the vegetated area — points = 3 Other plants that are not aquatic bed > $^{2}/_{3}$ unit — points = 3 Other plants that are not aquatic bed in > $^{1}/_{3}$ vegetated area — points = 1 Aquatic bed plants and open water cover > $^{2}/_{3}$ of the unit — points = 0	
Total for L 1 — Add the points in the boxes above	

Rating of Site Potential If score is: ___**8-12 = H** ___**4-7 = M** ___**0-3 = L** *Record the rating on the first page*

L 2.0. Does the landscape have the potential to support the water quality function of the site?	
L 2.1. Is the lake used by power boats? Yes = 1 No = 0	
L 2.2. Is > 10% of the area within 150 ft of wetland unit on the upland side in land uses that generate pollutants? Yes = 1 No = 0	
L 2.3. Does the lake have problems with algal blooms or excessive plant growth such as milfoil? Yes = 1 No = 0	
Total for L 2 — Add the points in the boxes above	

Rating of Landscape Potential: If score is: ___**2 or 3 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

L 3.0. Is the water quality improvement provided by the site valuable to society?	
L 3.1. Is the lake on the 303(d) list of degraded aquatic resources? Yes = 1 No = 0	
L 3.2. Is the lake in a sub-basin where water quality is an issue (at least one aquatic resource in the basin is on the 303(d) list)? Yes = 1 No = 0	
L 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? *Answer YES if there is a TMDL for the lake or basin in which the unit is found.* Yes = 2 No = 0	
Total for L 3 — Add the points in the boxes above	

Rating of Value If score is: ___**2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number _____

LAKE FRINGE WETLANDS

Hydrologic Functions - Indicators that the wetland unit functions to reduce shoreline erosion

L 4.0. Does the site have the potential to reduce shoreline erosion?	
L 4.1. Distance along shore and average width of Cowardin classes along the lakeshore (**do not** include Aquatic bed): *Choose the highest scoring description that matches conditions in the wetland.*	
> ¾ of distance is Scrub-shrub or Forested at least 33 ft (10 m) wide — points = 6	
> ¾ of distance is Scrub-shrub or Forested at least 6 ft (2 m) wide — points = 4	
> ¼ distance is Scrub-shrub or Forested at least 33 ft (10 m) wide — points = 4	
Plants are at least 6 ft (2 m) wide (any type except Aquatic bed) — points = 2	
Plants are less than 6 ft (2 m) wide (any type except Aquatic bed) — points = 0	

Rating of Site Potential: If score is:___**6 = M** ___**0-5 = L** *Record the rating on the first page*

L 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
L 5.1. Is the lake used by power boats with more than 10 hp? Yes = 1 No = 0	
L 5.2. Is the fetch on the lake side of the unit at least 1 mile in distance? Yes = 1 No = 0	
Total for L 5 — Add the points in the boxes above	

Rating of Landscape Potential If score is:___**2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

L 6.0. Are the hydrologic functions provided by the site valuable to society?	
L 6.1. Are there resources along the shore that can be impacted by erosion? If more than one resource is present, choose the one with the highest score.	
There are human structures or old growth/mature forests within 25 ft of OHWM of the shore in the unit — points = 2	
There are nature trails or other paths and recreational activities within 25 ft of OHWM — points = 1	
Other resources that could be impacted by erosion — points = 1	
There are no resources that can be impacted by erosion along the shores of the unit — points = 0	

Rating of Value: If score is:___**2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:

Wetland name or number _____

SLOPE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

S 1.0. Does the site have the potential to improve water quality?	
S 1.1. Characteristics of the average slope of the wetland: *(a 1% slope has a 1 ft vertical drop in elevation for every 100 ft of horizontal distance*) Slope is 1% or less points = 3 Slope is > 1%-2% points = 2 Slope is > 2%-5% points = 1 Slope is greater than 5% points = 0	
S 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions)*: Yes = 3 No = 0	
S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants: Choose the points appropriate for the description that best fits the plants in the wetland. *Dense means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 in.* Dense, uncut, herbaceous plants > 90% of the wetland area points = 6 Dense, uncut, herbaceous plants > ½ of area points = 3 Dense, woody, plants > ½ of area points = 2 Dense, uncut, herbaceous plants > ¼ of area points = 1 Does not meet any of the criteria above for plants points = 0	
Total for S 1 Add the points in the boxes above	

Rating of Site Potential If score is: **___12 = H ___6-11 = M ___0-5 = L** *Record the rating on the first page*

S 2.0. Does the landscape have the potential to support the water quality function of the site?	
S 2.1. Is > 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants? Yes = 1 No = 0	
S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1? Other sources _____ Yes = 1 No = 0	
Total for S 2 Add the points in the boxes above	

Rating of Landscape Potential If score is: **___1-2 = M ___0 = L** *Record the rating on the first page*

S 3.0. Is the water quality improvement provided by the site valuable to society?	
S 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	
S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? *At least one aquatic resource in the basin is on the 303(d) list*. Yes = 1 No = 0	
S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? *Answer YES if there is a TMDL for the basin in which unit is found.* Yes = 2 No = 0	
Total for S 3 Add the points in the boxes above	

Rating of Value If score is: **___2-4 = H ___1 = M ___0 = L** *Record the rating on the first page*

Wetland name or number _____

SLOPE WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream erosion

S 4.0. Does the site have the potential to reduce flooding and stream erosion?	
S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. *Stems of plants should be thick enough (usually > 1/8 in), or dense enough, to remain erect during surface flows.* Dense, uncut, **rigid** plants cover > 90% of the area of the wetland points = 1 All other conditions points = 0	

Rating of Site Potential If score is: **___1 = M ___0 = L** *Record the rating on the first page*

S 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses or cover that generate excess surface runoff? Yes = 1 No = 0	

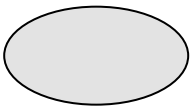
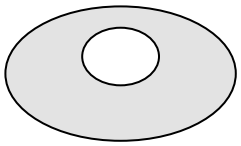
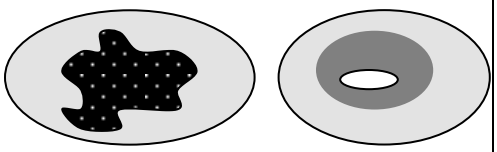
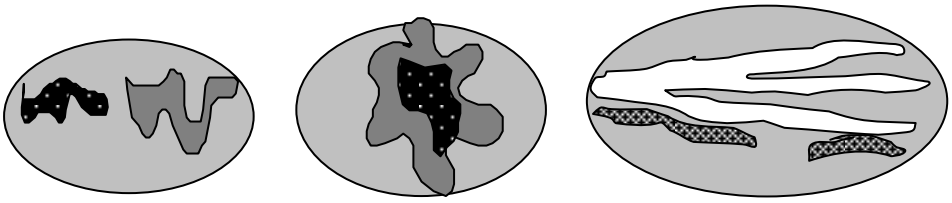
Rating of Landscape Potential If score is: **___1 = M ___0 = L** *Record the rating on the first page*

S 6.0. Are the hydrologic functions provided by the site valuable to society?	
S 6.1. Distance to the nearest areas downstream that have flooding problems: The sub-basin immediately down-gradient of site has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	
S 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	
Total for S 6 Add the points in the boxes above	

Rating of Value If score is: **___2-4 = H ___1 = M ___0 = L** *Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:

Wetland name or number WL 7

These questions apply to wetlands of all HGM classes. **HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat	
H 1.0. Does the site have the potential to provide habitat?	
H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.* __X__ Aquatic bed — 4 structures or more: points = 4 __X__ Emergent — 3 structures: points = 2 ____ Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points = 1 ____ Forested (areas where trees have > 30% cover) — 1 structure: points = 0 *If the unit has a Forested class, check if:* ____ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon	1
H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*). ____ Permanently flooded or inundated — 4 or more types present: points = 3 ____ Seasonally flooded or inundated — 3 types present: points = 2 ____ Occasionally flooded or inundated — 2 types present: points = 1 ____ Saturated only — 1 type present: points = 0 ____ Permanently flowing stream or river in, or adjacent to, the wetland ____ Seasonally flowing stream in, or adjacent to, the wetland ____ **Lake Fringe wetland** — **2 points** __X__ **Freshwater tidal wetland** — **2 points**	2
H 1.3. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. *Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle*** If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0	1
H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points  **Low** = 1 point  **Moderate** = 2 points All three diagrams in this row are **HIGH** = 3points 	2

Wetland name or number WL 7

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ____Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* ____At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	0
Total for H 1 Add the points in the boxes above	6

Rating of Site Potential If score is:___**15-18 = H** ___**7-14 = M** _X_**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	1
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	1
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	0
Total for H 2 Add the points in the boxes above	2

Rating of Landscape Potential If score is:___**4-6 = H** _X_**1-3 = M** ___**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 _X_ It has 3 or more priority habitats within 100 m (see next page) _X_ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ___ It is mapped as a location for an individual WDFW priority species ___ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ___ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If score is:_X_ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number WL 7

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

X **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

X **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number _____

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt Yes –Go to **SC 1.1** No= **Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina*, see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes **–** Go to **SC 2.2** No **–** Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes **= Category I** No **= Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes **– Contact WNHP/WDNR and go to SC 2.4** No **= Not a WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes **= Category I** No **= Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES you will still need to rate the wetland based on its functions.*** SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to **SC 3.3** No – Go to **SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** No = **Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Is a Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Is a Category I bog** No **= Is not a bog**	**Cat. I**

Wetland name or number _____

SC 4.0. Forested Wetlands Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.*** — **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. — **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). Yes = **Category I** No = **Not a forested wetland for this section**	**Cat. I**
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? — The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks — The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* Yes – Go to **SC 5.1** No = **Not a wetland in a coastal lagoon** SC 5.1. Does the wetland meet all of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2) Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.*** In practical terms that means the following geographic areas: — Long Beach Peninsula: Lands west of SR 103 — Grayland-Westport: Lands west of SR 105 — Ocean Shores-Copalis: Lands west of SR 115 and SR 109 Yes – Go to **SC 6.1** No = **not an interdunal wetland for rating** SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** No – Go to **SC 6.2** SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** No – Go to **SC 6.3** SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** No = **Category IV**	**Cat I** **Cat. II** **Cat. III** **Cat. IV**
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	

Wetland name or number _____

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Wetland boundary (approximate)

Wetland area

150-foot buffer around wetland

Figure 1. Width of Unit vs. Width of Stream

R 1.1, 2.3, 4.1

Wetland boundary (approximate)

150-foot buffer around wetland

Aquatic Bed Cowardin Class

Emergent Cowardin Class

Figure 2. Cowardin Plant Classes

R 1.2, 4.2; H 1.1, 1.4

Source: Washington Department of Ecology Water Quality Atlas online map.

Figure 3. 303(d) listed Waters

R 3.1

Wetland boundary (approximate)

Permanently flowing river

150-foot buffer around wetland

Saturated only

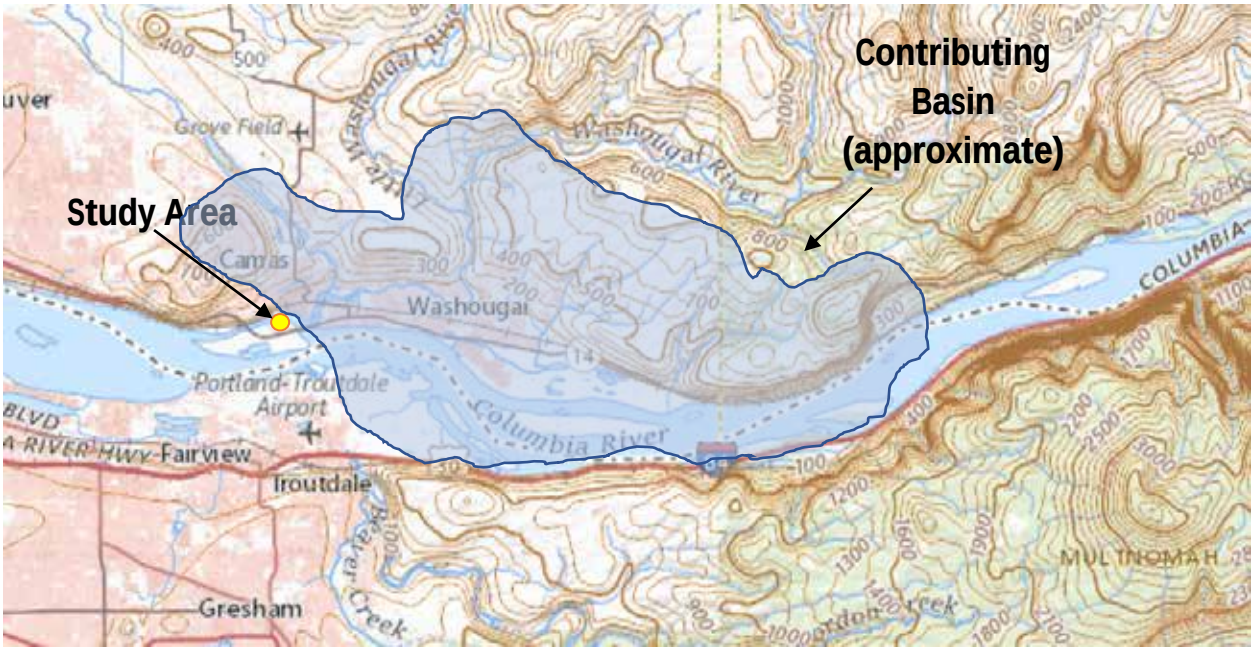
Figure 4. Hydroperiods

H 1.2; R 1.2, 2.4

- Wetland location
- Relatively Undisturbed
- Low to Moderate Intensity
- High Intensity

Figure 5. Land Use Intensity Within 1km of Study Area

H 2.1, 2.2, 2.3



Source: USGS The National Map online viewer.

Figure 6. Contributing Basin

R 2.2, 2.3, 5.2

LISTING_ID	TMDL_NAME	WATERBODY_NAME	PARAMETER_NAME	COUNTIES
6698	Salmon Creek Bacteria and Turbidity TMDL	COUGAR CANYON CREEK	Bacteria	Clark
6702	Salmon Creek Bacteria and Turbidity TMDL	WEAVER (WOODIN) CREEK	Bacteria	Clark
7871	Lower Columbia River TDG TMDL	COLUMBIA RIVER (BROUGHTON REACH)	Total Dissolved Gas	Skamania
7879	Lower Columbia River TDG TMDL	COLUMBIA RIVER (BROUGHTON REACH)	Total Dissolved Gas	Clark
7892	Salmon Creek Bacteria and Turbidity TMDL	CURTIN CREEK	Bacteria	Clark
7934	Salmon Creek Bacteria and Turbidity TMDL	MILL CREEK	Bacteria	Clark
7938	Salmon Creek Bacteria and Turbidity TMDL	SALMON CREEK	Bacteria	Clark
7940	Salmon Creek Bacteria and Turbidity TMDL	SALMON CREEK	Bacteria	Clark
7941	Salmon Creek Bacteria and Turbidity TMDL	SALMON CREEK	Bacteria	Clark
7942	Salmon Creek Watershed Temperature TMDL	SALMON CREEK	Temperature	Clark
8788	Salmon Creek Bacteria and Turbidity TMDL	SALMON CREEK	Turbidity	Clark
8793	Columbia River Basin Dioxin TMDL	COLUMBIA RIVER	Dioxin	Skamania
8794	Columbia River Basin Dioxin TMDL	COLUMBIA RIVER	Dioxin	Clark
10015	Gibbons Creek Watershed Bacteria TMDL	GIBBONS CREEK REMNANT CHANNEL	Bacteria	Clark
22019	Salmon Creek Watershed Temperature TMDL	COUGAR CANYON CREEK	Temperature	Clark
22021	Salmon Creek Watershed Temperature TMDL	CURTIN CREEK	Temperature	Clark
22024	Salmon Creek Watershed Temperature TMDL	MILL CREEK	Temperature	Clark
22033	Salmon Creek Bacteria and Turbidity TMDL	SALMON CREEK	Bacteria	Clark
22034	Salmon Creek Bacteria and Turbidity TMDL	SALMON CREEK	Bacteria	Clark
22047	Salmon Creek Watershed Temperature TMDL	SALMON CREEK	Temperature	Clark
22049	Salmon Creek Watershed Temperature TMDL	SALMON CREEK	Temperature	Clark
22050	Salmon Creek Watershed Temperature TMDL	SALMON CREEK	Temperature	Clark
22051	Salmon Creek Watershed Temperature TMDL	WEAVER (WOODIN) CREEK	Temperature	Clark
22107	Salmon Creek Bacteria and Turbidity TMDL	SALMON CREEK	Bacteria	Clark
42529	Gibbons Creek Watershed Bacteria TMDL	CAMPEN CREEK	Bacteria	Clark
42635	Gibbons Creek Watershed Bacteria TMDL	GIBBONS CREEK	Bacteria	Clark
72448	Salmon Creek Bacteria and Turbidity TMDL	MUD CREEK	Bacteria	Clark
72469	Gibbons Creek Watershed Bacteria TMDL	UNNAMED CREEK (TRIB TO GIBBONS CREEK)	Bacteria	Clark
72471	Gibbons Creek Watershed Bacteria TMDL	GIBBONS CREEK	Bacteria	Clark
72474	Gibbons Creek Watershed Bacteria TMDL	CAMPEN CREEK	Bacteria	Clark
72479	Salmon Creek Bacteria and Turbidity TMDL	TENNY CREEK	Bacteria	Clark
72481	Salmon Creek Bacteria and Turbidity TMDL	ROCKWELL CREEK	Bacteria	Clark
72482	Salmon Creek Bacteria and Turbidity TMDL	LALONDE CREEK	Bacteria	Clark
72483	Salmon Creek Bacteria and Turbidity TMDL	UNNAMED CREEK (TRIB TO SALMON CREEK)	Bacteria	Clark
72486	Gibbons Creek Watershed Bacteria TMDL	UNNAMED CREEK (TRIB TO CAMPEN CREEK)	Bacteria	Clark

Note: Those circled are applicable to the Wetland 7.

Figure 7. TMDLs in WRIA-28

(Washougal & Salmon)

R 3.2, 3.3

Exhibit 5 SHOR23-01

APPENDIX E: IPAC AND PHS SPECIES LISTS

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

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Location

Oregon and Washington

Local offices

Washington Fish And Wildlife Office

(360) 753-9440
(360) 753-9405

510 Desmond Drive Se, Suite 102

Lacey, WA 98503-1263

Oregon Fish And Wildlife Office

(503) 231-6179
(503) 231-6195

2600 Southeast 98th Avenue, Suite 100
Portland, OR 97266-1398

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

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2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Columbian White-tailed Deer *Odocoileus virginianus leucurus* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/154	Threatened

Birds

NAME	STATUS
Northern Spotted Owl *Strix occidentalis caurina* Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1123	Threatened
Streaked Horned Lark *Eremophila alpestris strigata* Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/7268	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout *Salvelinus confluentus* There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/8212	Threatened

Insects

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NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Golden Paintbrush Castilleja levisecta Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7706	Threatened
Nelson's Checker-mallow Sidalcea nelsoniana Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7340	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Bull Trout Salvelinus confluentus https://ecos.fws.gov/ecp/species/8212#crithab	Final

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Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Jan 1 to Sep 30
California Gull Larus californicus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 1 to Jul 31
Clark's Grebe Aechmophorus clarkii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Aug 31

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Evening Grosbeak Coccothraustes vespertinus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Aug 10
Lesser Yellowlegs Tringa flavipes This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Olive-sided Flycatcher Contopus cooperi This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Rufous Hummingbird selasphorus rufus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds Apr 15 to Jul 15
Western Grebe aechmophorus occidentalis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Wrentit Chamaea fasciata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 10

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

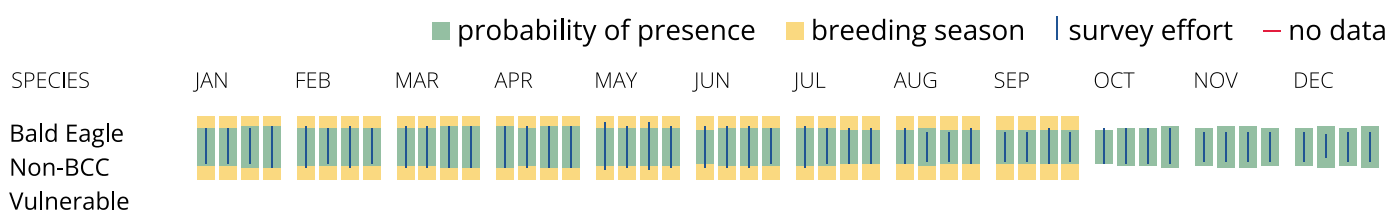
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid

cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to

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you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on Federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

There are no known coastal barriers at this location.

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

Facilities

Wildlife refuges and fish hatcheries

Refuge and fish hatchery information is not available at this time

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location did not intersect any wetlands mapped by NWI.

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

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The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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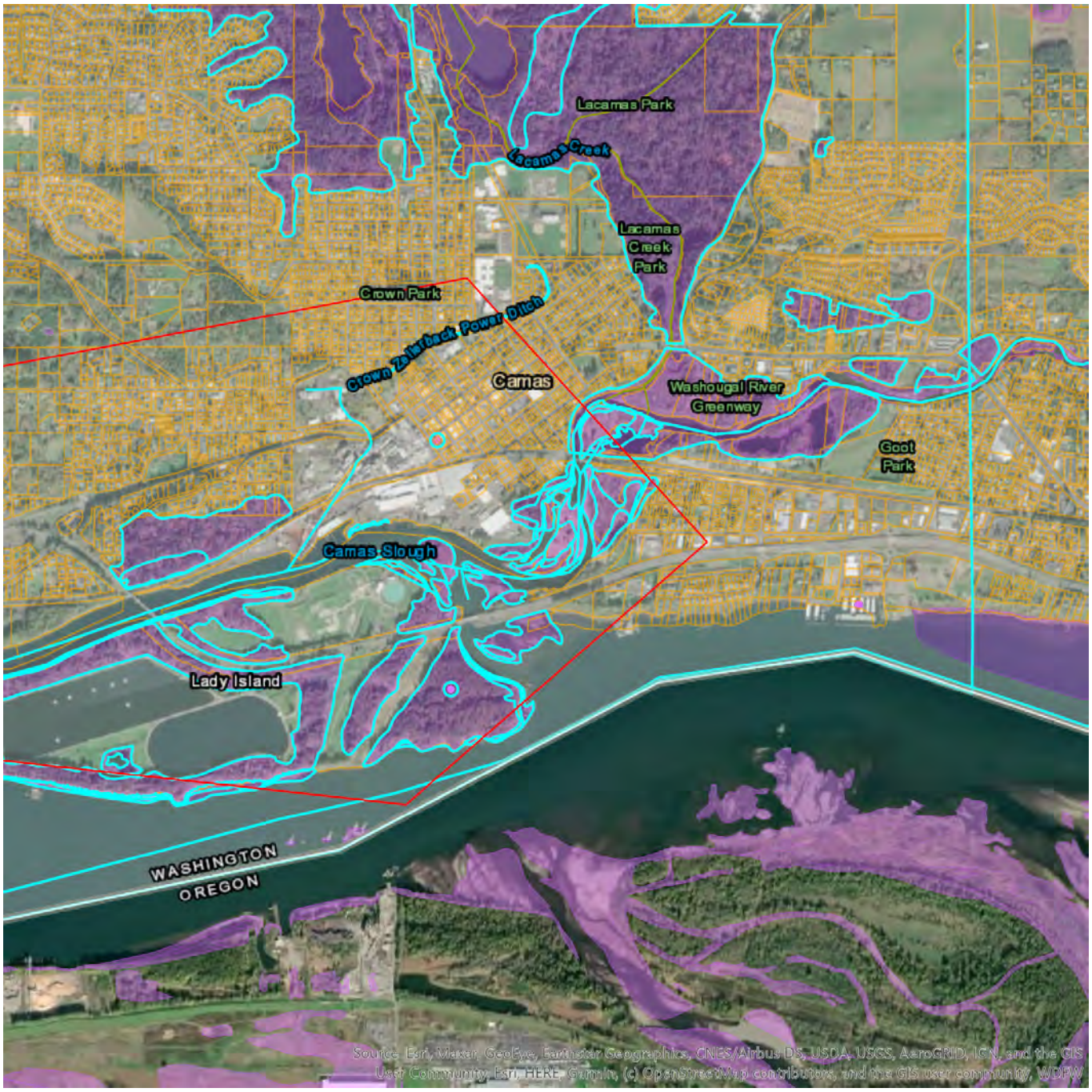
Priority Habitats and Species on the Web



Report Date: 07/31/2020

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Generalized Location
Slender-billed white-breasted nuthatch	N/A	Candidate	No
Vaux's swift	N/A	Candidate	No
Fall Chinook	N/A	N/A	No
Winter Steelhead	N/A	N/A	No
Dolly Varden/ Bull Trout	N/A	N/A	No
Fall Chum	N/A	N/A	No
Green Sturgeon	N/A	N/A	No
Sockeye	N/A	N/A	No
Coho	Threatened	N/A	No
Steelhead	Threatened	N/A	No
Coho	N/A	N/A	No
Summer Steelhead	N/A	N/A	No
Resident Coastal Cutthroat	N/A	N/A	No
Pink Salmon Odd Year	N/A	N/A	No
Cutthroat	Candidate	N/A	No
Chinook	Threatened	N/A	No
Spring Chinook	N/A	N/A	No
Summer Chinook	N/A	N/A	No
Chum	Threatened	N/A	No
White Sturgeon	N/A	N/A	No
Chinook	Not Warranted	N/A	No
Oak Woodland	N/A	N/A	No
Purple martin	N/A	N/A	No
Freshwater Emergent Wetland	N/A	N/A	No
Riverine	N/A	N/A	No
Freshwater Forested/Shrub Wetland	N/A	N/A	No
Biodiversity Areas And Corridor	N/A	N/A	No
Caves Or Cave-rich Areas	N/A	N/A	Yes

PHS Species/Habitats Details:

Slender-billed white-breasted nuthatch	
Scientific Name	*Sitta carolinensis aculeata*
Priority Area	Occurrence
Site Name	LADY ISLAND
Accuracy	1/8 mile (Quarter/Quarter Section)
Notes	SLENDER-BILLED WHITE-BREASTED NUTHATCH REGULAR OCCURRENCE IN COTTONWOOD GALLERY FORESTS. YEAR OF OBSERVATION UNREPORTED. DATA COMPILED BY WDFW REGIONAL BIOLOGIST 2009.
Source Record	110169
Source Dataset	WS_OccurPoint
Source Date	WS_OccurPoint
Source Name	CADY, W./AUDUBON PORTLAND;LABB
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	Candidate
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	Y
Display Resolution	AS MAPPED
Geometry Type	Points

Vaux's swift	
Scientific Name	*Chaetura vauxi*
Priority Area	Communal Roost
Site Name	CAMAS TAVERN CHIMNEY
Accuracy	Map 1:12,000 <= 33 feet
Notes	VAUX'S SWIFT FALL MIGRATION ROOST. SEVERAL THOUSAND SWIFTS. DATE IS REPORTING DATE. OBS. DATE UNKNOWN.
Source Record	110175
Source Dataset	WS_OccurPoint
Source Date	WS_OccurPoint
Source Name	LABBE, T./WDFW;CADY, W./AUDUBO
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	Candidate
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Points

Fall Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence/Migration
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Fish Name: Chinook Salmon, Run Time: Fall, Life History: Anadromous
Source Record	43703
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Winter Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Fish Name: Steelhead Trout, Run Time: Winter, Life History: Anadromous
Source Record	43716
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Dolly Varden/ Bull Trout	
Scientific Name	*Salvelinus malma/S. confluentus*
Priority Area	Occurrence/Migration
Site Name	Camas Slough
Accuracy	NA
Notes	LLID: 1223964455727, Fish Name: Bull Trout, Run Time: Unknown or not Applicable, Life History: Unknown
Source Record	43723
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Winter Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Camas Slough
Accuracy	NA
Notes	LLID: 1223964455727, Fish Name: Steelhead Trout, Run Time: Winter, Life History: Anadromous
Source Record	43727
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Winter Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Accuracy	NA
Notes	LLID: 1224124455873, Fish Name: Steelhead Trout, Run Time: Winter, Life History: Anadromous
Source Record	44088
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Fall Chum	
Scientific Name	*Oncorhynchus keta*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Chum Salmon, Run Time: Fall, Life History: Anadromous
Source Record	65458
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Green Sturgeon	
Scientific Name	*Acipenser medirostris*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Green Sturgeon, Run Time: Unknown or not Applicable, Life History: Adfluvial
Source Record	65471
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Sockeye	
Scientific Name	*Oncorhynchus nerka*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Sockeye Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	65487
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Occurrence
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Stock Name: Washougal Coho, Run: Unspecified, Status: Unknown
Source Record	3780
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Threatened
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Stock Name: Washougal Winter Steelhead, Run: Winter, Status: Depressed
Source Record	6791
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Threatened
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Occurrence/Migration
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Fish Name: Coho Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	43708
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Summer Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Fish Name: Steelhead Trout, Run Time: Summer, Life History: Anadromous
Source Record	43713
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Fall Chum	
Scientific Name	*Oncorhynchus keta*
Priority Area	Occurrence/Migration
Accuracy	NA
Notes	LLID: 1224124455873, Fish Name: Chum Salmon, Run Time: Fall, Life History: Anadromous
Source Record	44086
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Resident Coastal Cutthroat	
Scientific Name	*Oncorhynchus clarki*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Cutthroat Trout, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	65456
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Fall Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Chinook Salmon, Run Time: Fall, Life History: Anadromous
Source Record	65457
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Pink Salmon Odd Year	
Scientific Name	*Oncorhynchus gorbuscha*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Pink Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	65481
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Cutthroat	
Scientific Name	*Oncorhynchus clarki*
Priority Area	Occurrence
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Stock Name: Mainstem Washougal Coastal Cutthroat, Run: Unspecified, Status: Unknown
Source Record	7900
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Candidate
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Stock Name: Washougal Fall Chinook, Run: Fall, Status: Healthy
Source Record	1624
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Threatened
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Fall Chum	
Scientific Name	*Oncorhynchus keta*
Priority Area	Occurrence/Migration
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Fish Name: Chum Salmon, Run Time: Fall, Life History: Anadromous
Source Record	43706
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Occurrence/Migration
Site Name	Camas Slough
Accuracy	NA
Notes	LLID: 1223964455727, Fish Name: Coho Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	43722
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Summer Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Camas Slough
Accuracy	NA
Notes	LLID: 1223964455727, Fish Name: Steelhead Trout, Run Time: Summer, Life History: Anadromous
Source Record	43726
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Occurrence/Migration
Accuracy	NA
Notes	LLID: 1224124455873, Fish Name: Coho Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	44087
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Spring Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Chinook Salmon, Run Time: Spring, Life History: Anadromous
Source Record	65459
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Summer Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Chinook Salmon, Run Time: Summer, Life History: Anadromous
Source Record	65462
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Summer Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Steelhead Trout, Run Time: Summer, Life History: Anadromous
Source Record	65489
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Stock Name: Washougal Summer Steelhead, Run: Summer, Status: Unknown
Source Record	6784
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Threatened
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Chum	
Scientific Name	*Oncorhynchus keta*
Priority Area	Occurrence
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Stock Name: Lower Columbia Gorge Fall Chum, Run: Fall, Status: Depressed
Source Record	2765
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Threatened
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Resident Coastal Cutthroat	
Scientific Name	*Oncorhynchus clarki*
Priority Area	Occurrence/Migration
Site Name	Washougal River
Accuracy	NA
Notes	LLID: 1223962455734, Fish Name: Cutthroat Trout, Run Time: Unknown or not Applicable, Life History: Unknown
Source Record	43702
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Resident Coastal Cutthroat	
Scientific Name	*Oncorhynchus clarki*
Priority Area	Occurrence/Migration
Site Name	Camas Slough
Accuracy	NA
Notes	LLID: 1223964455727, Fish Name: Cutthroat Trout, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	43719
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Fall Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence/Migration
Site Name	Camas Slough
Accuracy	NA
Notes	LLID: 1223964455727, Fish Name: Chinook Salmon, Run Time: Fall, Life History: Anadromous
Source Record	43720
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Fall Chum	
Scientific Name	*Oncorhynchus keta*
Priority Area	Occurrence/Migration
Site Name	Camas Slough
Accuracy	NA
Notes	LLID: 1223964455727, Fish Name: Chum Salmon, Run Time: Fall, Life History: Anadromous
Source Record	43721
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Coho Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	65465
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Dolly Varden/ Bull Trout	
Scientific Name	*Salvelinus malma/S. confluentus*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Bull Trout, Run Time: Unknown or not Applicable, Life History: Unknown
Source Record	65468
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Winter Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: Steelhead Trout, Run Time: Winter, Life History: Anadromous
Source Record	65492
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

White Sturgeon	
Scientific Name	*Acipenser transmontanus*
Priority Area	Occurrence/Migration
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Fish Name: White Sturgeon, Run Time: Unknown or not Applicable, Life History: Adfluvial
Source Record	65498
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Stock Name: Bonneville Bright Fall Chinook, Run: Fall, Status: Unknown
Source Record	1628
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Not Warranted
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence
Site Name	Columbia River
Accuracy	NA
Notes	LLID: 1240483462464, Stock Name: Hanford Reach Fall Chinook, Run: Fall, Status: Healthy
Source Record	1720
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Not Warranted
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Oak Woodland	
Priority Area	Terrestrial Habitat
Site Name	WASHOUGAL OAKS
Accuracy	1/4 mile (Quarter Section)
Notes	OAK WOODLANDS ADJACENT TO WASHOUGAL RIVER AND SHEPARD HILL.
Source Record	912993
Source Dataset	PHSREGION
Source Name	MANLOW, STEVE WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00030
Geometry Type	Polygons

Purple martin	
Scientific Name	*Progne subis*
Priority Area	Breeding Area
Site Name	LADY ISLAND
Accuracy	Map 1:12,000 <= 33 feet
Notes	EIGHT GOURD COLONY ON LADY ISLAND, OWNED BY GEORGIA-PACIFIC CORP. POOR ACCESS. SITE BOUNDARY IS NOT PRECISE.
Source Record	4637
Source Dataset	WS_OccurPolygon
Source Date	WS_OccurPolygon
Source Name	CADY, W./PRIVATE
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	Y
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1S
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PFO1S
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1C
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE INTERMITTENT - NWI Code: R4SBC
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PFO1S
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PSS1S
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1S
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Biodiversity Areas And Corridor	
Priority Area	Terrestrial Habitat
Site Name	CAMAS BIODIVERSITY AREA
Accuracy	1/4 mile (Quarter Section)
Notes	BIODIVERSITY AREA IN THE VICINITY OF CAMAS AND WASHOUGAL. AREA SUPPORTS MATURE TIMBER. FREQUENT OBSERVATIONS OF VAUX SWIFTS SURROUNDING DEAD LAKE.
Source Record	913312
Source Dataset	PHSREGION
Source Name	STEVE MANLOW WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00023
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1S
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE INTERMITTENT - NWI Code: R4SBCx
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1C
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Oak Woodland	
Priority Area	Terrestrial Habitat
Site Name	CLARK COUNTY OAK WOODLANDS
Accuracy	1/4 mile (Quarter Section)
Notes	OAK WOODLANDS
Source Record	912981
Source Dataset	PHSREGION
Source Name	MANLOW, STEVE WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00030
Geometry Type	Polygons

Biodiversity Areas And Corridor	
Priority Area	Terrestrial Habitat
Site Name	LADY AND AKERMAN ISLANDS BAC
Accuracy	1/4 mile (Quarter Section)
Notes	RIPARIAN ZONE ON LADY AND ACKERMAN ISLANDS. COLUMBIA RIVER COTTONWOOD HABITAT.
Source Record	913311
Source Dataset	PHSREGION
Source Name	CARL DUGGER WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00023
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Riverine	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: RIVERINE TIDAL - NWI Code: R1USR
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEM1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PFO1R
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Caves Or Cave-rich Areas	
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	N
Display Resolution	TOWNSHIP

DISCLAIMER. This report includes information that the Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents the location of fish and wildlife resources to the best of our knowledge. It is not a complete inventory and it is important to note that fish and wildlife resources may occur in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site specific surveys are frequently necesssary to rule out the presence of priority resources. Locations of fish and wildlife resources are subject to variation caused by disturbance, changes in season and weather, and other factors. WDFW does not recommend using reports more than six months old.

Exhibit 5 SHOR23-01

APPENDIX F: BEST MANAGEMENT PRACTICES

Exhibit 5 SHOR23-01

1.0 BEST MANAGEMENT PRACTICES

The In-water/Overwater Removals Project (Project) would be accomplished in a manner that is sensitive and protective of the environment. Best management practices (BMPs) will be implemented throughout the Project by first identifying potential detrimental effects and then implementing methods that eliminate or reduce the potential effect. These BMPs have been identified for dredging, dredged materials management, vessel operations, piling and dolphin removals, and structure demolition along the riverbank, including construction stormwater management.

1.1 Best Management Practices for Dredging and Dredged Materials Management

As stated, dredging will be required and includes:

- Removal of overburden to provide access for removal of three submarine pipelines traversing Camas Slough and two outfall pipes extending from Lady Island into the Columbia River.
- Reshaping the Camas Slough riverbank following the removal of overwater structures.
- Deepening to -10 feet (Columbia River Datum [CRD]) a 1,800-square-foot area surrounding the Dock Warehouse piers to enable access for demolition barges.

Until recently, maintenance dredging in the Camas Slough has occurred regularly to maintain barge access and other operations at the Mill's waterfront. However, the Dock Warehouse Piers have not received maintenance dredging and currently the riverbed at the piers has filled in with river sediment.

Dredging will be conducted in a manner to prevent impingement of fish by a dredging clamshell or hydraulic dredge. Regular observation of dredged sediment aboard the barge or at the placement areas will be conducted to minimize impingement. If impingement should occur, clamshell equipment will be adjusted (slowed) or modified to increase the opportunity for fish to avoid or escape the bucket and/or suction head. Where hydraulic dredging is used, the dredge will be lowered deeper into the sandy sediment to reduce water entrainment.

BMPs to minimize sediment loss and turbidity generation may include, but are not limited to, the following:

- Smooth closure of the bucket when at the riverbed;
- Minimal stockpiling of dredged material on the riverbed;
- Maintaining suction head of any hydraulic dredge in the riverbed to the extent practicable;
- Using a buffer plate or other means to reduce flow energy of the hydraulic dredge at the placement area; and
- Other conditions as specified in the Project's Water Quality Certification and other approvals.

When dredged materials are placed on a barge for transport to the placement area, no spill of sediment back to the river from the barge will be allowed. The barge will be managed such that the

Exhibit 5 SHOR23-01

dredged sediment load does not exceed the capacity of the barge. The load will be placed in the barge to maintain an even keel and avoid listing.

A Dredged Materials Management Plan will be developed and will likely include the following measures:

- Hay bales and/or filter fabric may be placed over the barge scuppers to help filter suspended sediment from the barge effluent, if needed, based on sediment testing results.
- The contractor will be required to use a tightly sealing bucket and to monitor for spillage during transfer operations.
- Visual water quality monitoring and, if necessary, follow-up measurements will be conducted around the barge at the removal and upland transfer area to confirm that material is not being released.
- When stockpiling dredged material at the Lady Island Dredge Material Area, BMPs will be employed as appropriate to control runoff and erosion, and for example could include:
  - installing silt fences, straw bales, and/or containment berms;
  - managing runoff and elutriate water; and
  - routine inspections of the off-load and stockpile areas to verify water quality protections are functioning properly.

In-water reuse and other upland reuse is preferred for dredged materials determined to be suitable. Coordination with the Dredged Materials Management Program is underway to determine sediment quality and suitability for in-water disposal.

Materials not suitable for in-water reuse but found suitable would be disposed at the Lady Island Dredged Materials Area (LI DMA) located at the western extent of Lady Island (see **Figure 1** in the Shoreline Report for location). Dredged materials from Camas Slough and the Columbia River in the vicinity have been stored at the LI DMA for many years. The Revised Tier 1 Report (Tetra Tech 2023) provides details on the development and long-term use of this area, as well as sediment quality evaluations. A sediment sampling and analysis investigation is planned at the time of this document which will provide data on existing sediment quality prior to dredging and materials management.

1.2 Best Management Practices for Vessel Operations

Derrick barges, material barges, tugboats, along with support boats (work skiffs, survey boats) will be used on the Columbia River and in Camas Slough during demolition to provide access to the structures for removal and materials management. These vessels would be in the Project area throughout the regulatory in-water work window.

A navigation channel allows access from the Columbia River at approximately RM 119.5 to Camas Slough and the Project area from downriver. No navigable access is available to Camas Slough from the Columbia River at RM 122 from upriver during most river stages.

Material barges would work between the various dredge prisms and the LI DMA for off-loading dredge materials during dredging operations.

Exhibit 5 SHOR23-01

BMPs for vessel operation will include the following:

- The contractor will notify the U.S. Coast Guard of planned river operations prior to commencing work.
- The Contractor will prepare a Spill, Prevention, Control, and Countermeasures Plan (SPCC Plan) to be used to safeguard against unintentional release of fuel, lubricants, or hydraulic fluids.
- Drive mechanisms of equipment operated from the barge will be prevented from entering water to the extent possible.
- Turbidity and other parameters will be monitored to ensure compliance, to the greatest extent possible, with the Surface Water Quality Standards for Washington (Washington Administrative Code [WAC] 173-201A).
- Any equipment operating in the water will use vegetable-based oils in hydraulic lines.
- A turbidity curtain will be used where river currents allow and moved as necessary to accommodate vessel operations.
- Floating debris will be recovered to the barge.
- Petroleum products, concrete, chemicals, or other toxic or deleterious materials will be prevented from entering surface waters to the extent possible through the use of BMPs. For example:
  - Fuel hoses, oil drums, oil or fuel transfer valves, and fittings will be checked regularly for leaks.
  - Fuels and lubricating materials will be maintained and stored properly to prevent spills.

Any barge used as a work platform to support demolition will be:

- Large enough to remain stable under foreseeable loads and adverse conditions;
- Inspected by the contractor before arrival to ensure the vessel and ballast are free of invasive species; and
- Secured, stabilized, and maintained as necessary to ensure no loss of balance, stability, anchorage, or other condition that can result in the release of demolition debris or other materials from the barge.

The contractor will time vessel operations to occur during regulatory in-water work windows, and during river stages and at locations where water depths are sufficient to avoid groundings, minimize prop-wash, and avoid creating unnecessary turbidity.

1.3 Best Management Practices for Piling and Dolphin Removals

In the Project area, pilings comprise the following materials:

- Carbon steel H-piles,
- Reinforced concrete piles,
- Concrete-filled steel pipe piles,

Exhibit 5 SHOR23-01

- Steel sheet piles,
- Untreated wood, and
- Treated wood piles.

Methods to remove pilings and dolphins will be determined in part by the nature and location of the pilings and dolphins. To protect water, sediment, and habitat quality, all pilings will be removed following the BMPs for removals, as published by the U.S. Environmental Protection Agency (2016) and Washington Department of Natural Resources (2017). Work will be accomplished while minimizing turbidity, sediment disturbance, and debris reentry to the water column.

In general, removals will use a direct-pull extraction method that primarily utilizes a vibratory hammer to loosen the piling along with a crane to stabilize and help extract the loosened pile. Use of a clamshell bucket may be required for removals in some locations. Complete extraction of pilings is preferred to partial removals, although some pilings may need to be cut below the mudline. The contractor will make multiple attempts to remove a pile before resorting to cutting the pile. Also, pilings along the riverbank may be partially excavated to enable removal.

The following BMPs will be implemented:

- Prior to commencement of work to remove piles, a work plan will be produced by the contractor with the intent to identify appropriate detailed methods to minimize turbidity, sediment disturbance, and debris reentry.
- The contractor will assess each pile's condition, material, and location and identify if access will be from a barge or from the riverbank.
- Where river currents allow, the contractor will surround the structure to be removed with a floating surface boom to capture floating surface debris.
- Some piles in the project area are protected by tire bumpers (e.g., the piling supporting the PECO Dock). Tires will be cut from the piling and placed on the barge or at an upland location for disposal.
- All dolphin-binding materials (e.g., cables, steel straps) will be removed to the barge or upland location for disposal.
- If the pile is intractable or breaks, the contractor will cut the pile off approximately 2 feet below the mudline with consideration given to the mudline elevation, slope, and stability of the location.
- The contractor's work plan will include procedures for extracting and handling pilings that break off during removal.
- To the extent possible, the contractor will keep all equipment (e.g., bucket, steel cable, vibratory hammer) out of the water, and grip piling above the waterline.
- The contractor will minimize overall damage to pilings during removal and will remove pilings slowly to minimize sediment disturbance and turbidity.
- A containment basin will be provided on the barge deck to contain removed materials along with sediment removed, floating debris, and splintered wood.

Exhibit 5 SHOR23-01

- Upon removal, the pile will be moved expeditiously into the containment area for processing.
- The piling shall not be shaken, hosed off, stripped or scraped, left hanging to drip, or subjected to any other action intended to clean or remove adhering material from the piling. Sediment associated with the removed piling must not be returned to the river.

1.4 Best Management Practices for Demolition along the Riverbank

BMPs will be employed throughout the operation of the Project and are to include:

- Limits of work will be clearly established prior to any demolition.
- Only established staging areas will be used for fueling, servicing, and demolition.
- Temporary equipment storage will be located in a manner that will prevent contaminants from entering aquatic areas.
- Demolition materials management areas will be identified on-site and will include appropriate sediment controls and stormwater controls.
- Materials resulting from demolition will be managed appropriately to protect the environment.
- Demolition materials will be recycled to the extent possible and if not recyclable, will be disposed at off-site approved facilities.
- Appropriate stormwater and temporary erosion and sediment control plans will be developed and will comply with the City's erosion control standards and state requirements.
- A site-specific SPCC Plan appropriate for the Project activities will be developed.

1.5 Stormwater Management during Demolition along the Riverbank

Within the demolition area on the Camas Slough riverbank, stormwater runoff is collected currently as industrial stormwater and conveyed to the Lady Island Wastewater Treatment facility for treatment. Treated waters are discharged to the Columbia River (Outfall 001) from the Lady Island Wastewater Treatment plant under GP's Industrial Permit (No. WA0000256). Per Condition S7 of the Permit, coordination with the Washington Department of Ecology (Ecology) would occur to secure permission for construction stormwater to be collected and treated as industrial water during demolition.

GP will also apply to be covered by the State's General Construction Stormwater Permit during demolition for areas not within the industrial treatment footprint and for coverage of off-site transportation.

Following completion of structure demolition and riverbank shaping, all industrial activities in this area will have ceased within the footprint. Impervious surfaces will have been greatly reduced over the area. Stormwater from this riverbank area, now free from all industrial activities and industrial structures, would infiltrate, or if not infiltrated, would flow naturally towards Camas Slough.

Additional details on best management practices for stormwater management are provided in the Project's Stormwater Pollution Prevention Plan (SWPPP).

Exhibit 5 SHOR23-01

In summary, the following BMPs will be followed to help ensure stormwater quality protection and protection of the adjacent aquatic areas:

- Identifying clear staging and laydown areas away from water.
- Sequencing work with water protection as a priority, for example time demolition activities so that low river stages allow demolition with no water present (in-the-dry).
- Conducting the riverbank demolition in a fashion that prevents the debris movement towards water, such as use of screens or staging in a manner that barricades materials from movement towards water
- Activities will be conducted to meet conditions as specified in the Project's Water Quality Certification and with requirements of the General Construction Stormwater Permit.
- Temporary disturbance to riverbank vegetation at Camas Slough and on Lady Island will be limited to the minimum amount needed to access and remove infrastructure.
- The Contractor will prepare an SPCC Plan to be used to safeguard against unintentional release of fuel, lubricants, or hydraulic fluids.
- Drive mechanisms of equipment operated from the riverbank, but that may reach waterward of the ordinary high water mark will be prevented from entering water to the extent possible.
- Turbidity and other parameters will be monitored to ensure compliance, to the greatest extent possible, with the Surface Water Quality Standards for Washington (Washington Administrative Code 173-201A).
- Petroleum products, concrete, chemicals, or other toxic or deleterious materials will be prevented from entering surface waters to the extent possible through the use of best management practices. For example:
  - Fuel hoses, oil drums, oil or fuel transfer valves, and fittings will be checked regularly for leaks.
  - Fuels and lubricating materials will be maintained and stored properly to prevent spills.

2.0 REFERENCES

EPA (U.S. Environmental Protection Agency). 2016. EPA Region 10 Best Management Practices for Piling Removal and Placement in Washington State. February 18, 2016. Available online at: http://www.nws.usace.army.mil/Portals/27/docs/regulatory/Forms/EPA%20BMPs%20for%20Piling%20Removal%202-18-16.pdf. Accessed 9/18/2019.

Tetra Tech. 2023 (in draft). Revised Tier 1 Evaluation for Dredged Materials Management. Prepared for Georgia Pacific Camas Operations, LLC.

WDNR (Washington Department of Natural Resources (WDNR). 2017. Derelict Creosote Piling Removal Best Management Practices for Pile Removal and Disposal. Updated 1/25/2017. Available online: https://www.dnr.wa.gov/publications/aqr_rest_pileremoval_bmp_2017.pdf. Accessed 9/18/2019.

February 14, 2023

Caleigh Belkoff
Environmental Manager
Georgia-Pacific Consumer Operations LLC
401 NE Adams Street
Camas, WA 98607

Subject: Frequently Flooded Areas Report and Flood Hazard Assessment for Demolition of Encroachments Camas, Washington

This report addresses requirements in Camas Ordinance Chapter 16.57 "Frequently Flooded Areas," including a frequently flooded areas report and flood hazard assessment, pertinent to the proposed demolition of approximately 3,000 pilings plus dolphins and other structures along Camas Slough and the north bank of the Columbia River at the Camas Mill.

The demolition would occur in the special flood hazard area (SFHA) of the Columbia River, including portions in the floodway, as mapped by the Federal Emergency Management Agency (FEMA) in the Flood Insurance Study (FIS) of Clark County, Washington and incorporated areas (two volumes, dated effective January 19, 2018 [FEMA 2018]) and its attached Flood Insurance Rate Maps (FIRMs).

The proposed activity consists entirely of removing existing encroachments to flow, and no new construction of any structures is involved. Almost no ground elevations will change in the channel and floodplain (SFHA). However, small areas of net fill (and others of net cut) would occur within the floodway and result from the demolition.

The project also includes demolition of one dolphin located in unincorporated Clark County approximately 65 feet downstream of the city-county line, which is addressed in a separate no-rise certification submitted to the county.

FLOOD HAZARD DESCRIPTION

The area of proposed activity lies in the SFHA and floodway on the north bank of the Columbia River (including Camas Slough, which is treated as part of the Columbia River in the FIS). This reach has been studied in detail by the FEMA as part of the FIS dated June 19, 2018 (FEMA, 2018) and the accompanying FIRMs.

The proposed demolitions would be in an area that lies in FIRM Panels 529 (downstream of Lady Island), 533 (most of Lady Island and Camas Slough), and 534 (the eastern portion of Lady Island and upstream) published by FEMA dated effective September 5, 2012 (panels 529 and 533), and January 19, 2018 (panel 534).

The area includes the north bank of the Columbia River and both banks of Camas Slough upstream of FEMA cross-section "AB" (base flood elevation [BFE] 34.2 feet relative to the North American Vertical Datum of 1988 [NAVD88]) and downstream of section "AD" (34.9 feet NAVD88), and includes cross-section "AC" (34.6 feet NAVD88, for the Columbia River, but not Camas Slough).

The reach lies entirely within the City of Camas (FEMA community ID 530026) except for one dolphin being removed about 2,200 feet downstream of section "AB" and 65 feet downstream of the city-county boundary. This single dolphin lies just inside the jurisdiction of unincorporated Clark County (community ID 530024), and a separate certification of no-rise is being made to the County.

The cross-section labels and BFEs are from the latest FEMA national flood hazard map layer (accessed July 2020) and the FEMA FIS report (FEMA 2018).

Attachment 1 presents the following information reproduced from the FIS:

- FIRM panels 529,533, and 534. Proposed activity begins at the city boundary near river mile 117.5 (measured at the profile baseline near the river centerline) and extends upstream to about mile 120.4

- Flood Profile 22P of the Columbia River from river mile 117.0 to river mile 122.2, which includes the reach of proposed activity.
- Floodway Data Table (FIS Table 9) highlighting lettered cross-sections AB through AD that includes the reach of proposed activity.

Attachment 2 presents this same information from the FIS overlaid on site plans for the proposed demolition. Areas of net cut and net fill are also shown (Attachment 2, Figure 5).

Attachment 3 presents project plan sheets.

PROJECT DESCRIPTION

Georgia-Pacific Consumer Operations LLC (GP) is planning to remove and/or demolish several structures associated with GP's prior operations in the City of Camas, Washington. The structures to be removed are located in-water and/or over water on the Columbia River and Camas Slough and are located within the City of Camas or Clark County Shoreline Management Zones. The structures to be removed and/or demolished are no longer supporting current operations at the Camas Mill.

The project footprint includes areas along the shoreline at the Camas Mill, several other locations in the Camas Slough, and approximately 3 miles of shoreline near the Camas Mill.

The structures to be removed include approximately 3,000 piles and dolphins, one building-like industrial structure, three docks/piers, an oil storage tank and its pumps, and a conveyor housing. Where piles, dolphins, and structures are to be removed, the river bank will not be changed, except in the area of the PECO Dock, where the bank will be graded back more gradually than existing, and at the large concrete foundation of the former Berger Crane, where the concrete will be removed to well below water surface and the riverbank regraded to bury the remaining obstruction. **Attachment** 2 shows in detail the locations of the structures to be removed in relation to the SFHA, floodway boundary, and lettered FIS cross-sections AB and AC.

The proposed project will require work below the ordinary high water of the Columbia River and Camas Slough. Some of the structures to be removed are located on State-owned land currently leased by GP through the Washington Department of Natural Resources (WDNR).

GP is the sole organization responsible for maintaining, developing, removing, and deconstructing facilities at the Camas Mill.

CITY OF CAMAS REQUIREMENTS FOR FREQUENTLY FLOODED AREAS

The City of Camas Code 16.57 addresses frequently flooded areas. Portions that relate to the proposed demolition project state the following.

> *Chapter 16.57-FREQUENTLY FLOODED AREAS*
>
> *16.57.010- Applicability.*
>
> *A. Frequently Flooded Areas" The areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for Clark County, Washington, and incorporated areas" dated September 5, 2012, and any revisions thereto, with accompanying Flood Insurance Rate Maps (FIRM). ...*

16.57.020-Uses and activities prohibited.

E. Development in Floodways.

1. New Development Requires Certification by an Engineer. Encroachments, including new construction, substantial improvements, fill, and other development, are prohibited within designated floodways unless certified by a registered professional engineer. Such certification shall demonstrate through hydrologic and hydraulic analyses, performed in accordance with standard engineering practice that the proposed encroachment will not result in any increase in flood levels during the occurrence of the base flood discharge. ...

16.57.030-Critical area report-Additional requirements.

In addition to the items listed in CMC 16.51.140 Critical Area Reporting, the following is required:

A. Prepared by a Qualified Professional. A frequentl, flooded areas report shall be prepared by a qualified professional who is a hydrologist, or engineer, who is licensed in the state of Washington, with experience in preparing flood hazard assessments.

B. Area Addressed in Critical Area Report. The following areas shall be addressed in a critical area report for frequently flooded areas:

1. The site area of the proposed activity;

2. All areas of a special flood hazard area, as indicated on the flood insurance rate map(s), within three hundred feet of the project area; and

3. All other flood areas indicated on the flood insurance rate map(s) within three hundred feet of the project area.

C. Flood Hazard Assessment Required. A critical area report for a proposed activity within a frequently flooded area shall contain a flood hazard assessment, including the following site- and proposal-related information at a minimum:

1. Site and Construction Plans. A copy of the site and construction plans for the development proposal showing:

a. Floodplain (one hundred-year flood elevation), ten- and fifty-year flood elevations, floodway, other critical areas, management zones, and shoreline areas;

b. Proposed development, including the location of existing and proposed structures, fill, storage of materials, and drainage facilities, with dimensions indicating distances to the floodplain; ...

D. Information Regarding Other Critical Areas. Potential impacts to wetlands, fish and wildlife habitat, and other critical areas shall be addressed in accordance with the applicable sections of these provisions. ...

16.57.050-Performance standards-General requirements.

H. Fill and Grading. Fill and grading within the floodplain shall only occur upon a determination from a registered professional engineer that the fill or grading will not block side channels, inhibit channel migration, increase flood hazards to others, or be placed within a channel migration zone, whether or not the City has delineated such zones as of the time of the application. If fill or grading is located in a floodway, CMC Section 16.57.020 applies.

16.57.080-Variations-Additional considerations for frequently flooded areas.

A. Additional Variation Considerations. In review of variation requests for activities within frequently flooded areas, the City shall consider all technical evaluations, relevant factors, standards specified in this chapter, and:

1. The danger to life and property due *to flooding, erosion damage, or materials swept onto other lands during flood events;*

B. Variations shall only be issued *upon a determination that the granting of a variation will not result in increased flood heights, additional threats to public safety, ...*

C. Variations shall not be issued *within a designated floodway if any increase in flood levels during the base flood discharge would result.*

Summarized below are our conclusions regarding how these sections of the Camas Code relate to GP's proposed demolition:

- The demolition affects frequently flooded areas because proposed fill (defined as "Development" in Camas Code) would occur in the SFHA and the floodway of the Columbia River. No other development is proposed because no construction is proposed, and the removal of encroachments in the floodway and SFHA are not defined as development by Camas Code.
- Certification by a registered professional engineer will be required that the proposed fill, together with proposed cut and removal of encroaching piles and structures, will not result in any increase in flood levels during the occurrence of the base flood (100-year) discharge. This certification will be based on hydraulic analysis comparing the existing regulatory model to one that incorporates the proposed activity. This certification will be documented separate from this memorandum.
- A frequently flooded areas report prepared by a qualified professional engineer or hydrologist will be required that includes site plans showing location of the proposed activity in relation to the FEMA SFHA (floodplain) and floodway, other critical areas, management zones, and shoreline areas. **This memorandum is intended to satisfy this requirement.**
- This proposed project consists only of demolition with no new development or redevelopment and no construction of new structures. As such, the project does not represent a "Development Proposal" as described by Camas Code 16.57.030 Cl, and no development is proposed for which a flood hazard assessment is required beyond the frequently flood areas report included in this memorandum.
- Information regarding other critical areas shall be addressed in separate documents in accordance with the applicable sections of those provisions, including potential impacts to wetlands, fish and wildlife habitat, and other critical areas.
- Fill and grading within the SFHA (floodplain), both inside and outside the floodway, will require determination from a registered professional engineer that the fill or grading will not block side channels, inhibit channel migration, increase flood hazards to others, or be placed within a channel migration zone. This determination will be documented separate from this memorandum.
- A variation to the Camas Code (variance) cannot be issued to avoid determination of the no-rise requirement for fill in the floodway. 1

FREQUENTLY FLOODED AREAS REPORT

Attachment 2 presents site and construction plans that show the location of the proposed activity in relation to the FEMA SFHA (floodplain) and floodway. The figures in **Attachment** 2 show the same FEMA information shown

1 Camas, Washington. May 19, 2020. Code of Ordinances. Title 16-Environment Critical Areas. Chapter 16.57-Frequently Flooded Areas. Retrieved July 21, 2020, from:
https://library.municode.com/wa/camas/codes/code_of_ordinances?nodeid=TIT16EN_CRAR_CH16.57FRFLAR

in **Attachment 1** but projected onto the site plans. **Attachment 2** shows the FEMA SFHA information within at least 300 feet of areas of proposed activity.

The site plans in **Attachment 2** includes the following sheets, numbered as **Figure 1** through **Figure 6:**

- **Figure 1** shows the full extent of the site plans; demolition extends from approximately river mile 117.51 (the boundary of Camas and unincorporated Clark County) to river mile 121.1. **Figure 1** also provides a spatial index for the other site plans shown in **Figures** 2 thorough **6.**
- **Figure 2** shows approximately river mile 117.51 to 118.2, downstream of Lady Island, including project demolition sites LA-2 (dolphin removal) and LA-3 (area of piles and dolphin removals). Area LA-1 is also shown, but it is a pile demolition outside the city limit that will be addressed under a separate application to Clark County; its removal will be included in the no-rise analysis for the City of Camas. Figure 2 also shows FEMA cross-section "AB" and the boundary of the City of Camas and unincorporated Clark County. The sites shown are only removals of encroaching structures with no change in grade and no construction.
- **Figure 3** shows approximately river mile 118.2 to 118.7, mostly showing Camas Slough and the downstream portion of Lady Island, including project demolition sites LA-4, LA-5, and LA-6, where dolphin structures will be removed along with a floating wooden walkway. An area of temporary fill will occur in the lower-right, outside (above) the SFHA. The sites shown are only removals of encroaching structures with no change in grade and no construction.
- **Figure 4** shows approximately river mile 118.7 to 119.6 along Camas Slough, including project demolition sites LA-8 through LA-13. Site LA-12 is an area of dolphins and piles; the other sites are single dolphins. The sites shown are only removals of encroaching structures with no change in grade and no construction.
- **Figure 5** shows approximately river mile 119.6 to 120.4 (the upstream extent of the project) along Camas Slough, including project demolition sites LA-14 through LA-19 plus three wastewater lines that will not be removed. Sites LA-17 and LA-19 are areas of dolphins and piles; the other sites are single dolphins. The three wastewater lines protrude above the bottom to various degrees and are included in the existing conditions. Areas that will be dredged as part of the removal are shown in green hatching. In addition, small areas of net fill are shown. In the western portion of LA 17, the large concrete foundation of the Berger Crane will be mostly removed, and the remainder buried by fill. The Tug Dock just west of the Berger Crane foundation will also be removed. Grading, including cut and fill, is proposed to smooth a bank underneath where an existing encroaching structure (the PBCO dock) and associated buildings will be removed in part of the central and eastern portion of LA-17. No construction is proposed at these sites.
- **Figure 6** shows approximately river mile 120.3 to 121.0 along Camas Slough including project LA-21, where an existing water intake structure and building will not be removed but are included as part of existing conditions. The figure shows the confluence with the Washougal River, which is upstream of the area of activity. The figure is for context.

If you have any questions, please do not hesitate to contact me.

Sincerely,

WSP USA Environment & Infrastructure Inc.

Seth Jelen, PE, CFM, CWRE
Principal Engineer-Water Resources
E-mail: sethJelen@wsp.com

Project Review by:

Tyler Marley, PE
Senior Project Engineer - Water Resources
E-mail: tyler.marley@wsp.com

Attachments: Attachment 1: Flood Insurance Study Information
Attachment 2: Flood Hazard Areas and Project Locations
Attachment 3: Demo Plan Sheets

ATTACHMENT 1:
FLOOD INSURANCE STUDY INFORMATION

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base Map information shown on this FIRM was derived from the U.S.D.A. Farm Service Agency National Agriculture Imagery Program (NAIP) produced at a scale of 1:12,000 from photography dated 2009.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

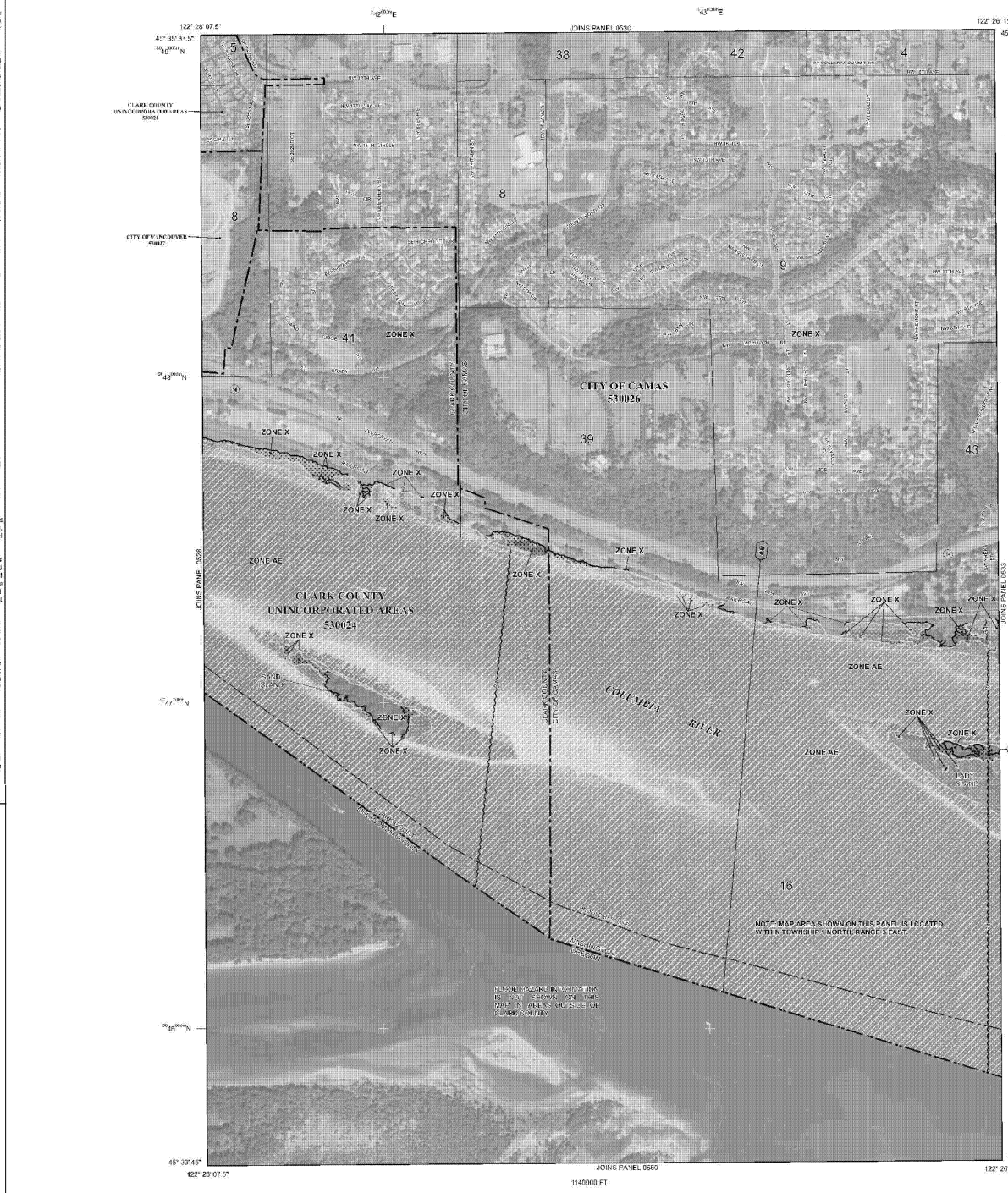
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report, (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** No Base Flood Elevations determined.
- **ZONE AE** Base Flood Elevations determined.
- **ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 Base Flood Elevation line and value; elevation in feet*
- (EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A Cross section line
- 23 — 23 Transect line
- 45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 2100000 FT 5000-foot ticks: Washington State Plane South Zone (FIPS Zone 4602), Lambert Conformal Conic projection
- 5000 FT 10000-meter Universal Transverse Mercator grid values, zone 10
- DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)
- MAP REPOSITORIES
  Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
  September 5, 2012
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

100 0 150 300 METERS

PANEL 0529D

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 529 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAMAS, CITY OF	530026	0529	D
CLARK COUNTY	530024	0529	D
VANCOUVER, CITY OF	530027	0529	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53011C0529D

DATE
SEPTEMBER 5, 2012

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.1 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base Map information shown on this FIRM was derived from the U.S.D.A. Farm Service Agency National Agriculture Imagery Program (NAIP) produced at a scale of 1:12,000 from photography dated 2009.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

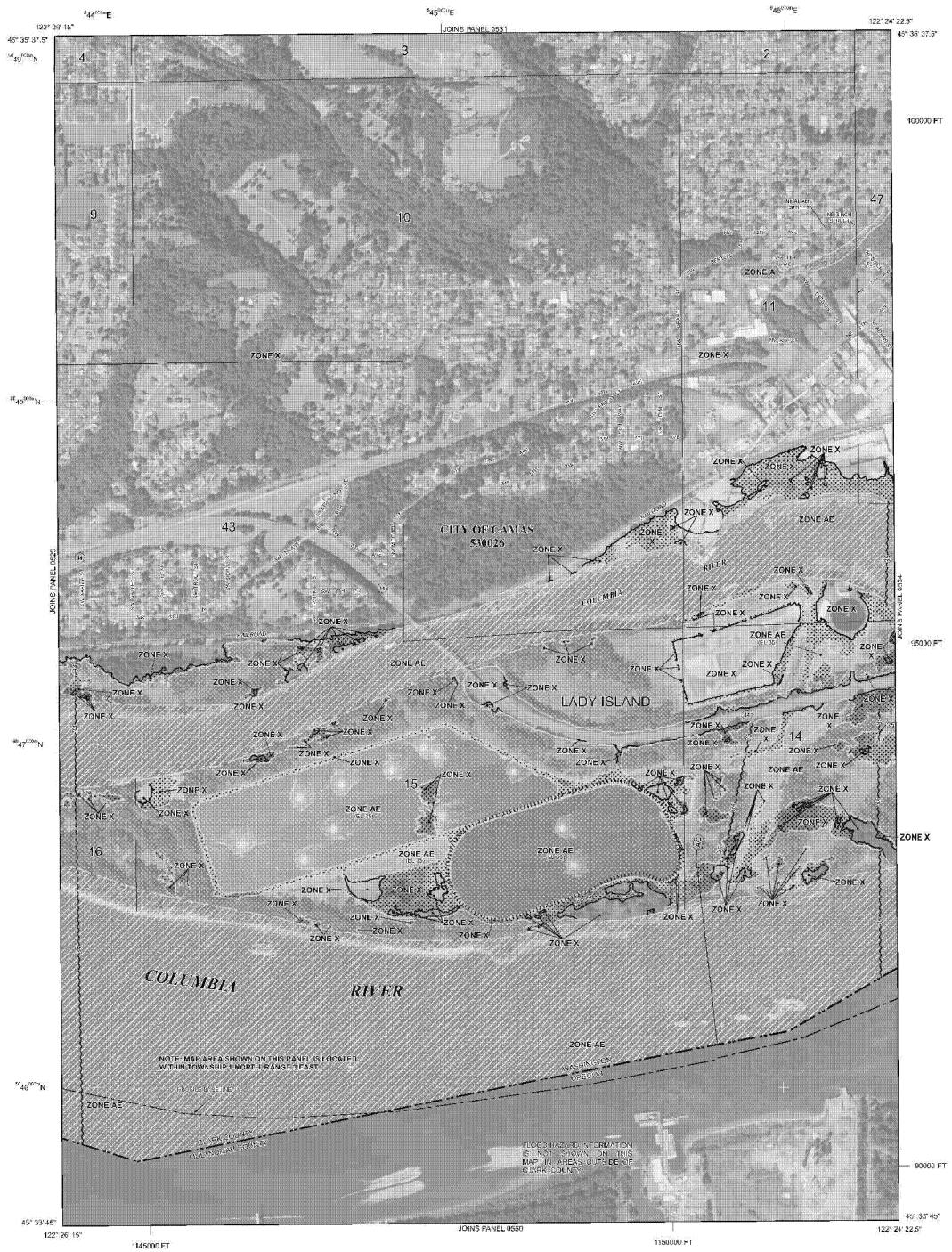
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** No Base Flood Elevations determined.
- **ZONE AE** Base Flood Elevations determined.
- **ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 Base Flood Elevation line and value; elevation in feet*
- (EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A Cross section line
- 23 — 23 Transect line
- 45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 2190000 FT 5000-foot ticks: Washington State Plane South Zone (FIPS Zone 4602), Lambert Conformal Conic projection
- 5000-meter Universal Transverse Mercator grid values, zone 10
- DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
- MAP REPOSITORIES
  Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
  September 5, 2012
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

100 0 150 300 METERS

PANEL 0533D

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 533 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAMAS, CITY OF	530026	0533	D

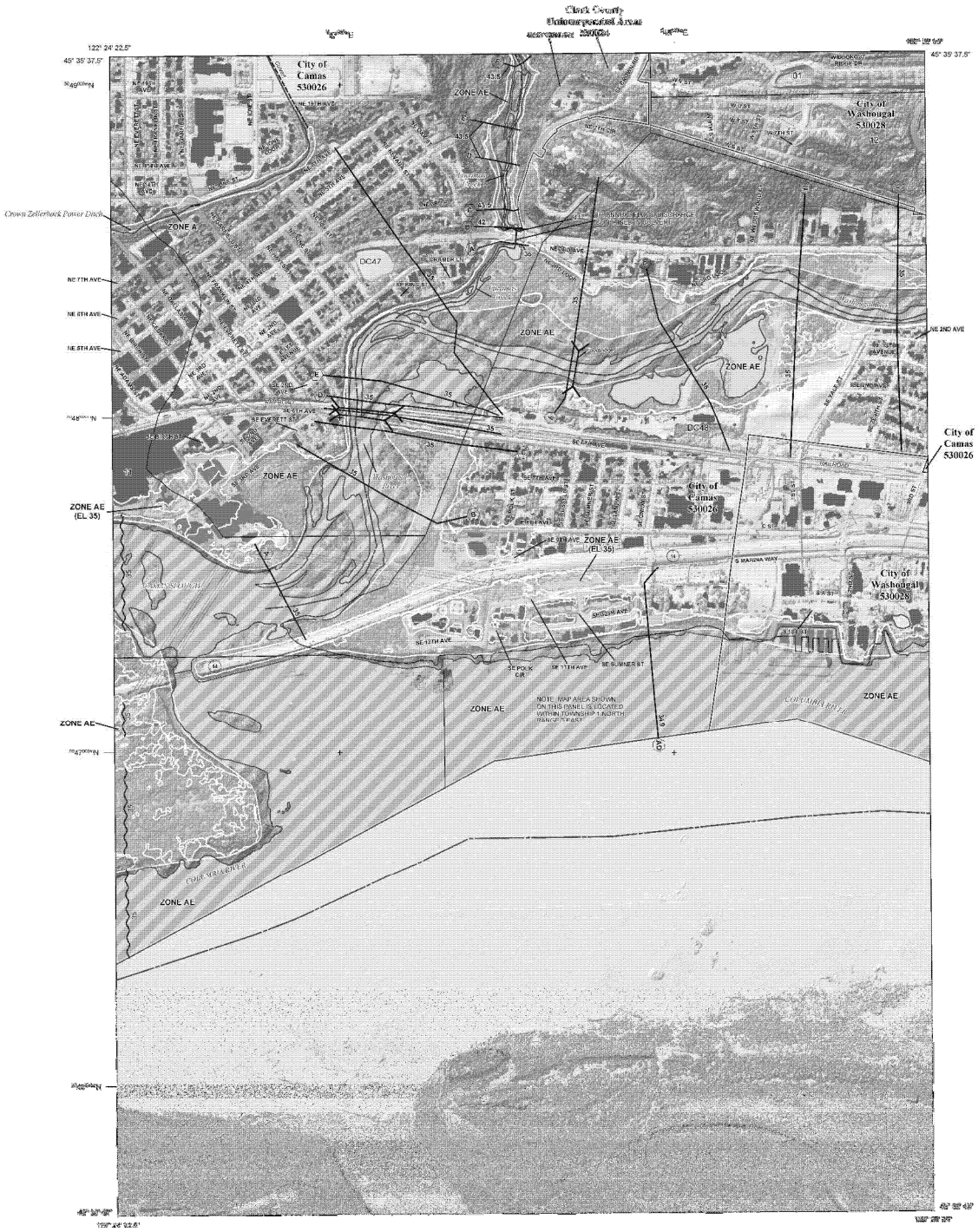
NATIONAL FLOOD INSURANCE PROGRAM

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53011C0533D

EFFECTIVE DATE
SEPTEMBER 5, 2012

Federal Emergency Management Agency



I'LOOO H.A.ZAAD INFORMATION:

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I I O C I J M I - • - - • - - •

Without Base Flood Elevation (BFE)

With BFE or Depth Zone AE, AO, AH, VE, AR

SPECIAL FLOOD HAZARD AREAS

Regulatory Floodway

UIAMuat0h8ffCeRoodHazard,Ale8S

dfl,..JIMI{al ji'ICeftood MJm

MMtlarLoite!OOtf.11\'lfflldt.tritap

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orfIfMklnnlJy

GENWJ.

SIRIJCJURES

Base"AoodlElftationUne(BFE)

FEATURES

JulhlEfletionBdlmdary

NOTHS ID USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from this website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

SCALE

Map Projection:
NAD 1983 L.IM zone 10IN;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

PANEL LOCATOR

0532 0555 Clark County 0533 0534 0553

*PANEL NOT PRINTED)

FEMA

National Flood Insurance Program

NATIONAL FIIIOD IIISUIIAIICE PRIUIIAM
FLOOD INSURANCE RATE MAP

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FEMA

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430

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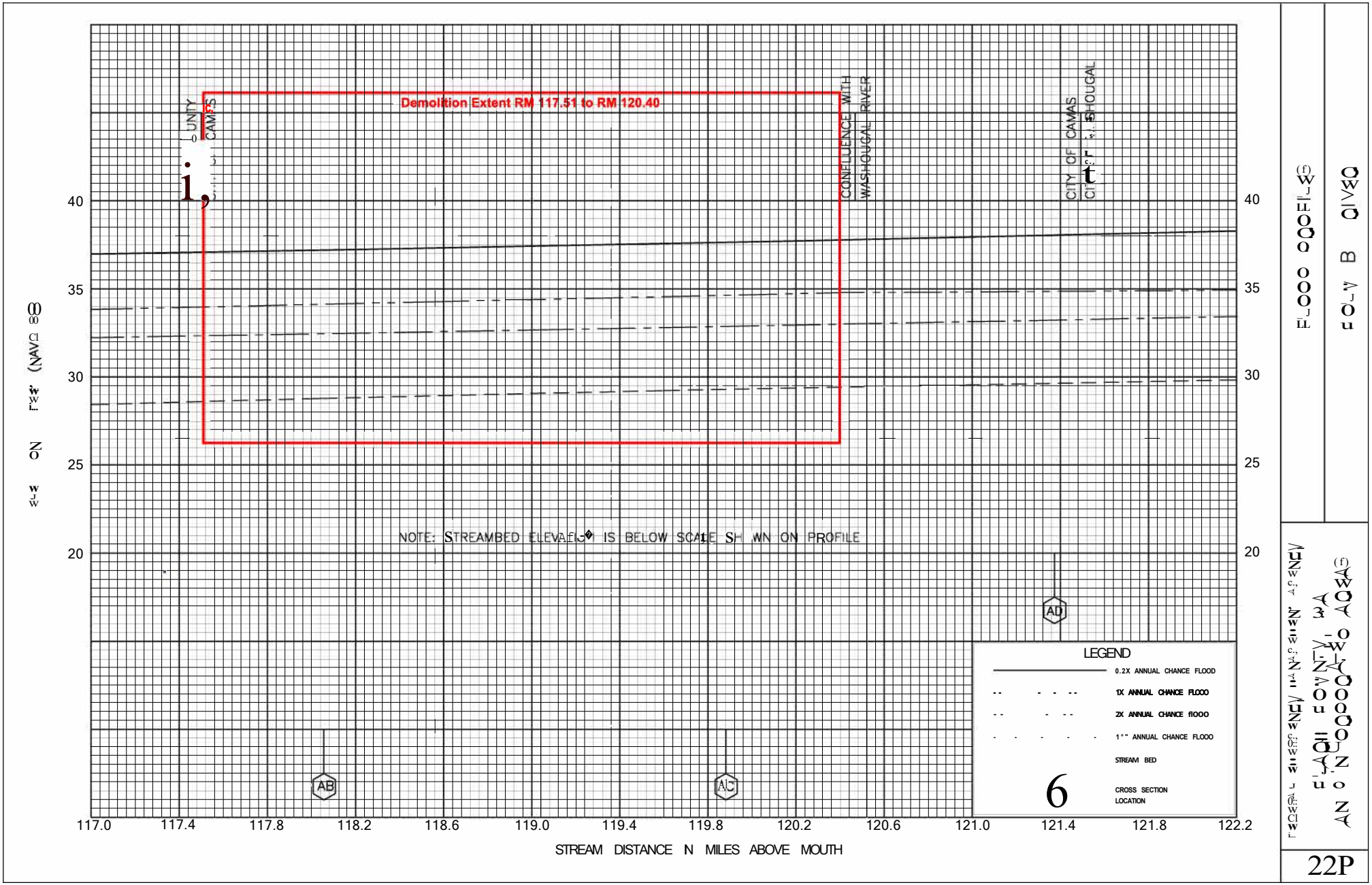

Demolition Extent RM 117.51 to RM 120.40
CONFLUENCE WITH WASHOUGAL RIVER
CITY OF CAMAS
UNITY
CAMAS
NOTE: STREAMBED ELEVATION IS BELOW SCALE SHOWN ON PROFILE
AB
AC
AD
LEGEND
0.2X ANNUAL CHANCE FLOOD
1X ANNUAL CHANCE FLOOD
2X ANNUAL CHANCE FLOOD
100 ANNUAL CHANCE FLOOD
STREAM BED
6
CROSS SECTION LOCATION
117.0
117.4
117.8
118.2
118.6
119.0
119.4
119.8
120.2
120.6
121.0
121.4
121.8
122.2
STREAM DISTANCE IN MILES ABOVE MOUTH
20
25
30
35
40

22P

FLOODING SOURCE		FLOODWAY			1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ.FT.)	MEAN VELOCITY (F. P.S.)	REGULATORY (NAVD88)	WITHOUT FLOODWAY (NAVD88)	WITH FLOODWAY (NAVD88)	INCREASE
COLUMBIA RIVER								
AA	116.10	4,773 / 1,206[2]	178,406	3.2	33.7	33.2	34.1	0.9
AB	118.06	6,731 / 3,745[2]	210,779	2.7	34.2	33.6	34.4	0.8
AC	119.88	2,280 / 1,367[2]	127,035	4.4	34.6	33.9	35.0	0.9
AD	121.37	4,250 / 1, 101[2]	157,277	3.6	34.9	34.3	35.1	0.8
AE	122.86	5,500 / 1,856[2]	189,310	2.9	35.1	34.7	35.5	0.8
AF	123.43	5,700 / 2,039[2]	197,499	2.8	35.3	34.8	35.7	0.9
AG	123.98	5,800 / 2,475[2]	206,916	2.7	35.4	34.8	35.7	0.9
AH	125.53	6,950 / 4, 728[2]	198,505	2.8	35.6	35.1	36.0	0.9
AI	126.58	5,900 / 5,498[2]	173,646	3.2	35.8	35.2	36.1	0.9

!'Istream distance in miles above mouth

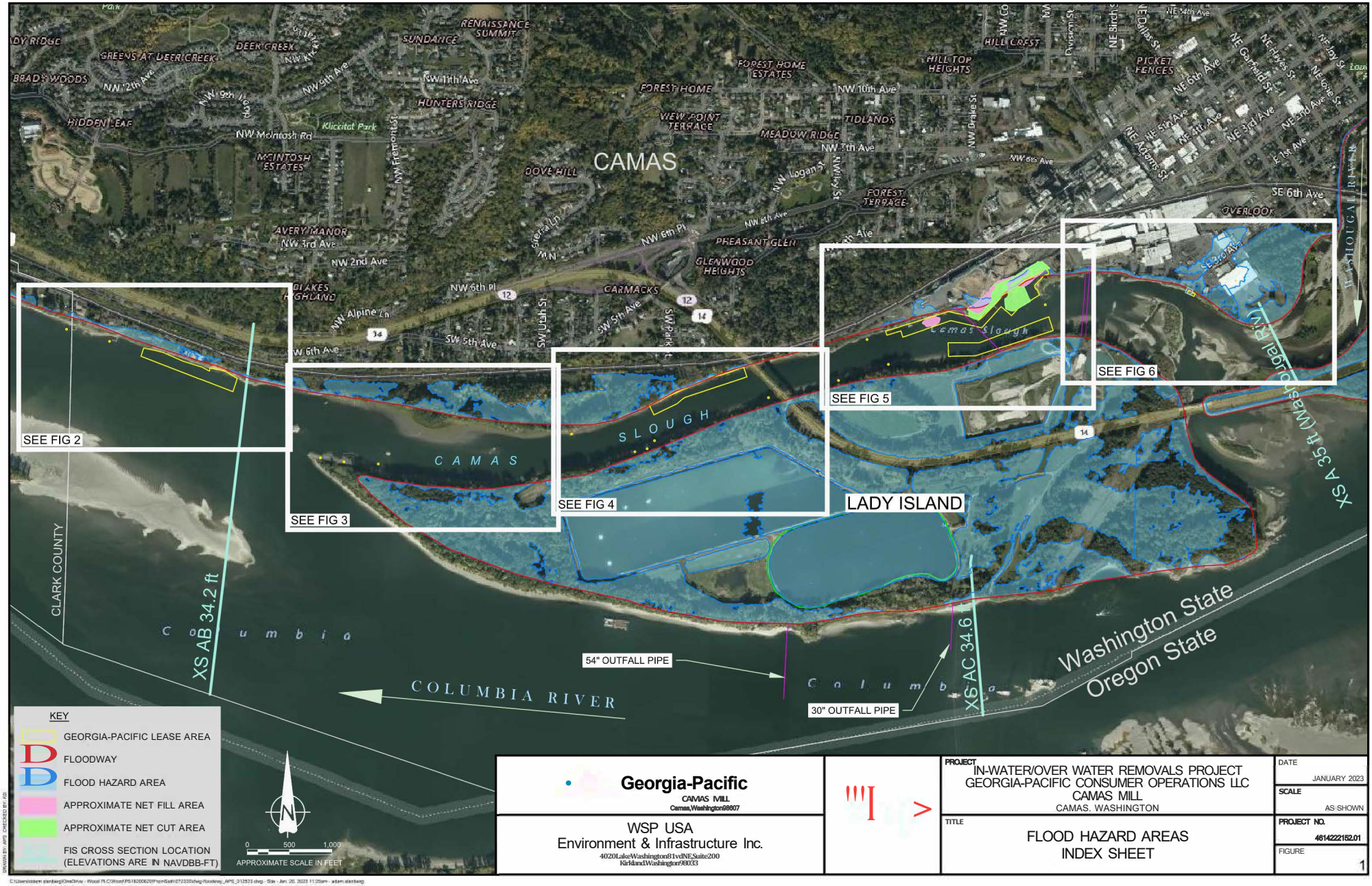
(2)Elevations computed without consideration of backwater from Columbia River

!3IE1evations based on HEC-2 hydraulic model

!4Iwidth/width within county limits

!5Iwidth excluding island/right channel width looking downstream/width of right channel within corporate limits

ATTACHMENT 2:
FLOOD HAZARD AREAS AND PROJECT LOCATIONS



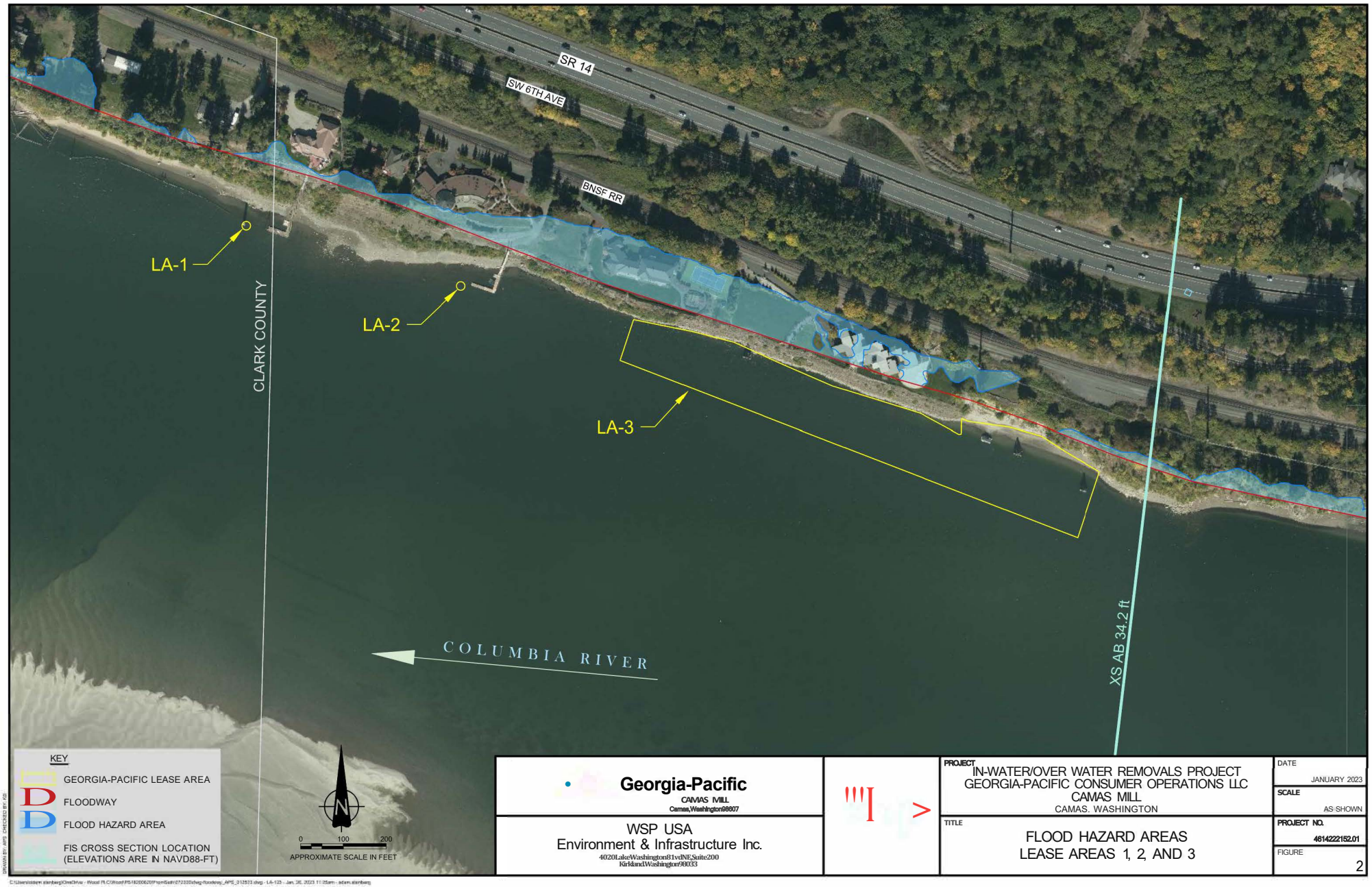
Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

WSP USA
Environment & Infrastructure Inc.
4020 Lake Washington Blvd NE, Suite 200
Kirkland, Washington 98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
INDEX SHEET

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 461422215 2.01
FIGURE: 1



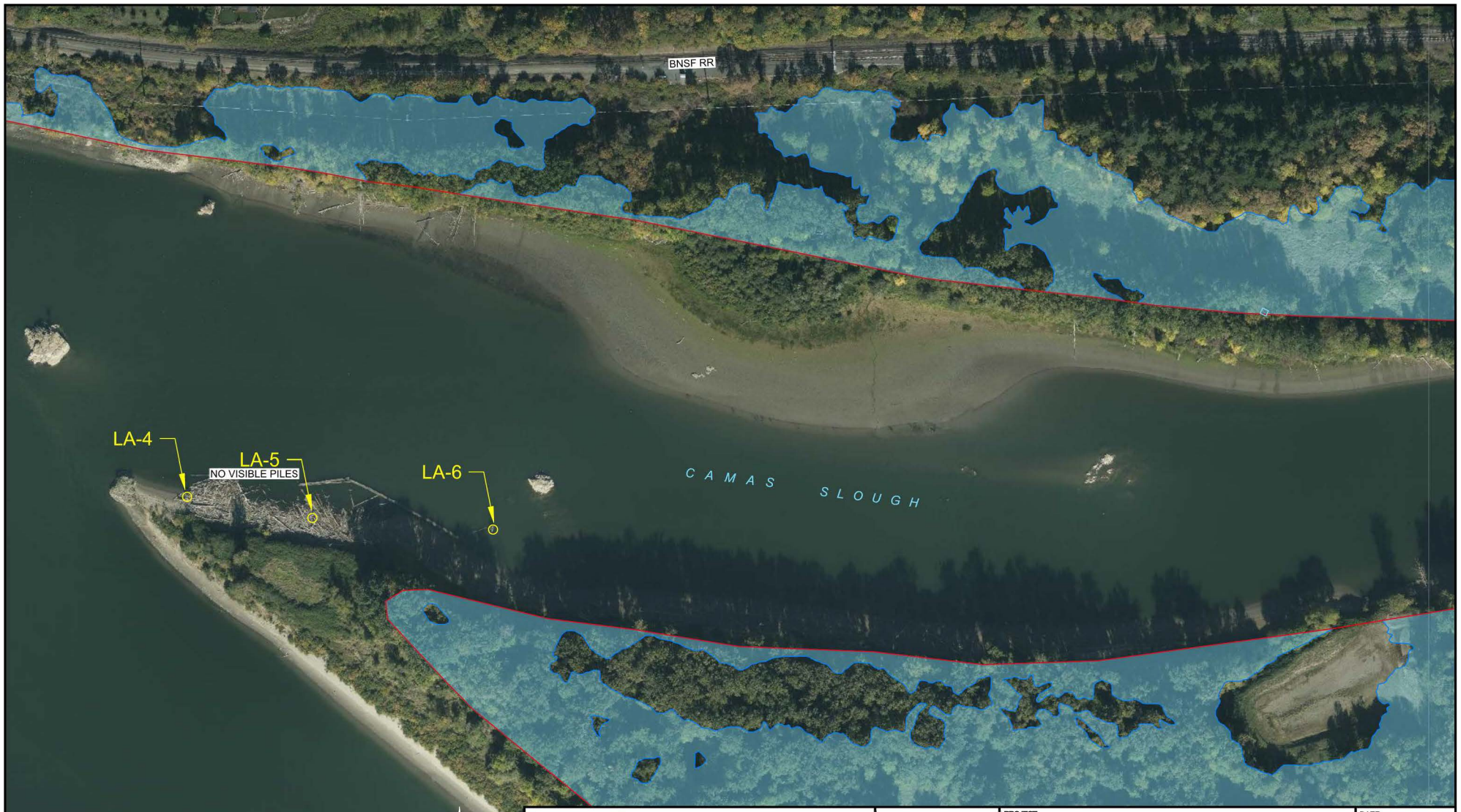
Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

WSP USA
Environment & Infrastructure Inc.
4020 Lake Washington Blvd NE, Suite 200
Kirkland, Washington 98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
LEASE AREAS 1, 2, AND 3

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 4614222152.01
FIGURE: 2



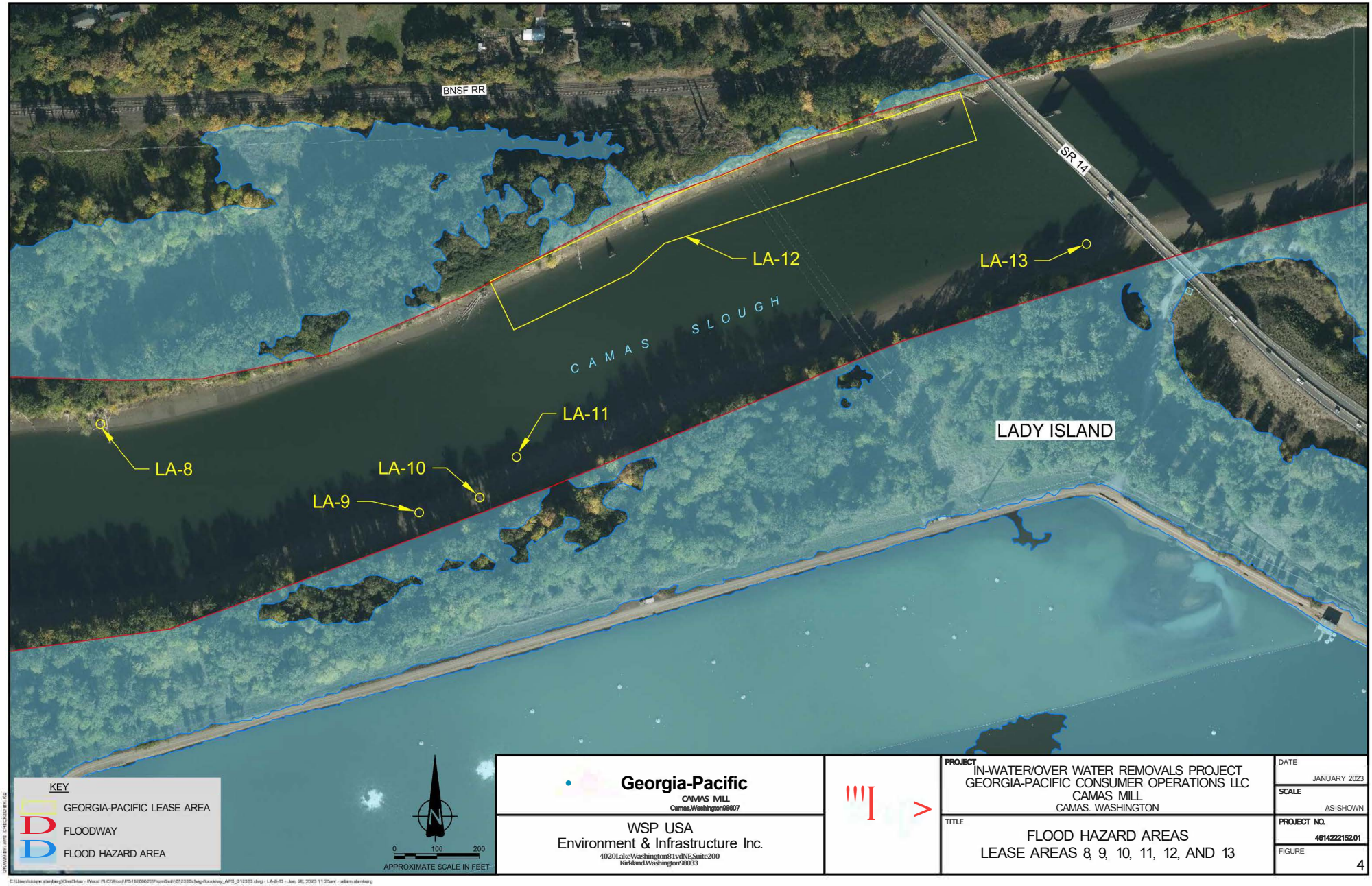
Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

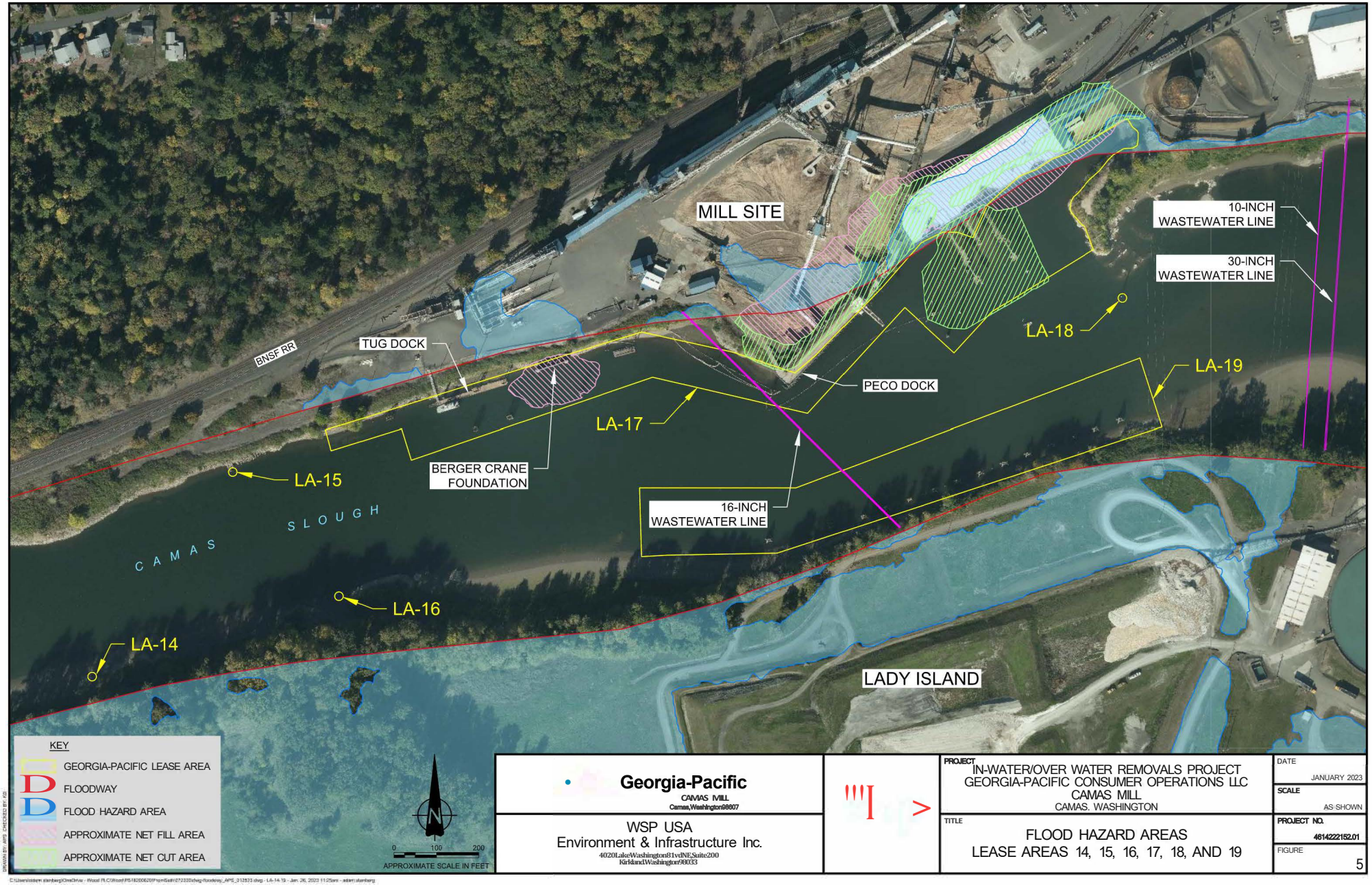
WSP USA
Environment & Infrastructure Inc.
4020 Lake Washington Blvd NE, Suite 200
Kirkland, Washington 98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
LEASE AREAS 4, 5, AND 6

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 4614222152.01
FIGURE: 3


BNSF RR
SR 14
LA-12
LA-13
CAMAS SLOUGH
LA-11
LADY ISLAND
LA-8
LA-10
LA-9
KEY
GEORGIA-PACIFIC LEASE AREA
FLOODWAY
FLOOD HAZARD AREA
N
0
100
200
APPROXIMATE SCALE IN FEET
Georgia-Pacific
CAMAS MILL
Camas, Washington 98607
WSP USA
Environment & Infrastructure Inc.
4020 Lake Washington Blvd NE, Suite 200
Kirkland, Washington 98033
PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS. WASHINGTON
TITLE
FLOOD HAZARD AREAS
LEASE AREAS 8, 9, 10, 11, 12, AND 13
DATE
JANUARY 2023
SCALE
AS SHOWN
PROJECT NO.
4614222152.01
FIGURE
4



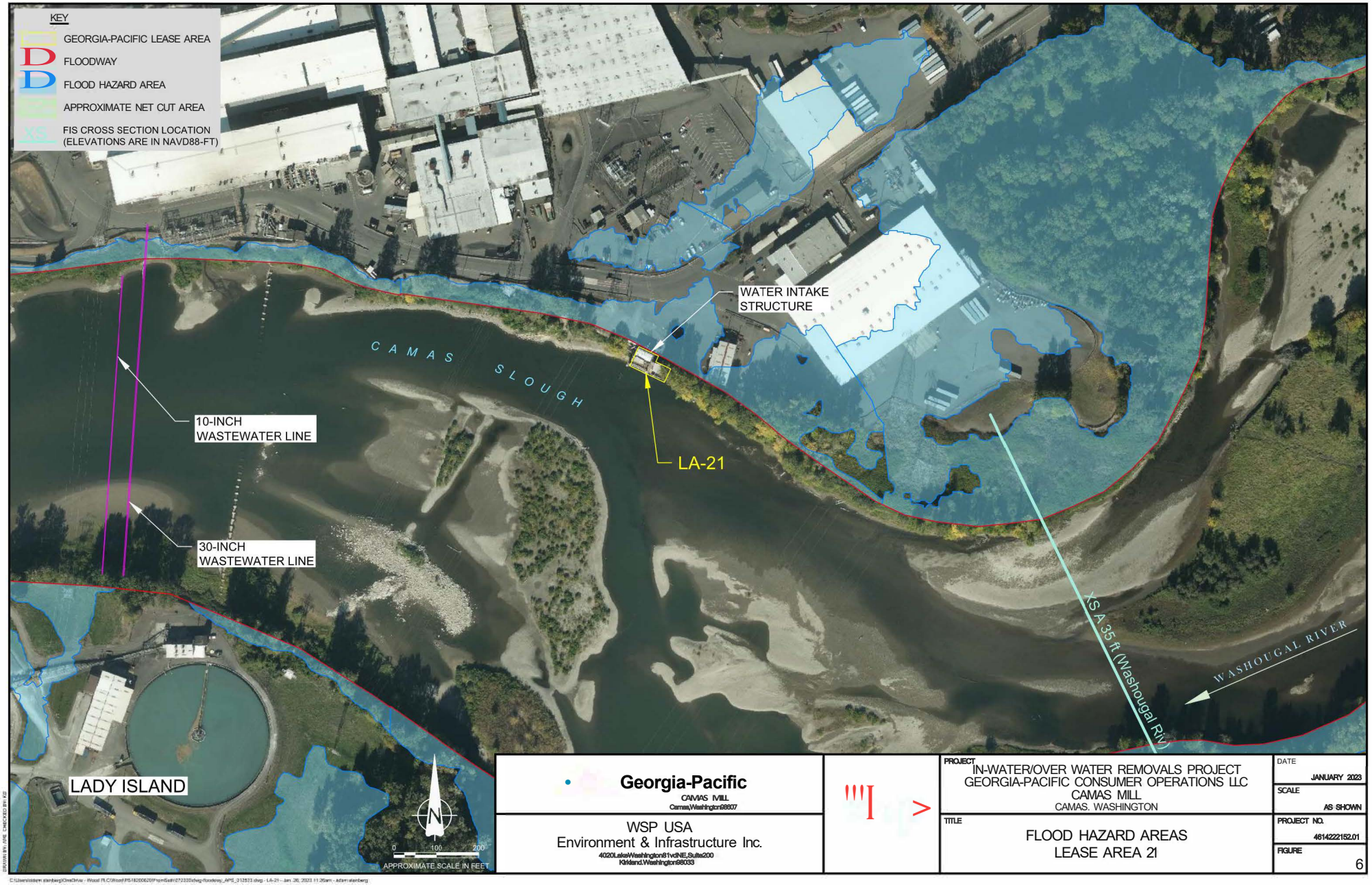
Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

WSP USA
Environment & Infrastructure Inc.
4020 Lake Washington Blvd NE, Suite 200
Kirkland, Washington 98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
LEASE AREAS 14, 15, 16, 17, 18, AND 19

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 461422152.01
FIGURE: 5



Georgia-Pacific
CAMAS MILL
Camas,Washington98607

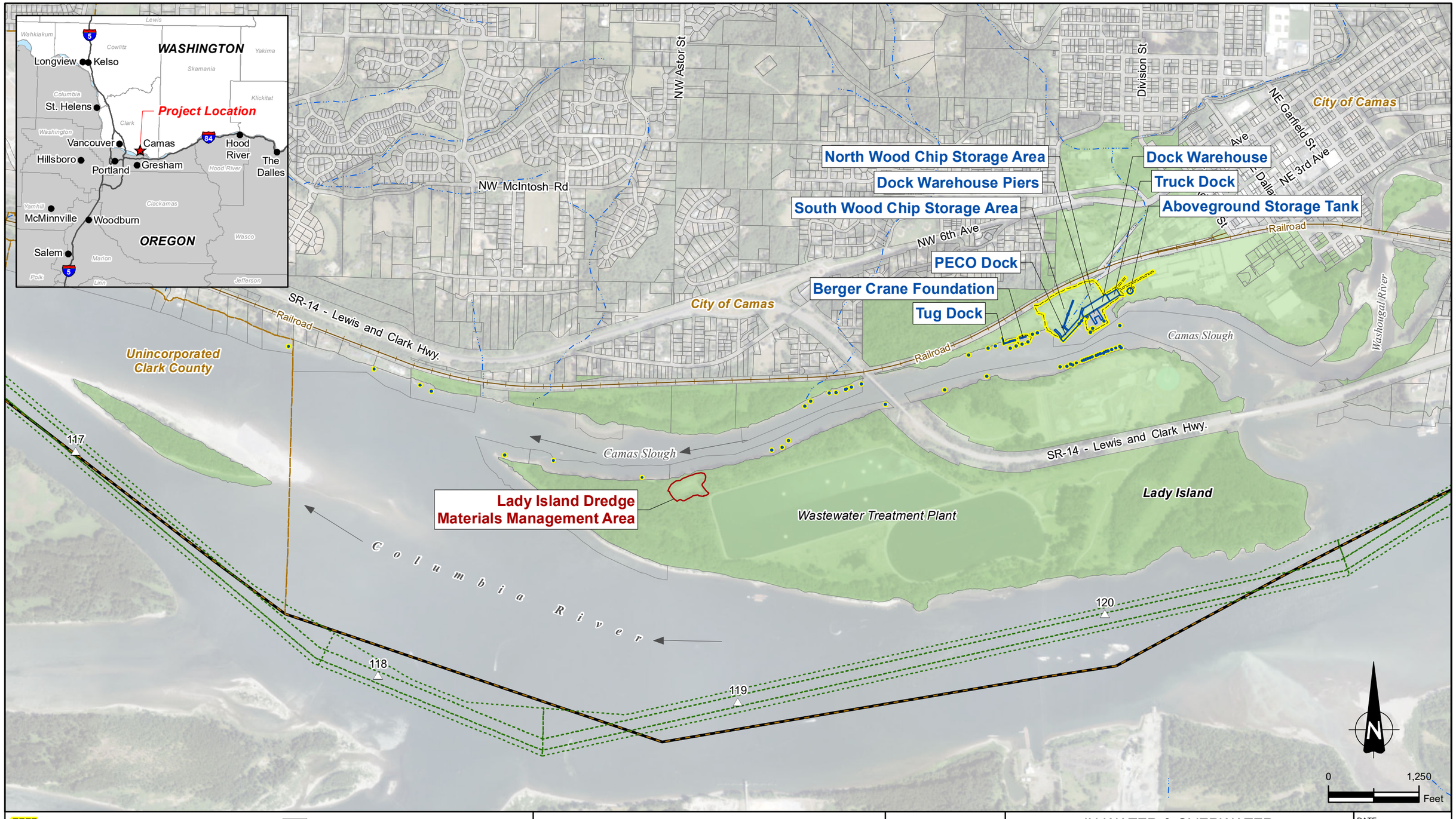
WSP USA
Environment & Infrastructure Inc.
4020LakeWashington81vdNE,Suite200
Kirkland,Washington98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
LEASE AREA 21

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 4614222152.01
FIGURE: 6

ATTACHMENT 3:
DEMO PLAN SHEETS



Project Limits	Tax Lot
Columbia River Mile Marker	Tax Lot Owned by Georgia-Pacific
Stream/River	City Boundary
Structure To Be Removed	County Boundary
Dolphin To Be Removed	Federal Navigation Channel
Lady Island Dredge Materials Management Area	

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

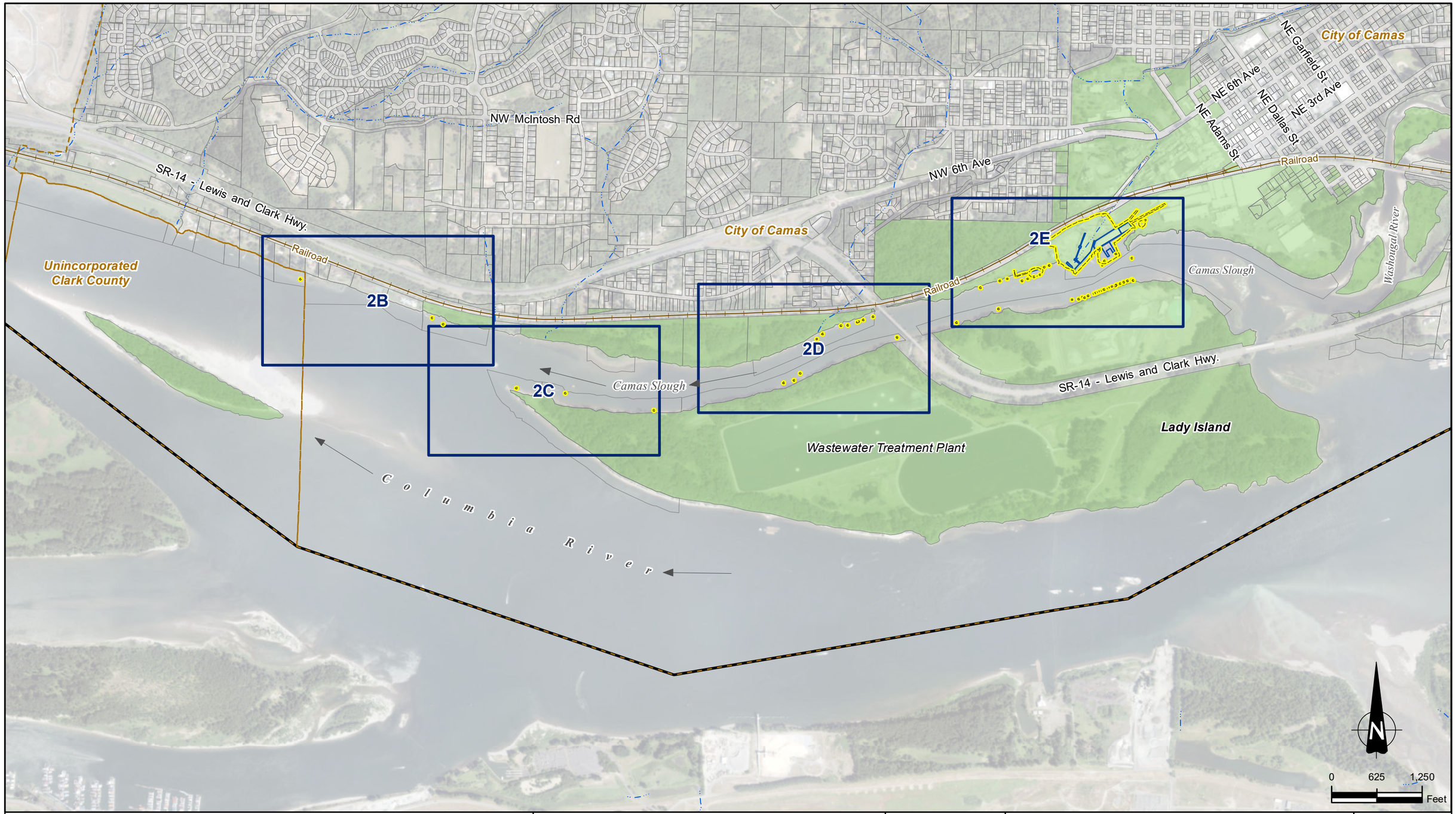
TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

PROJECT LOCATION

DATE: OCTOBER 2022
SCALE: 1 " = 1,250 '
PROJECT NO.
FIGURE: 441

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 1 - Project Location.mxd - sierra.marrs - 10/19/2022 - 3:37:33 PM



Project Limits
Structure To Be Removed
Dolphin To Be Removed
Stream/River
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary
County Boundary

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP
OVERVIEW

DATE
OCTOBER 2022

SCALE
1 " = 1,250 '

PROJECT NO.

FIGURE
442

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2A - Study Area Map - Overview.mxd - sierra.marrs - 10/19/2022 - 3:36:05 PM

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE
OCTOBER 2022

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
443

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2B-2E - Study Area Map - Mapbook.mxd - sierra.marrs - 10/19/2022 - 3:36:17 PM

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE
OCTOBER 2022

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
444

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2B-2E - Study Area Map - Mapbook.mxd - sierra.marrs - 10/19/2022 - 3:36:20 PM

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

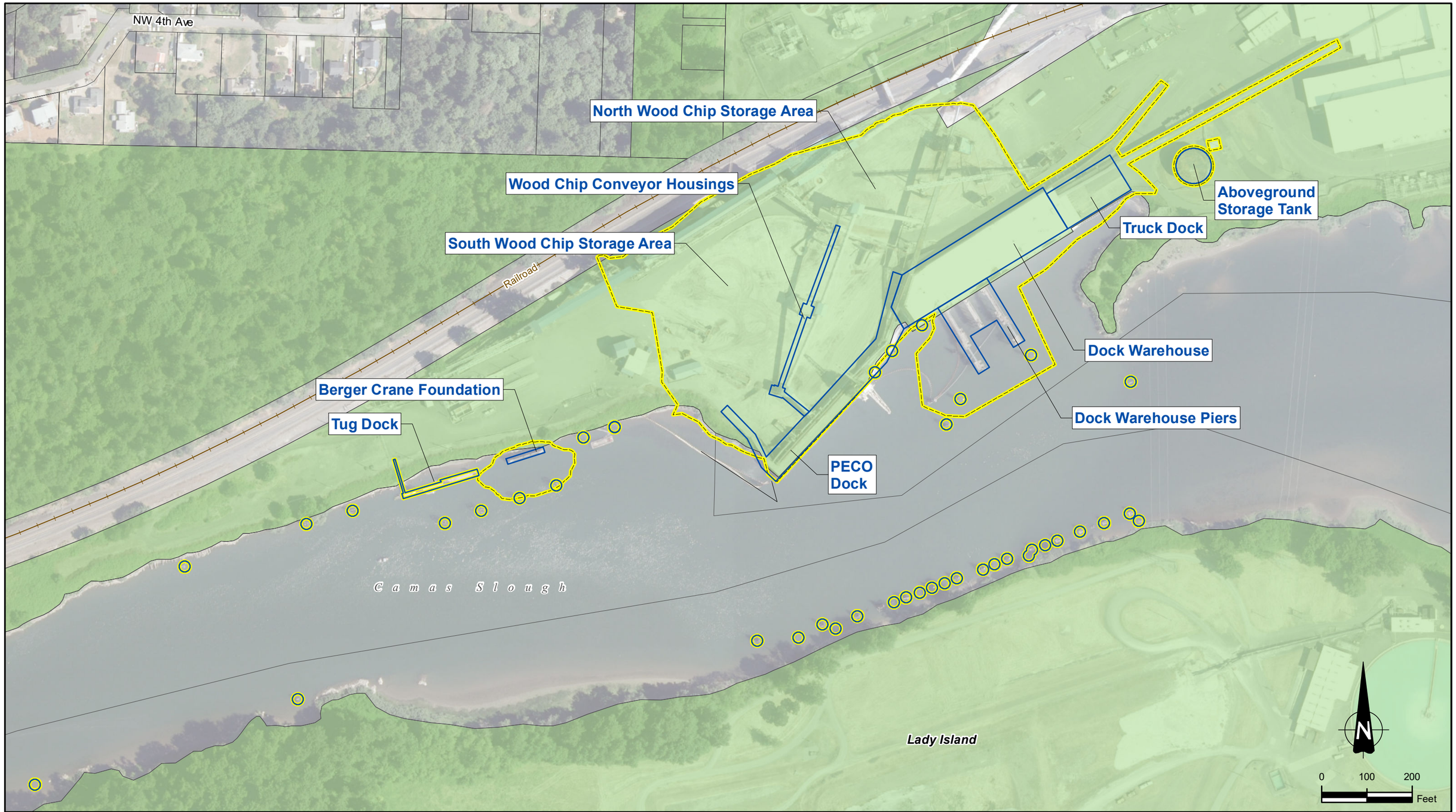
DATE
OCTOBER 2022

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
445

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2B-2E - Study Area Map - Mapbook.mxd - sierra.marrs - 10/19/2022 - 3:36:23 PM



Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

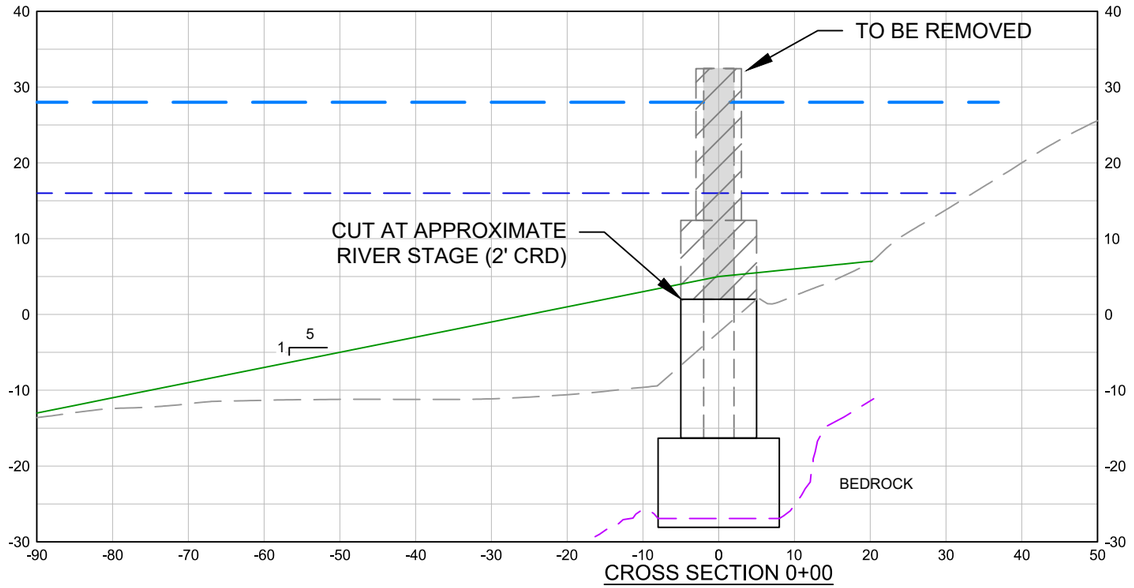
DATE
OCTOBER 2022

SCALE
1 " = 200 '

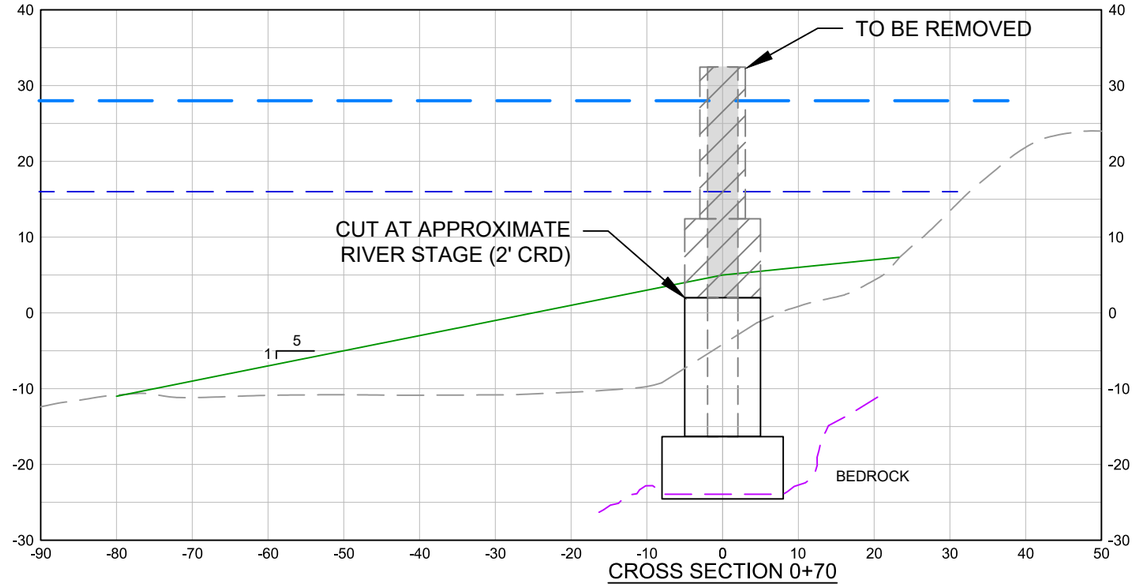
PROJECT NO.

FIGURE
446

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2B-2E - Study Area Map - Mapbook.mxd - sierra.marrs - 10/19/2022 - 3:36:26 PM



CROSS SECTION 0+00



CROSS SECTION 0+70

Depth Thickness Table in Ft		
MIN	MAX	Color
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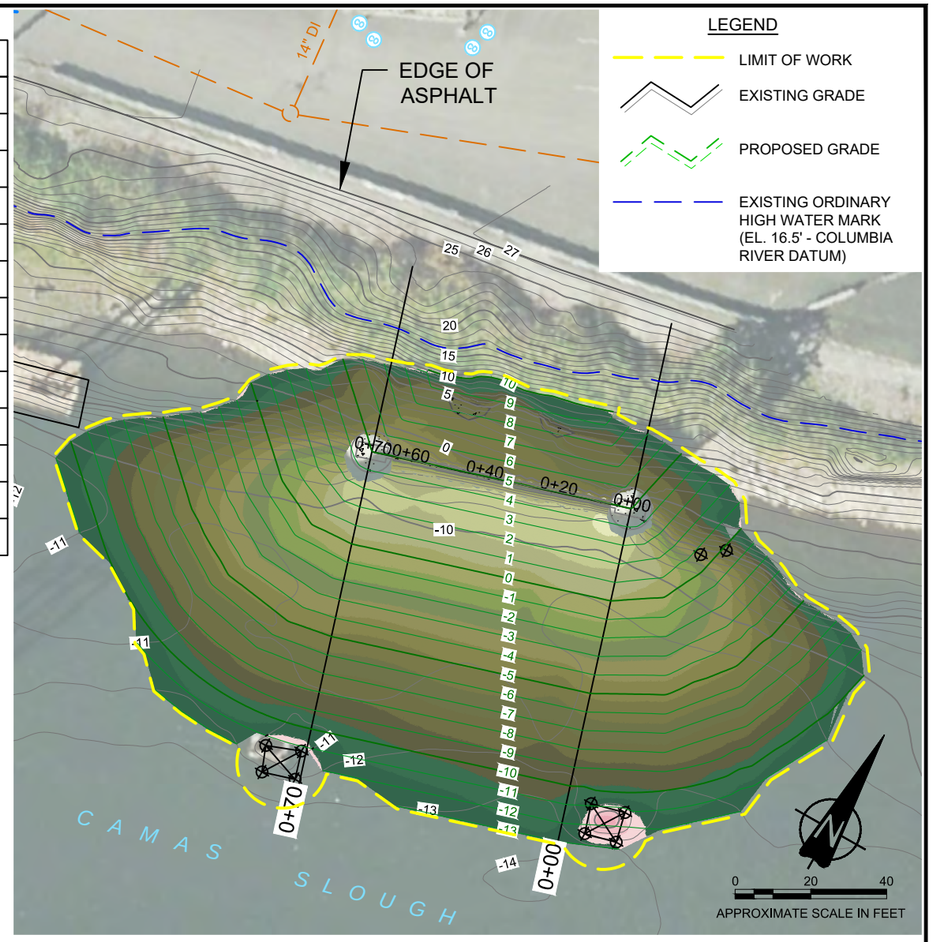
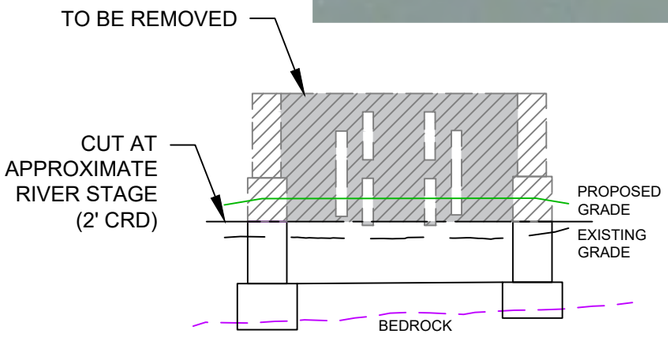
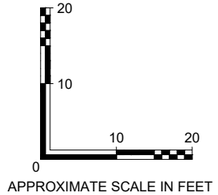
+1	+2	
+2	+3	
+3	+4	
+4	+5	
+5	+6	
+6	+7	
+7	+8	
+8	+9	
+9	+10	
+10	+11	
+11	+12	

3,500 c□ FILL





BERGER CRANE FOUNDATION PHOTO



APPROXIMATE SCALE IN FEET

CROSS SECTION LEGEND

- ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING GRADE
- PROPOSED FINAL GRADE

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE: OCTOBER 2022
			SCALE: AS SHOWN
Tetra Tech		GRADING PLAN BERGER CRANE FOUNDATION	PROJECT NO.
			FIGURE 447

LEGEND

LIMIT OF WORK

EXISTING GRADE

PROPOSED GRADE

EXISTING ORDINARY HIGH WATER MARK
(EL. 16.5' - COLUMBIA RIVER DATUM)

UTILITY LEGEND

GRIT SUMP COLLECTION

KEY

FILL = 3,500 CY

BERGER CRANE
FOUNDATION

GANGWAY

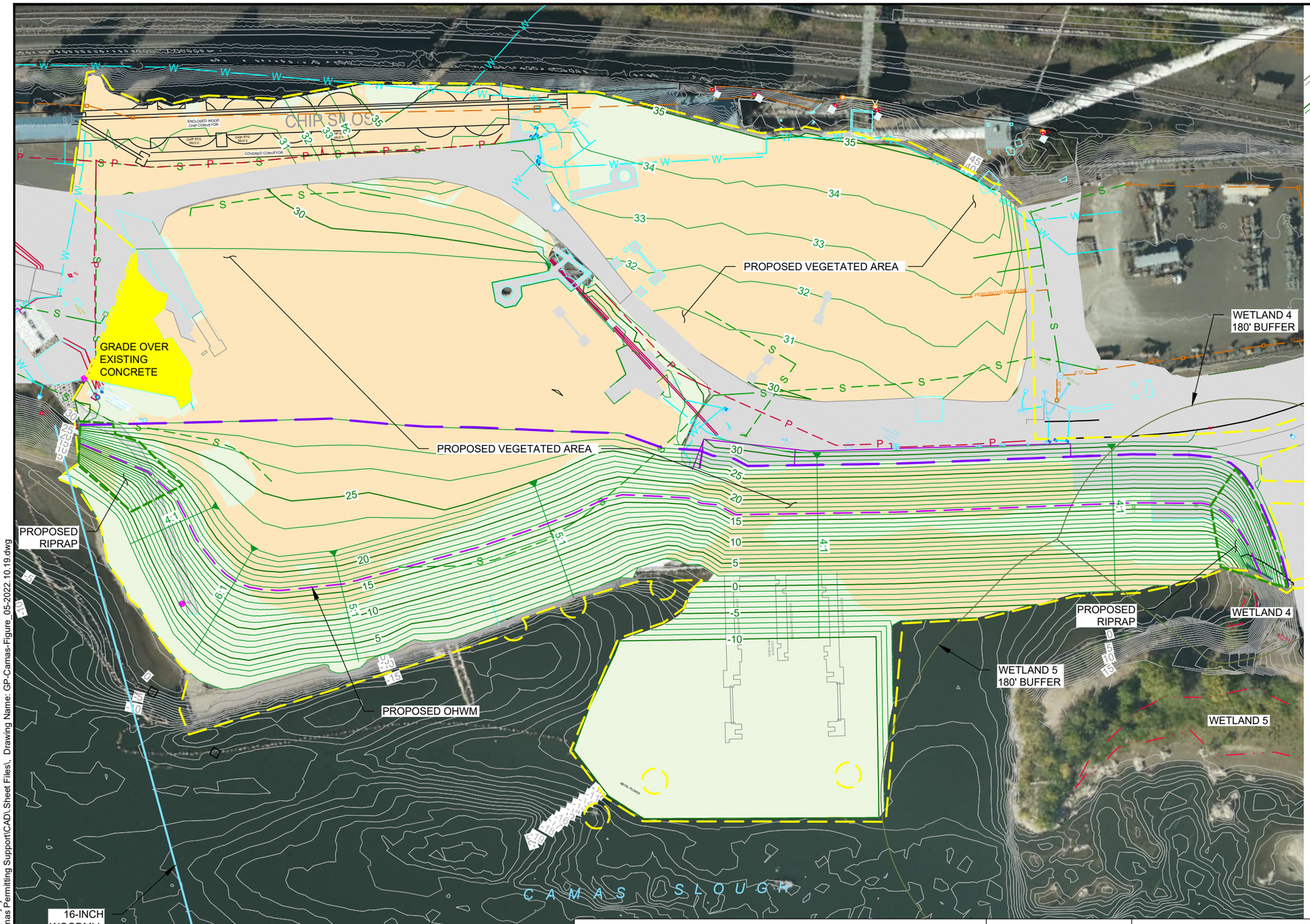
TUG DOCK

N

0 20 40

APPROXIMATE SCALE IN FEET

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE OCTOBER 2022
Tetra Tech		BERGER CRANE FOUNDATION RIVER BOTTOM RESTORATION	SCALE AS SHOWN PROJECT NO. FIGURE 448



LEGEND

- LIMIT OF WORK
- EXISTING GRADE CONTOURS (SITEWIDE LAND SURVEYING 7/07/20)
- PROPOSED FINAL GRADE CONTOURS
- PROPOSED ORDINARY HIGH WATER MARK (OHWM) (EL. 16.5' - COLUMBIA RIVER DATUM)
- PROPOSED 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING WETLAND

UTILITY LEGEND

- FIRE MAIN
- W — WATER
- S — PROCESS SEWER
- GRIT SUMP COLLECTION
- OL — OVERHEAD POWER LINE
- P — UNDERGROUND POWER LINE
- NATURAL GAS

EARTHWORK QUANTITIES

NORTH WOOD CHIP AREA:
130,730 SF (3.00 ACRE)
- CUT = 5,678 CY
- FILL = 32,943 CY

SOUTH WOOD CHIP AREA, PECO DOCK, WAREHOUSE, AND PIERS:
340,088 SF (7.81 ACRE)
- CUT = 32,676 CY
- FILL = 20,788 CY

DRAFT

0 50 100
APPROXIMATE SCALE IN FEET

CLIENT
Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

TETRA TECH
www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

GRADING PLAN - PECO DOCK, DOCK WAREHOUSE, AND DOCK WAREHOUSE PIERS

DATE 10/19/22
SCALE AS SHOWN
PROJECT No. 194-0117
FIGURE 449

Plot Date: 10/19/22 - 5:03pm, Plotted by: joel.cameron
Drawing Path: P:\194-0117-0064 Camas Permitting Support\CAD\ Sheet Files\, Drawing Name: GP-Camas-Figure_05-2022.10.19.dwg

NO-RISE REPORT FOR REMOVAL OF STRUCTURES ALONG CAMAS SLOUGH

IN-WATER AND OVERWATER REMOVALS PROJECT
CAMAS MILL, CAMAS, WASHINGTON

Prepared for:

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Camas, Washington

FEBRUARY 23, 2023

NO-RISE REPORT FOR REMOVAL OF STRUCTURES ALONG CAMAS SLOUGH

IN-WATER AND OVERWATER REMOVALS PROJECT CAMAS MILL, CAMAS, WASHINGTON

Prepared for:

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Environmental Manager
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Camas, WA 98607

Prepared by:

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503-639-3400

February 23, 2023

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ENGINEERING CERTIFICATION

NO-RISE REPORT FOR REMOVAL OF STRUCTURES ALONG CAMAS SLOUGH

IN-WATER AND OVERWATER REMOVALS PROJECT

CAMAS MILL, CAMAS, WASHINGTON
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

February 23, 2023

I certify that I am a duly qualified registered professional engineer licensed to practice in the State of Washington. The attached report supports the finding that the proposed demolition of piles and other structures and associated changes to ground surface along Camas Slough, a side channel of the Columbia River, as proposed by Georgia-Pacific Consumer Operations LLC (GP), if constructed in substantial accordance with the horizontal and vertical alignments shown on the design drawings dated November 2, 2022 July, prepared by Tetra Tech, Inc., will not increase the 100-year regulatory flood elevations on Camas Slough, and thus on the Washougal River or Columbia River. The Flood Insurance Study (FIS) for Clark County, Washington, by the Federal Emergency Management Agency (FEMA) maps Camas Slough as a detail-study area with regulatory floodway and base flood elevations; however, those were interpolations from the Columbia River main channel. Camas Slough was not studied in detail for the FIS. The FIS was dated January 19, 2018, with some maps dated September 5, 2012. This report dated January 30, 2023, supports this finding. In addition to this report, its attachments, and referenced documents, a hydraulic model and work map files were provided in support of these findings.

This certification was prepared exclusively for GP by WSP. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in WSP services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This No-Rise Certification is intended to be used by GP for this demolition project only, subject to the terms and conditions of its contract with WSP. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

While this report was prepared in accordance with standard engineering practice by qualified engineering professionals, GP should understand that this report evaluated a specific storm recurrence interval and assumes free-flowing hydraulic conditions. It is reasonable to assume that a storm event of greater magnitude or that changes in waterway conveyance capacity might cause higher stages than estimated for this assignment.

Engineering Certification by:

WSP USA Environment & Infrastructure Inc.

Seth Jelen, PE, CFM
Principal Engineer—Water Resources
E-mail: seth.jelen@wsp.com

Project Review by:

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TABLE OF CONTENTS

1 Introduction 1
2 Background 1
2.1 Regulatory Floodplain Mapping 1
2.2 Project Description 2
2.3 Study Approach 3
2.3.1 Previously Existing Models 3
2.3.2 Overview of Modeling Approach 3
2.4 Vertical Datum 4
3 Existing Base Flood Elevation Analysis 4
4 Proposed Flood Elevation Analysis 6
5 Conclusion and Finding of No-Rise 7
6 Limitations 10
7 References 10

LIST OF TABLES

Table 1. No-Rise Analysis for Camas Slough Model 8
Table 2. No-Rise Analysis for Washougal River-Camas Slough Model 9

LIST OF FIGURES

Figure 1. Study Area Map
Figure 2. Schematic of Hydraulic Model Cross-Sections
Figure 3. Model Cross-Section of East Bridge: SR 14/27 N-S (ID 12168)
Figure 4. Model Cross-Section of West Bridge: SR 14/25 (ID 6428)
Figure 5. Model Cross-Section with Pile Areas (ID 8982)
Figure 6. Model Cross-Section at PECO dock and Mill Site Buildings (ID 9198)
Figure 7. Model Cross-Section with Dolphin (ID 7220)
Figure 8. Model Cross-Section with Horizontal Obstruction (ID 1589)
Figure 9. Profiles of Multiple Flows Finding 35,000 cfs Base Flow
Figure 10. Model Cross-Section with Cut/Fill Changes (ID 9099)

LIST OF APPENDICES

Appendix A Proposed Demolition Plans Dated November 2, 2022
Appendix B FEMA Flood Insurance Study (FIS) Information
Appendix C Model Output Tables
Appendix D Existing-Condition Data for Camas Slough Model
Appendix E Existing-Condition Data for Washougal River with Camas Slough Model
Appendix F Proposed-Condition Cross-Section Data for Both Models

LIST OF ACRONYMS

BFE	Base Flood Elevation (100-year flood)
cfs	cubic feet per second
CRD	Columbia River Datum
DNR	Washington Department of Natural Resources
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map (part of FEMA FIS)
FIS	Flood Insurance Study (by FEMA)
GP	Georgia-Pacific Consumer Operations LLC
LA	lease area
NAVD88	North American Vertical Datum of 1988
NOAA	National Oceanic and Atmospheric Administration
SFHA	Special Flood Hazard Area
SR	State Route
USACE	U.S. Army Corps of Engineers
WS	water surface

1 INTRODUCTION

Georgia-Pacific Consumer Operations LLC (GP) plans to abate and demolish structures located in-water and/or overwater at the Camas Mill along the Columbia River and Camas Slough in the City of Camas and unincorporated Clark County, Washington. The demolition will result in small areas of net cut and fill within the Camas Slough, a side channel of the Columbia River. This no-rise report and certification documents that the project will meet the requirements of the City of Camas Code 16.57 E 1:

> *Development in Floodways. New Development Requires Certification by an Engineer. Encroachments, including new construction, substantial improvements, fill, and other development, are prohibited within designated floodways unless certified by a registered professional engineer. Such certification shall demonstrate through hydrologic and hydraulic analyses, performed in accordance with standard engineering practice that the proposed encroachment will not result in any increase in flood levels during the occurrence of the base flood discharge. ...*

The requirement for this study and certification was triggered because fill is being placed in areas inside the regulatory floodway. Other than these small areas of fill, the proposed project consists entirely of demolition and removal of existing man-made encroachments consisting of piles, piers, dolphins, and structures that would not require a study.

The finding presented herein is based on a hydrologic and hydraulic study of Camas Slough that compared existing to proposed conditions and found no rise in 100-year flood elevations. This study included preparation of a hydraulic model, which should be submitted to the City along with this report.

A detailed hydraulic model for existing conditions was prepared for the full length of Camas Slough using 69 cross-sections to model base flood elevations. Encroachment by fields of piles and by other structures were modeled as increases in channel roughness and as solid obstructions to flow, respectively. The Federal Emergency Management Agency (FEMA) profile for the Columbia River was used for the downstream and upstream base flood elevations (BFEs, commonly called 100-year flood elevations), and the flow in the slough was set so the upstream modeled elevation was an acceptable match to the FEMA profile.

The model of proposed conditions (following demolition) for Camas Slough removed these encroachments and updated the ground elevations of those cross-sections where cut or fill would occur. The model was otherwise unchanged, with the same flow and the same cross-section locations. Comparison of BFEs between the two models for existing conditions versus proposed conditions showed that BFEs would either drop or stay unchanged but not rise.

The existing conditions and proposed conditions models were revised to find that the no-rise finding also would apply to the Washougal River, which flows into the slough near its upstream end. Four upstream cross-sections on the slough near the State Route (SR) 14 bridge were replaced with three cross-sections on the Washougal River. The FEMA base flow for the Washougal River at its mouth was used, and the downstream flood elevation was set to the 10-year FEMA profile on the Columbia River. Comparison showed that BFEs on the Washougal River would also either drop or stay unchanged but not rise.

2 BACKGROUND

The following sections describe the study approach, project activity, and its context within regulatory flood mapping. **Appendix A** presents site plans for the proposed demolition in relation to key regulatory flood mapping information followed by proposed demolition plans from GP dated November 2, 2022.

2.1 REGULATORY FLOODPLAIN MAPPING

The area of proposed activity lies in the Special Flood Hazard Area (SFHA) and floodway on the north bank of the Columbia River including Camas Slough, which is treated as part of the Columbia River in the FEMA Flood

Insurance Study (FIS). This reach has been studied in detail by the FEMA as part of the FIS for Clark County, Washington, and Incorporated Areas dated June 19, 2018 (FEMA, 2018) and the accompanying Flood Insurance Rate Maps (FIRMs).

The proposed demolitions would be in an area that lies in FIRM Panels 529 (downstream of Lady Island), 533 (most of the island and Camas Slough), and 534 (the eastern portion of Lady Island and areas upstream) published by FEMA dated effective September 5, 2012 (panels 529 and 533), and January 19, 2018 (panel 534).

The area includes the north bank of the Columbia River and both banks of Camas Slough upstream of FEMA cross-section "AB" (BFE 34.2 feet relative to the North American Vertical Datum of 1988 [NAVD88]), downstream of section "AD" (34.9 feet NAVD88) and including section "AC" (34.6 feet NAVD88, for the Columbia River not Camas Slough).

All structures to be removed are in the City of Camas (FEMA community ID 530026) except for one dolphin that is located about 2,200 feet downstream of section "AB" and 65 feet downstream of the city-county boundary, and just inside the jurisdiction of unincorporated Clark County (community ID 530024). A separate certification of no-rise is being made to Clark County for this single dolphin.

The cross-section labels and BFEs are from the FEMA national flood hazard map layer (accessed July 2020) and the FEMA Flood Insurance Study report (two volumes, dated effective January 19, 2018).

Appendix B includes the following information from the FIS:

- FIRM panels 529, 533, and 534; the proposed activities begin at the city boundary near river mile 117.5 (measured at the profile baseline near the river centerline) and extend upstream to about river mile 120.4;
- Floodway Data Table (FIS Report Table 9) highlighting lettered cross-sections AB through AD, which include the reach of the proposed activities;
- Flood Profile 22P of the Columbia River from river mile 117.0 to 122.2, which encompasses the reach of the proposed activity;
- FEMA map cross-sections AB, AC, and AD on the Columbia River; and
- Table of flood flows (peak discharges) showing the base flood flow for the Washougal River at its mouth (FIS Table 6).

The site plans in **Appendix A** present the proposed demolition along with this same information from the FIS for reference, followed by demolition plans from GP dated November 2, 2022. Areas of net cut and net fill are also shown (**Appendix A, Figure 5**).

2.2 PROJECT DESCRIPTION

GP is planning to remove and/or demolish several structures associated with GP's prior operations at the Camas Mill in the City of Camas, Washington. The structures to be removed are located in-water and/or overwater on the Columbia River and Camas Slough and are located within the City of Camas or Clark County Shoreline Management Zones. The structures to be removed and/or demolished are no longer supporting GP operations.

The structures to be removed include approximately 3,000 piles and dolphins, one building-like industrial structure, five docks/piers including the Tug Dock, an aboveground storage tank and its pumps, and a conveyor housing. Where piles, dolphins, and structures are to be removed, the riverbank will not be changed, except at two locations:

- In the area of the PECO Dock, the bank will be graded back to a more gradual slope than currently existing.
- At the large concrete foundation of the former Berger Crane, the concrete will be removed to well below water surface, and the riverbank will be regraded to bury the remaining obstruction, resulting in net fill in the floodway.

The drawings in **Appendix A** show in detail the locations of the structures to be removed in relation to the SFHA, the floodway boundary, lettered FIS cross-sections AB and AC, and cross-section locations from the hydraulic model developed for this study. These are followed by demolition plans from GP dated November 2, 2022.

No development or fill will occur in the Columbia River, and almost no ground elevations will change in the channel and floodplain (SFHA) of Camas Slough, except small areas of net fill (and other areas of net cut) will occur within the floodway mapped for Camas Slough and result from the demolition. This fill triggers the requirement that this no-rise certification and hydrologic and hydraulic analysis be completed for Camas Slough.

The project footprint extends along approximately 3 miles of shoreline near the Camas Mill, including area along the shoreline within the Camas Mill site and at several other locations in Camas Slough.

Figure 1 shows a map of Camas Slough, including the FEMA SFHA, floodway, model cross-sections (described later), and major features of the demolition project.

The proposed project will require work below the ordinary high water (OHW) elevation. Some of the structures to be removed are located on state-owned land currently leased by GP through the Washington Department of Natural Resources (DNR).

2.3 STUDY APPROACH

This study involved creating and comparing two hydraulic models—one of existing, pre-project conditions and the other of proposed, post-project conditions. The no-rise finding resulted when the water surface elevations modeled for the proposed condition were the same or lower than the elevations modeled for the existing condition at each cross-section. WSP developed the hydraulic models of Camas Slough for this study, including existing bathymetry, encroachments, and obstructions. The new models were required because no previous detailed model for the slough was available.

2.3.1 PREVIOUSLY EXISTING MODELS

WSP identified two existing hydraulic models for the project area, but neither was suitable for this evaluation.

The existing FIS hydraulic model for the Columbia River does not explicitly model Camas Slough. Its floodway boundary was apparently estimated (for example based on base flood depth) but not modeled explicitly, and flood elevations were interpolated from the Columbia River between FIS cross-sections AB and AD. The FIRMs show that cross-section AC stops on Lady Island and does not include Camas Slough.

WSP obtained data on the regulatory hydraulic model of the Columbia River from the FEMA Map Library. However, data were only provided as scans of microfiche records that were nearly illegible. In addition, the regulatory model dates from the 1970s and is almost 50 years old.

A second model was obtained for the Columbia River-Willamette River system that was developed by the U.S. Army Corps of Engineers (USACE). That model dates from about 2010 and is considered the best available model for the Columbia River.

Neither model of the Columbia River could be used for this study of Camas Slough because the slough is not explicitly included in either model, and the slough could not be added because another side channel diverges from the Columbia River across from Lady Island. The “braided” geometry that would result from including both side channels cannot be modeled using normal one-dimension software from USACE (either HEC-RAS or the previous standard HEC-2 computer programs). Instead, Camas Slough was modeled separately and matched to the Columbia River profile at the upstream and downstream confluences.

2.3.2 OVERVIEW OF MODELING APPROACH

A detailed hydraulic model was prepared for the full length of Camas Slough to model BFEs for existing conditions. A second model of existing conditions was developed to check the no-rise condition on the Washougal River, because the river flows into the slough near its upstream end. Effects of the proposed demolition activities

were evaluated by constructing a second set of models identical to the existing condition models but with features slated for demolition removed from the models and with proposed changes to bathymetry incorporated into the models. The difference in model output between the models of existing conditions versus the proposed conditions was used to assess the effects of the demolition on future flood conditions.

Version 6.3.1 of the HEC-RAS computer program (USACE, 2022) was used for hydraulic modeling. **Appendix C** summarizes output data for all model runs.

2.4 VERTICAL DATUM

All elevations in this study are measured in feet above the North American Vertical Datum of 1988 (NAVD88), consistent with published FEMA elevations. Values expressed above NAVD88 are 6.95 feet greater than those above the USACE's Columbia River Datum (CRD) in this vicinity, which are used for the proposed design drawings. For example, an elevation of 20 feet CRD on the proposed design drawings corresponds to 26.95 feet NAVD88 (SWLS, 2020).

Note that the CRD is not "flat" relative to NAVD88 but increases upstream on the Columbia River, approximately following the low-water profile of the river.

3 EXISTING BASE FLOOD ELEVATION ANALYSIS

A detailed hydraulic model was prepared for the full length of Camas Slough to model BFEs for existing conditions. Version 6.3.1 of the HEC-RAS computer program (USACE, 2022) was used for hydraulic modeling.

The model represented the slough using 69 cross-sections (plus 2 internal cross-sections at each bridge used for constructing their input). The locations of these cross-sections are shown on **Figure 1** along with the FEMA floodplain (red hatching) and floodway (thick red line), lease areas (labeled "LA-number"), structures to be demolished, and areas of proposed regrading that would result in net cut or fill. **Figure 2** shows a schematic diagram of the cross-section alignments in the hydraulic model. **Appendix D** presents the model output for the existing conditions model.

The existing model was built using best available ground and bathymetric elevations. The default source was the Lower Columbia River Digital Terrain Model (USACE, 2010) that combined LiDAR elevations above water with bathymetric surveys from the National Oceanic and Atmospheric Administration (NOAA) and dredge surveys from the USACE. The data were supplemented by bathymetry and survey points collected for the design.

Channel and floodplain hydraulic roughness was modeled using Manning's *n*-values. The channel was modeled with a uniform *n*-value of 0.025. Floodplain *n*-values varied by land cover type, including 0.040 for grass and 0.120 for forest or dense brush.

The existing conditions model included the following features:

- Two bridges are present where SR14 crosses the slough—the West Bridge (oriented north-south, state file number SR14/25) and the East Bridge (oriented east-west, number SR14/27N-S). Only the bridge piers and highway embankments can affect hydraulics; the bridge deck structures cannot affect flood elevations because they are many feet above the base flood. The model input includes the structure and the structure obstruction. Cross-sections of the bridges are shown on **Figure 3** (East Bridge; model ID 12168 [feet above cross-section AB]) and **Figure 4** (West Bridge; model ID 6428).

- Areas with dense numbers of piles (totaling about 3,000 piles) were modeled as increased channel roughness (Manning *n*-value) of 0.055 versus the normal value of 0.025. This value is conservatively low to underestimate the benefit provided by demolition and removal of these piles. **Figure 5** shows an example at cross-section 8982, which includes two such areas: LA-19 on the left (south) and LA-17 on the right (north) portion of the channel. These areas affect multiple cross-sections, as shown in the plots in **Appendix D**. Other areas modeled with higher *n*-values include LA-3 and LA-12, downstream of the west bridge.
- Concrete or steel supports for the Berger Crane foundation or the piers east of the PECO Dock were modeled as part of the areas with many piles and higher *n*-values, as illustrated on **Figure 5**.
- Buildings on the mill site, including the PECO Dock, were modeled as obstructions. **Figure 6** shows an example in cross-section 9198. Many other cross-sections have building obstructions.
- Dolphins (clusters of piles) were modeled as 6-foot-diameter obstructions. **Figure 7** shows an example for LA-14 in cross-section 7220. Many other cross-sections have dolphins.
- Dense accumulation of floating wood, including a wooden walkway, were modeled as a floating obstruction in three downstream cross-sections. **Figure 9** shows an example for cross-section 1589. Sections 1265 and 975 have similar floating obstructions. The elevations of the structures are fixed in the model; they do not actually "float." (Their elevations must be changed manually to model other flood elevations.)

The model was forced to match the FEMA regulatory flood profile for the Columbia River. Its downstream flood elevation was set to the 39.2-foot BFE, which was interpolated at the mouth of the slough 552 feet upstream of FEMA cross-section AB. The upstream BFE was set to 39.7 feet, interpolated to where the slough diverges 4,121 feet downstream of cross-section AD.

FEMA had not defined flows for Camas Slough, so this study "solved" for a base flow by modeling a range of flows to find that 35,000 cubic feet per second (cfs) matched the FEMA BFE profile at the upstream end of the slough model, 39.7 feet. The modeled elevation was slightly less than the FEMA profile elevation to allow for expected loss from the bifurcation and sudden change in flow direction from west in the river to north into the slough. **Figure 9** shows the water surface profiles for a range of flows and highlights the base flow of 35,000 cfs identified by this study.

Appendix D provides the following model outputs for the hydraulic model developed for existing conditions on the Camas Slough:

- Schematic layout of hydraulic model cross-sections;
- Profile plots of the flood profile for existing and proposed conditions; and
- Plots of model outputs for individual cross-sections.

A second model of existing conditions was developed to check the no-rise condition on the Washougal River, because the river flows into the slough near its upstream end. Four upstream cross-sections on the slough near the SR14 bridge were replaced with three cross-sections on the Washougal River. **Figure 1** shows the locations of the cross-sections added for the Washougal River.

The watershed areas for the Columbia River and Washougal River are very different, so a concurrent base flood on both rivers would be inappropriate. Instead, the FEMA base (100-year) flow of 56,672 cfs for the Washougal River at its mouth was used. The downstream flood elevation was set to a lower elevation corresponding to the 10-year FEMA profile on the Columbia River of 27.9 feet. The downstream elevation was lower, so the modeled obstruction was also lowered in the three affected downstream cross-sections. **Appendix B** provides additional FIS data used for this model.

Appendix C summarizes output data for all model runs. **Appendix E** shows the following outputs for the hydraulic model developed for the Washougal River and downstream Camas Slough under existing conditions:

- Schematic layout of hydraulic model cross-sections (including the three sections added for the Washougal River);

- Plots of the flood profile for existing and proposed conditions; and
- Plots of model outputs for individual cross-sections.

4 PROPOSED FLOOD ELEVATION ANALYSIS

The model of proposed conditions in Camas Slough following demolition was constructed by modifying the existing-condition model to remove features that would be demolished. The model was otherwise identical to the existing model described above, including locations of and distances between cross-sections, downstream starting water surface elevation, flow, bridges, and hydraulic surface roughness (Manning *n*-values).

The proposed conditions model included the following changes:

- Removed buildings: These obstructions were removed from affected cross-sections.
- Areas with removed dense numbers of piles: The greater roughness value (Manning *n*-value) of 0.055 was restored to 0.025 for affected cross-sections to match the rest of the channel.
- Removed dolphins (clusters of piles): The obstructions were removed from affected cross-sections.
- Removed dense accumulation of floating wood downstream: The horizontal obstruction used to model floating wood was removed from cross-sections 1589, 1265, and 975.
- Changes to grade (cut and fill) near the PECO dock and Berger Crane foundation demolition areas: Ground and bathymetric elevations were changed in 13 cross-sections. **Appendix F** presents plots comparing existing to proposed cross-sections for these cross-sections. **Figure 10** shows an example for cross-section 9099.

Appendix C summarizes output data for all model runs.

Appendix F presents the following model outputs for the proposed-condition hydraulic model developed for Camas Slough:

- Plots comparing 13 cross-sections with cut or fill; and
- Plots of all cross-sections (including those unchanged from the existing model).

The cross-section layout and profiles in **Appendix D** show the existing-condition data.

A second proposed model was developed to check the no-rise condition on the Washougal River. This model was prepared like the existing-conditions model that included the river and was described above. The same four upstream cross-sections were replaced with the same three cross-sections on the lower Washougal River. Those cross-sections are the same for the existing and proposed conditions. The same flow (56,672 cfs) and downstream starting water surface elevation (27.9 feet NAVD88) were used. No change occurred for the three downstream cross-sections with the horizontal obstruction because it had been removed for the proposed-condition model.

Appendix C summarizes output data for all model runs. No separate appendix is provided for the Washougal River proposed-conditions scenario because the cross-section layout is in **Appendix E** and the cross-sections for this model are the same (the upstream three cross-sections are the same for existing and proposed models) or **Appendix F** (proposed cross-sections on Camas Slough downstream of the east bridge).

5 CONCLUSION AND FINDING OF NO-RISE

Based on the detailed analysis described above, the proposed demolition of structures associated with prior operations that are located in-water and/or overwater on Camas Slough meet hydraulic performance standards of no-rise set by the City of Camas.

The models of existing versus proposed conditions were compared to find that no rise in base flood elevations would result on Camas Slough or the studied reach of the Washougal River. The lack of any rise on the slough or the lower Washougal River also meant that no rise would be physically possible upstream on the Columbia River or the Washougal River.

Table 1 summarizes the flood elevations modeled for existing and proposed conditions in Camas Slough. The results show that no increase in water surface elevation occurs. In the table, River Station (RS) is the model cross-section identifier and corresponds to feet upstream of FEMA cross-section AB; "WS" is the water surface elevation in feet above NAVD88, and "Rise" is the proposed WS minus existing (base) WS.

Table 2 summarizes similar information for the models of the Washougal River and downstream Camas Slough and shows that no increase in water surface elevation occurs. In the table, the three upstream cross-sections with (*) are the new sections added on the Washougal River.

Hydraulic energy grades were also compared for both models. These results are summarized in **Appendix C** for both the Camas Slough and Washougal River models.

Table 1. No-Rise Analysis for Camas Slough Model

River Station	Bottom Elev (ft)	Base WS (ft) (Plan P01)	Proposed WS (ft) (Plan P02)	Rise (ft)
13120	6.27	34.69	34.58	-0.11
12625	3.58	34.66	34.55	-0.11
12222	-4.99	34.37	34.25	-0.12
12168	East Bridge (SR-14/27N-S)			
11974	-0.22	34.25	34.22	-0.03
11507	-1.19	34.36	34.33	-0.03
11240	6.94	34.35	34.33	-0.02
11204	-2.00	34.35	34.32	-0.03
11153	0.49	34.35	34.32	-0.03
11078	0.07	34.35	34.32	-0.03
10998	0.61	34.34	34.32	-0.02
10651	-1.34	34.34	34.31	-0.03
10312	0.67	34.33	34.30	-0.03
10251	-2.15	34.33	34.30	-0.03
10231	-0.94	34.33	34.30	-0.03
10201	-1.29	34.32	34.30	-0.02
10119	-2.39	34.32	34.30	-0.02
9857	-3.94	34.32	34.29	-0.03
9798	-7.83	34.32	34.29	-0.03
9760	-7.17	34.32	34.29	-0.03
9716	-6.84	34.32	34.30	-0.02
9622	-8.14	34.32	34.30	-0.02
9494	-9.49	34.31	34.30	-0.01
9319	-13.13	34.31	34.30	-0.01
9198	-14.95	34.31	34.29	-0.02
9099	-12.43	34.30	34.28	-0.02
8982	-10.92	34.28	34.27	-0.01
8876	-7.24	34.29	34.28	-0.01
8708	-6.84	34.29	34.28	-0.01
8557	-7.77	34.29	34.28	-0.01
8486	-8.48	34.29	34.28	-0.01
8428	-9.02	34.29	34.27	-0.02
8363	-9.05	34.28	34.27	-0.01
8279	-8.81	34.28	34.27	-0.01
8060	-10.14	34.27	34.26	-0.01
7881	-12.00	34.26	34.25	-0.01
7804	-12.29	34.26	34.25	-0.01
7728	-12.48	34.25	34.25	0
7637	-14.15	34.25	34.25	0
7570	-15.32	34.25	34.25	0
7281	-22.16	34.24	34.23	-0.01
7220	-22.28	34.24	34.23	-0.01
7151	-21.65	34.24	34.23	-0.01
6864	-18.39	34.25	34.24	-0.01
6440	-15.13	34.24	34.24	0
6428	West Bridge (SR-14/25)			
6343	-14.63	34.24	34.23	-0.01
6148	-14.90	34.23	34.23	0
5580	-16.11	34.23	34.23	0
5008	-19.62	34.22	34.22	0
4887	-19.87	34.22	34.22	0
4834	-19.86	34.22	34.22	0
4784	-20.06	34.22	34.22	0
4710	-19.46	34.22	34.22	0
4632	-19.40	34.22	34.22	0
4580	-19.08	34.22	34.22	0
4017	-21.17	34.22	34.22	0
3962	-21.47	34.22	34.22	0
3890	-21.09	34.22	34.22	0
3467	-18.81	34.22	34.22	0
2856	-13.11	34.22	34.22	0
2287	-16.77	34.22	34.22	0
1911	-18.58	34.22	34.22	0
1782	-29.48	34.22	34.22	0
1670	-40.87	34.23	34.22	-0.01
1589	1.75	34.22	34.22	0
1265	-10.40	34.22	34.22	0
975	0.89	34.22	34.22	0
689	-14.95	34.20	34.20	0
612	-20.24	34.19	34.19	0
552	-24.96	34.20	34.20	0

Table 2. No-Rise Analysis for Washougal River-Camas Slough Model

River Station	Bottom Elev (ft)	Base WS (ft) (Plan P11)	Proposed WS (ft) (Plan P12)	Rise (ft)
13159 (*)	9.39	28.68	28.56	-0.12
12653 (*)	8.61	28.55	28.43	-0.12
12111 (*)	5.98	28.55	28.43	-0.12
11507	-1.19	28.61	28.49	-0.12
11240	6.94	28.57	28.45	-0.12
11204	-2.00	28.56	28.44	-0.12
11153	0.49	28.56	28.44	-0.12
11078	0.07	28.56	28.44	-0.12
10998	0.61	28.54	28.42	-0.12
10651	-1.34	28.52	28.4	-0.12
10312	0.67	28.47	28.35	-0.12
10251	-2.15	28.47	28.36	-0.11
10231	-0.94	28.47	28.35	-0.12
10201	-1.29	28.45	28.34	-0.11
10119	-2.39	28.44	28.32	-0.12
9857	-3.94	28.41	28.3	-0.11
9798	-7.83	28.42	28.3	-0.12
9760	-7.17	28.41	28.3	-0.11
9716	-6.84	28.42	28.31	-0.11
9622	-8.14	28.45	28.34	-0.11
9494	-9.49	28.41	28.33	-0.08
9319	-13.13	28.41	28.33	-0.08
9198	-14.95	28.38	28.31	-0.07
9099	-12.43	28.35	28.28	-0.07
8982	-10.92	28.27	28.22	-0.05
8876	-7.24	28.29	28.25	-0.04
8708	-6.84	28.3	28.26	-0.04
8557	-7.77	28.29	28.25	-0.04
8486	-8.48	28.28	28.24	-0.04
8428	-9.02	28.27	28.22	-0.05
8363	-9.05	28.27	28.22	-0.05
8279	-8.81	28.26	28.22	-0.04
8060	-10.14	28.21	28.18	-0.03
7881	-12.00	28.15	28.12	-0.03
7804	-12.29	28.15	28.13	-0.02
7728	-12.48	28.13	28.1	-0.03
7637	-14.15	28.13	28.11	-0.02
7570	-15.32	28.14	28.11	-0.03
7281	-22.16	28.07	28.05	-0.02
7220	-22.28	28.08	28.05	-0.03
7151	-21.65	28.09	28.06	-0.03
6864	-18.39	28.11	28.08	-0.03
6440	-15.13	28.1	28.07	-0.03
6428	West Bridge (SR-14/25)			
6343	-14.63	28.08	28.06	-0.02
6148	-14.90	28.06	28.04	-0.02
5580	-16.11	28.04	28.03	-0.01
5008	-19.62	28.01	28	-0.01
4887	-19.87	28.01	28	-0.01
4834	-19.86	28.01	28	-0.01
4784	-20.06	28.01	28	-0.01
4710	-19.46	28.01	28	-0.01
4632	-19.40	28.01	28.01	0
4580	-19.08	28	28	0
4017	-21.17	28	27.99	-0.01
3962	-21.47	27.99	27.99	0
3890	-21.09	27.99	27.99	0
3467	-18.81	27.99	27.98	-0.01
2856	-13.11	27.99	27.99	0
2287	-16.77	27.99	27.99	0
1911	-18.58	27.99	27.98	-0.01
1782	-29.48	27.99	27.98	-0.01
1670	-40.87	28	28	0
1589	1.75	28	27.99	-0.01
1265	-10.40	27.98	27.98	0
975	0.89	27.97	27.97	0
689	-14.95	27.89	27.89	0
612	-20.24	27.87	27.87	0
552	-24.96	27.9	27.9	0

6 LIMITATIONS

This report was prepared exclusively for Georgia-Pacific Consumer Operations LLC by WSP. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in WSP's services and is based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This No-Rise Certification is intended to be used by GP for this demolition project only, subject to the terms and conditions of its contract with WSP. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

While this report was prepared in accordance with standard engineering practice by qualified engineering professionals, GP should understand that this report evaluated a specific storm recurrence interval and assumes free-flowing hydraulic conditions. It is reasonable to assume that a storm event of greater magnitude or changes in waterway conveyance capacity might cause higher stages than estimated for this assignment.

The report was prepared by WSP at the instruction of, and for use by, our client named on the front of the report. It does not in any way constitute advice to any third party who is able to access it by any means. WSP excludes to the fullest extent lawfully permitted all liability whatsoever for any loss or damage howsoever arising from reliance on the contents of this report. We do not however exclude our liability (if any) for personal injury or death resulting from our negligence, for fraud, or any other matter in relation to which we cannot legally exclude liability.

7 REFERENCES

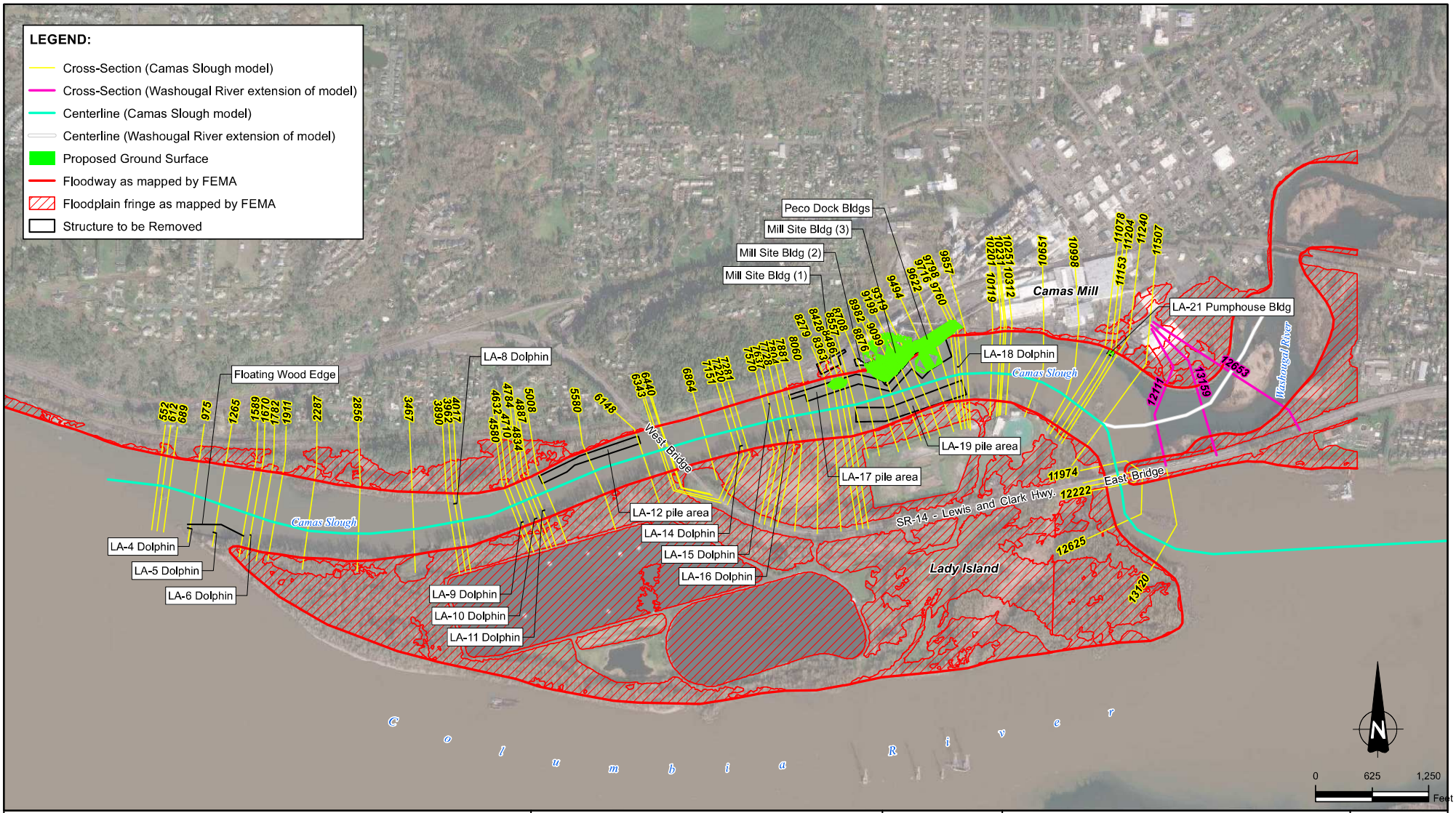
Federal Emergency Management Agency (FEMA), 2018, Flood Insurance Study, Clark County, Washington, and Incorporated Areas, June 19.

SWLS, 2020. Draft Memorandum: Vertical and Hydraulic Definitions, Statewide Land Surveying, June 10.

U.S. Army Corps of Engineers (USACE), 2010, Lower Columbia River Digital Elevation Model. Downloaded from: https://www.estuarypartnership.org/lower-columbia-digital-elevation-model-2010. U.S. Army Corps of Engineers Portland District. Accessed August 2020.

———, 2022, HEC-RAS River Analysis System Version 6.3.1 Computer Program. U.S. Army Corps of Engineers (USACE) Hydraulic Engineering Center, September.

FIGURES



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	WSP USA Environment & Infrastructure Inc. 4020 Lake Washington Blvd NE, Suite 200 Kirkland, Washington 98033		STUDY AREA MAP	SCALE 1 " = 1,000 '
				PROJECT NO. 7650191188
				FIGURE 1

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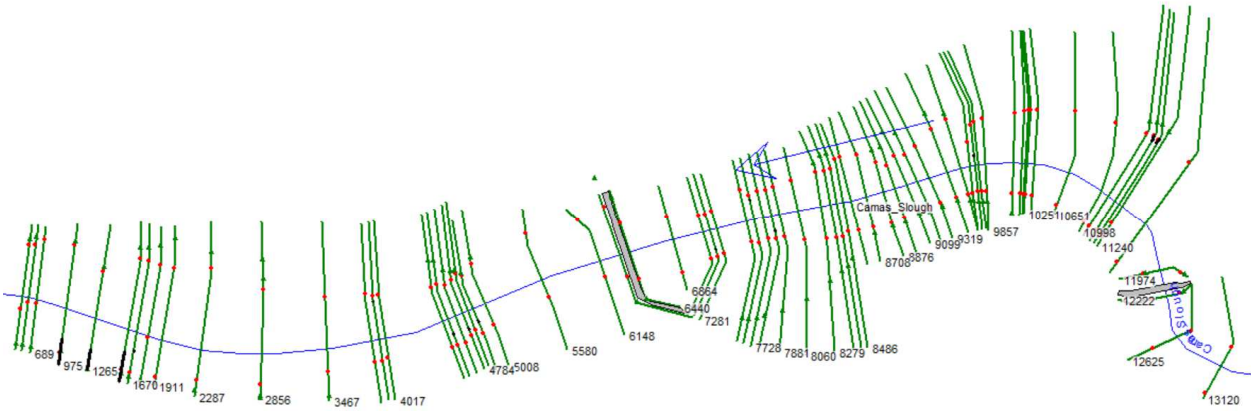


Figure 2. Schematic of Hydraulic Model Cross-Sections

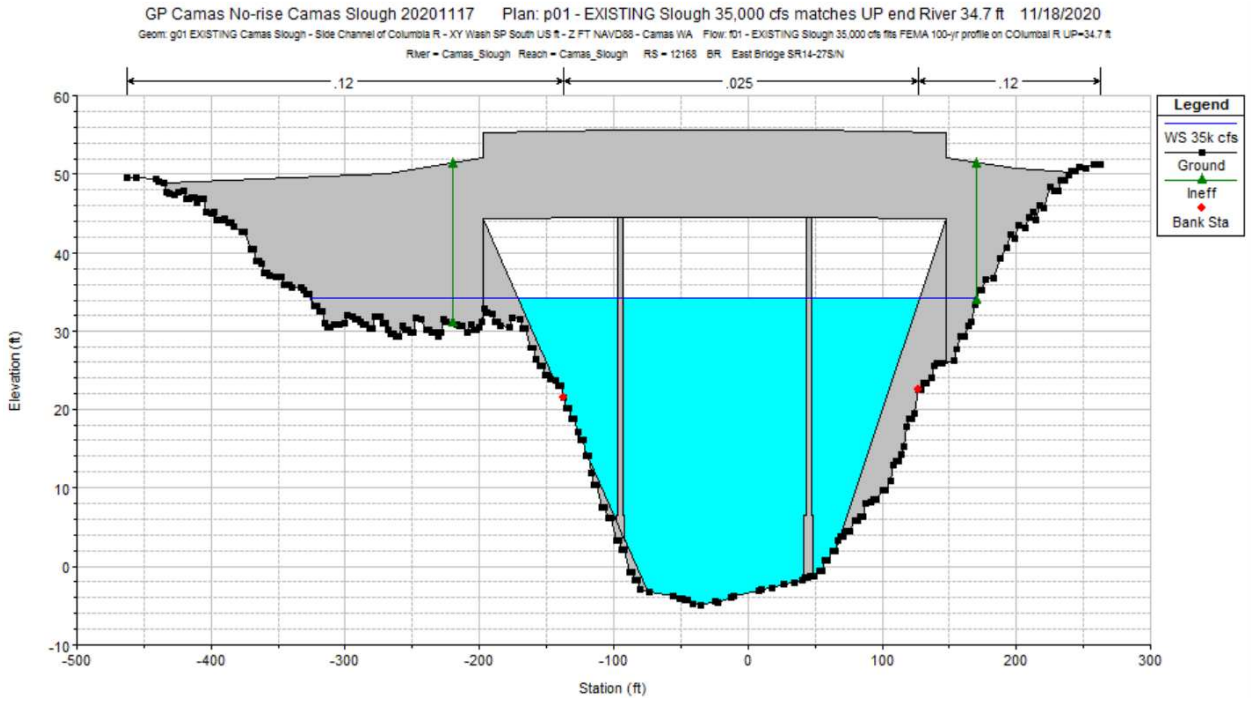


Figure 3. Model Cross-Section of East Bridge: SR 14/27 N-S (ID 12168)

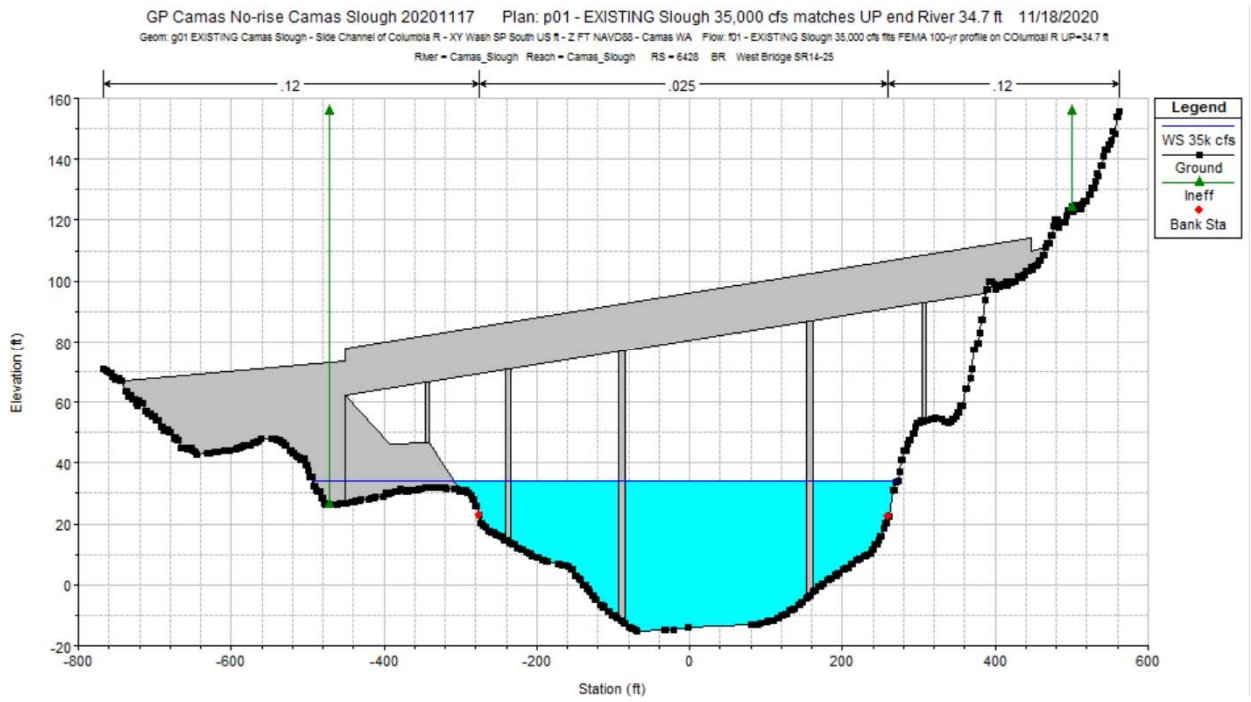


Figure 4. Model Cross-Section of West Bridge: SR 14/25 (ID 6428)

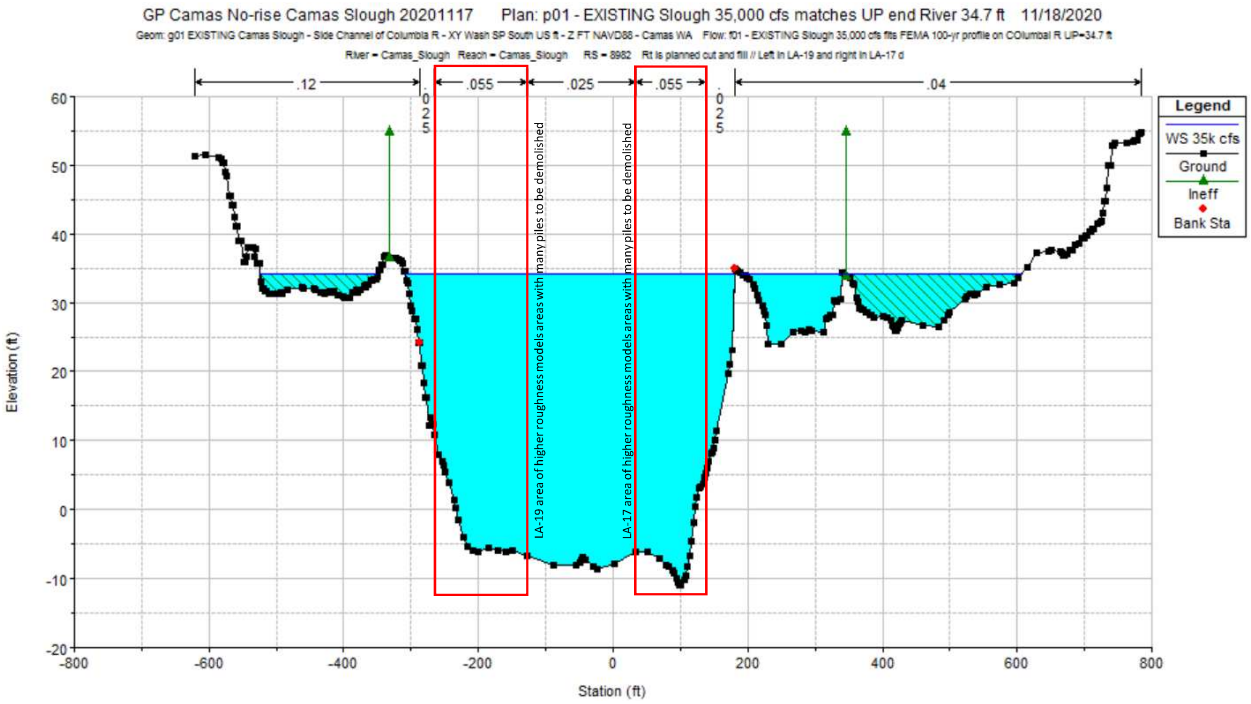


Figure 5. Model Cross-Section with Pile Areas (ID 8982)

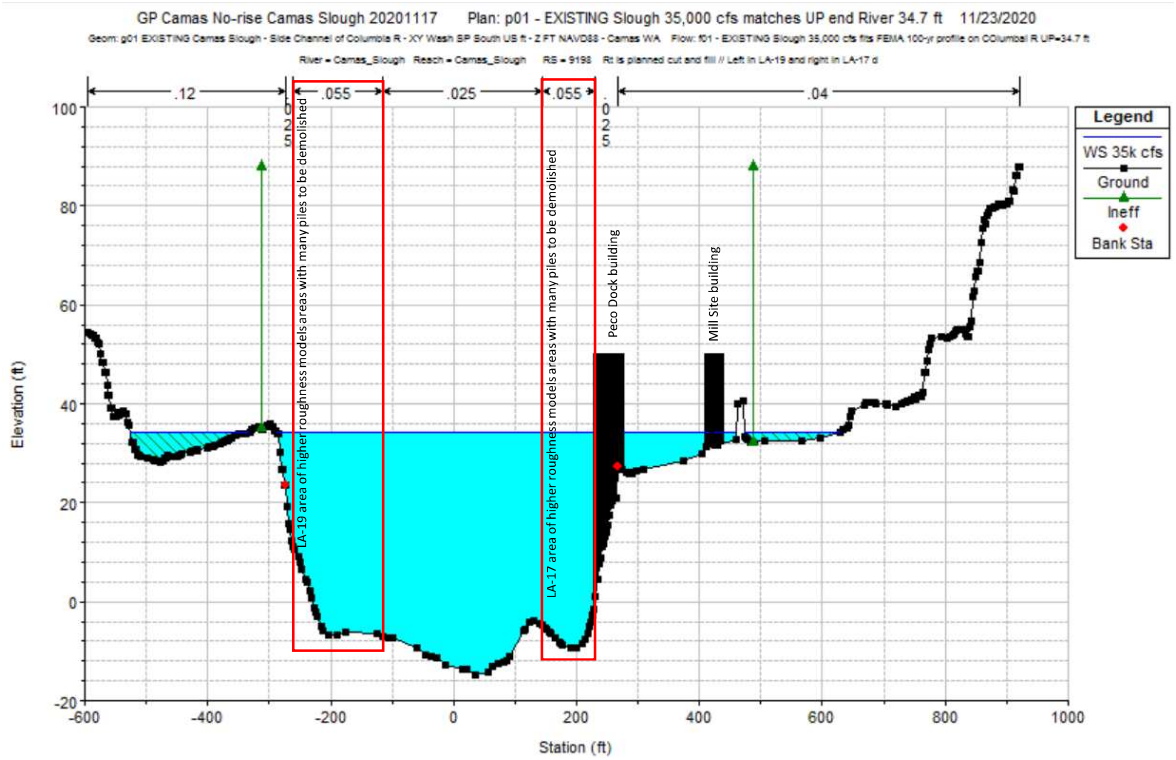


Figure 6. Model Cross-Section with PECO dock and mill site buildings (ID 9198)

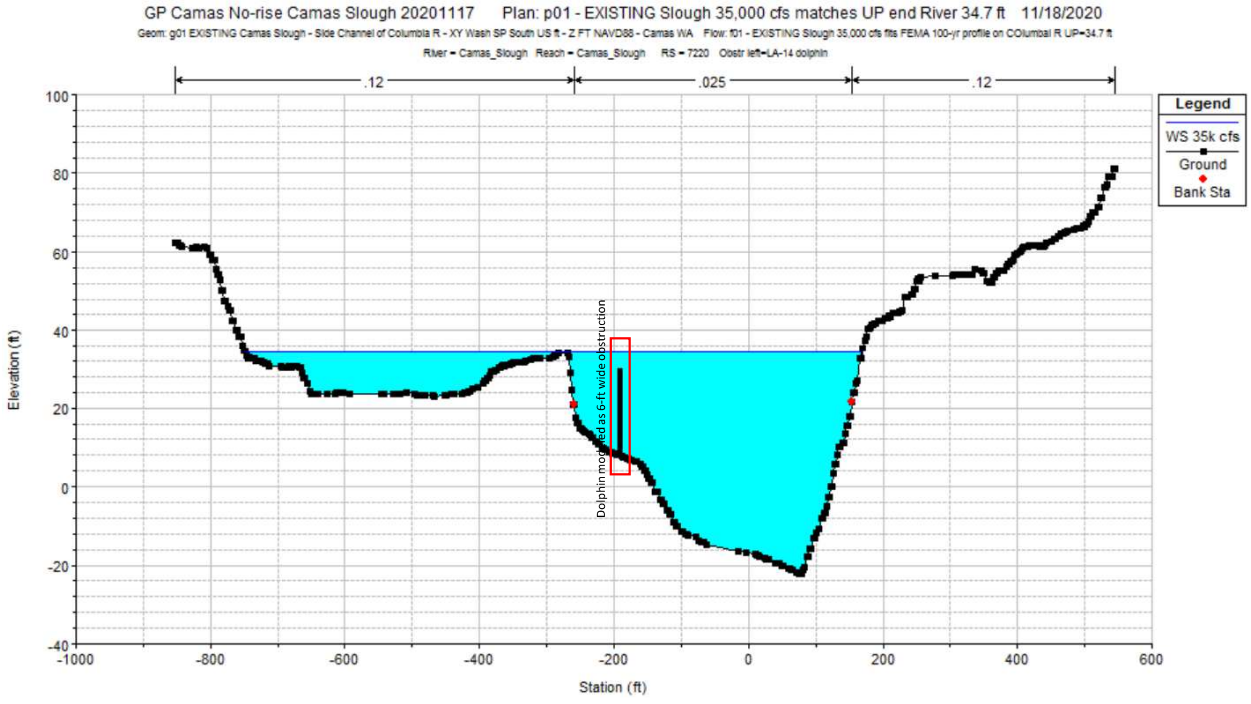


Figure 7. Model Cross-Section with Dolphin (ID 7220)

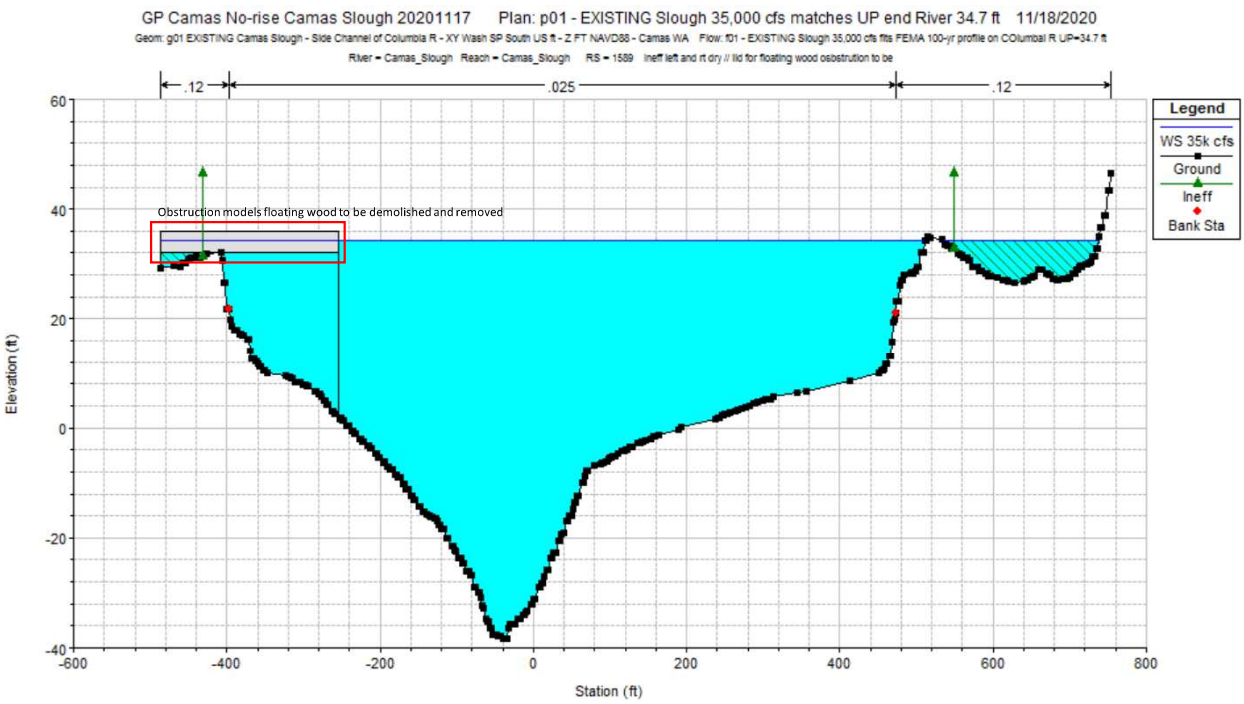


Figure 8. Model Cross-Section with Horizontal Obstruction (ID 1589)

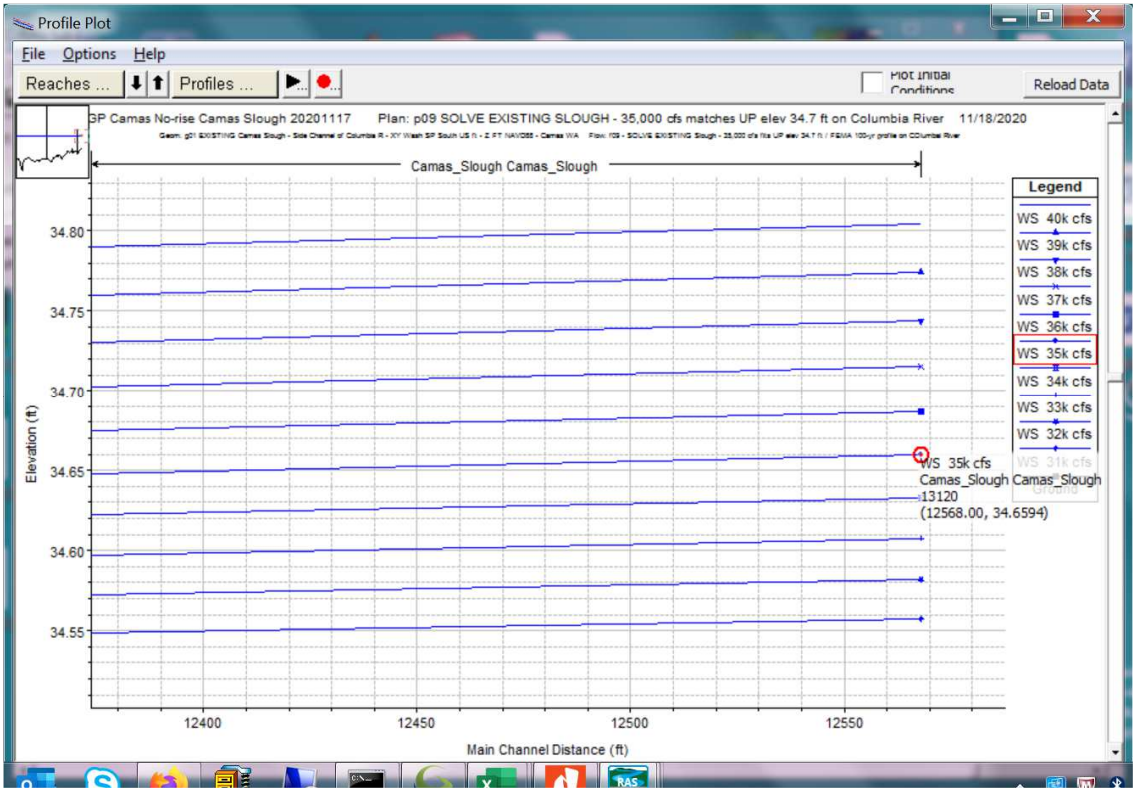


Figure 9. Profiles of Multiple Flows Finding 35,000 cfs Base Flow

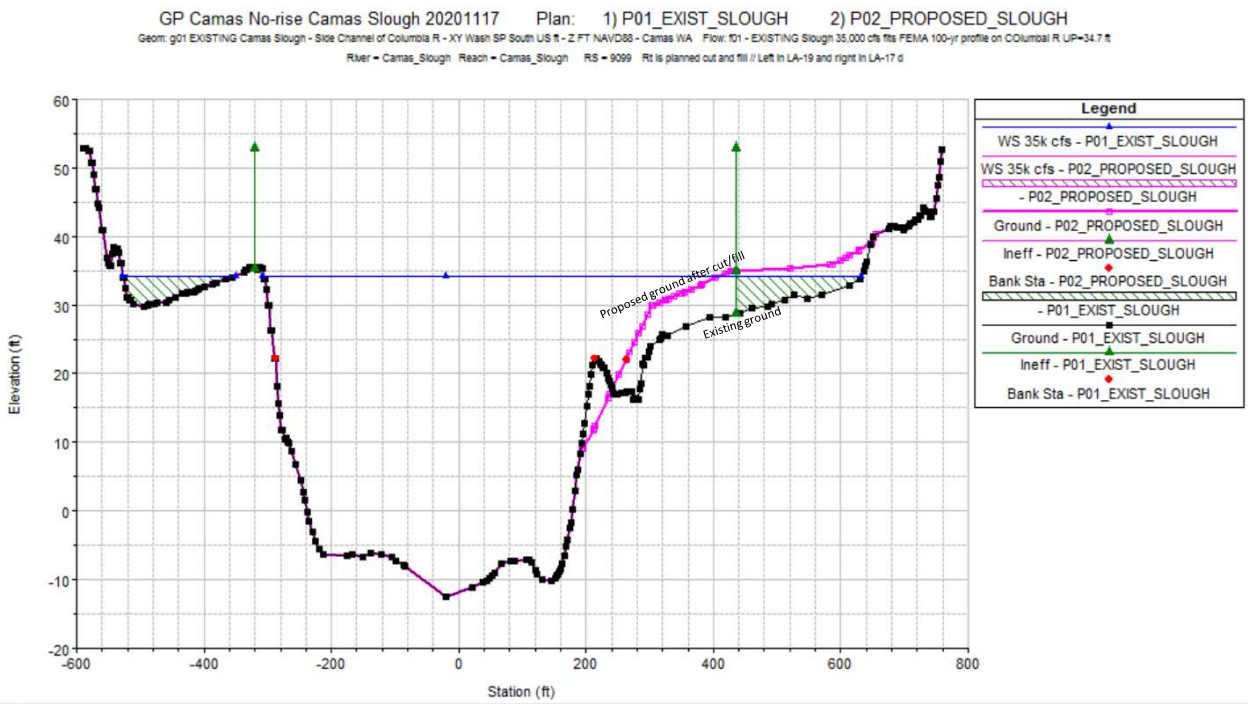
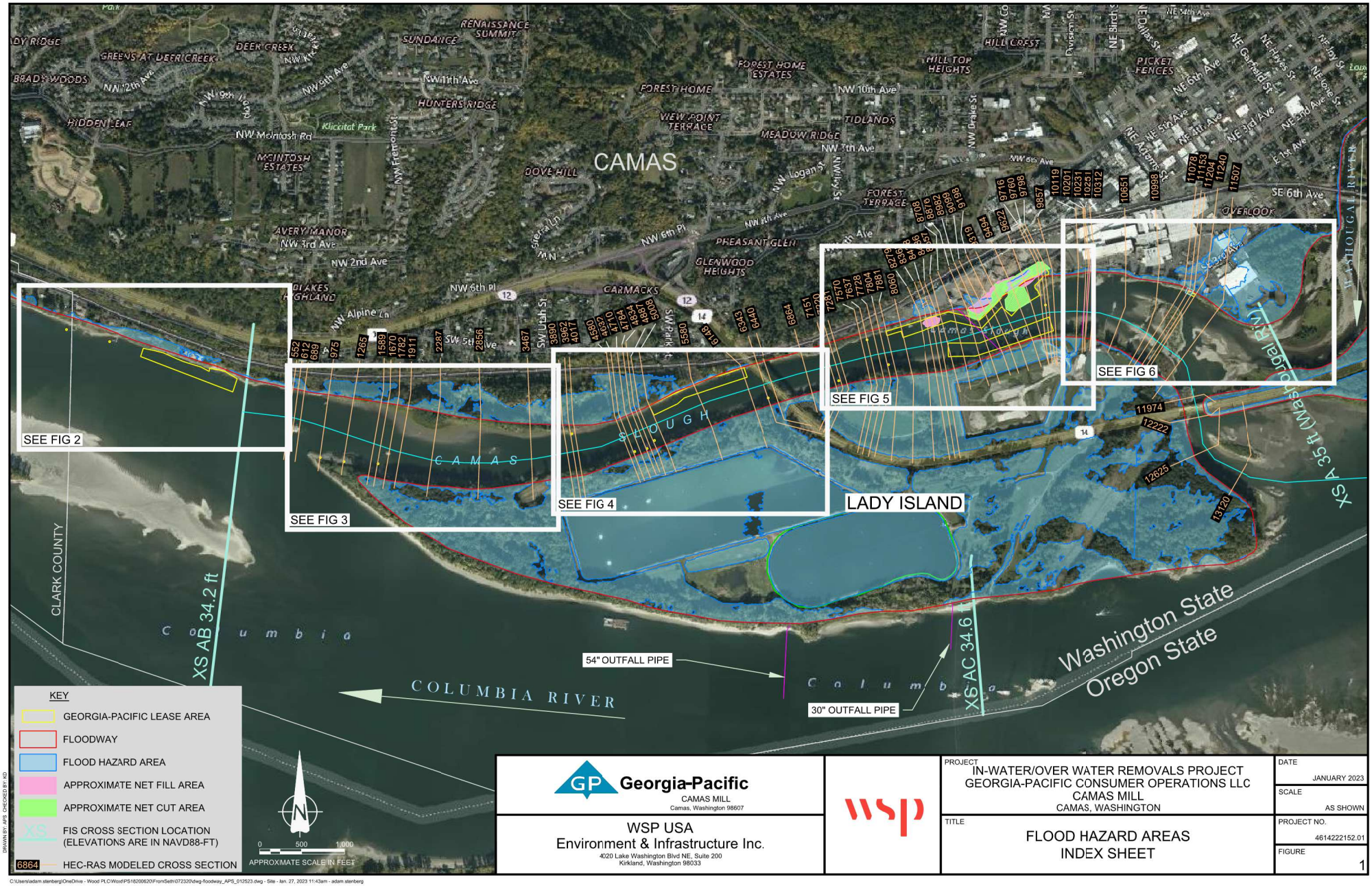


Figure 10. Model Cross-Section with Cut/Fill Changes (ID 9099)

APPENDIX A:
PROPOSED DEMOLITION PLANS DATED NOVEMBER 2, 2022



Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

WSP USA
Environment & Infrastructure Inc.
4020 Lake Washington Blvd NE, Suite 200
Kirkland, Washington 98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
INDEX SHEET

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 4614222152.01
FIGURE: 1

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CAMAS MILL
Camas, Washington 98607

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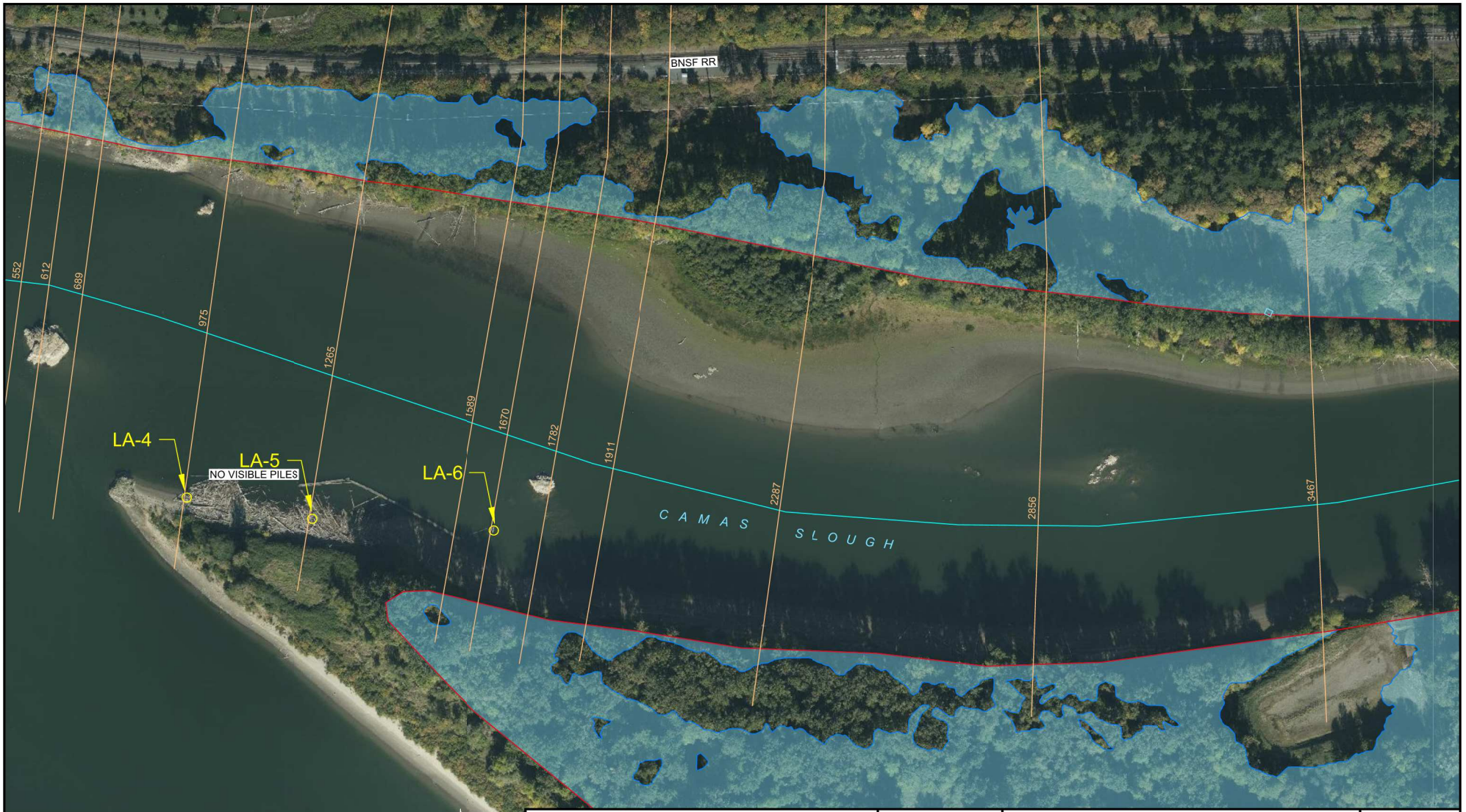
Environment & Infrastructure Inc.
4020 Lake Washington Blvd NE, Suite 200
Kirkland, Washington 98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
LEASE AREAS 1, 2, AND 3

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 4614222152.01
FIGURE: 2



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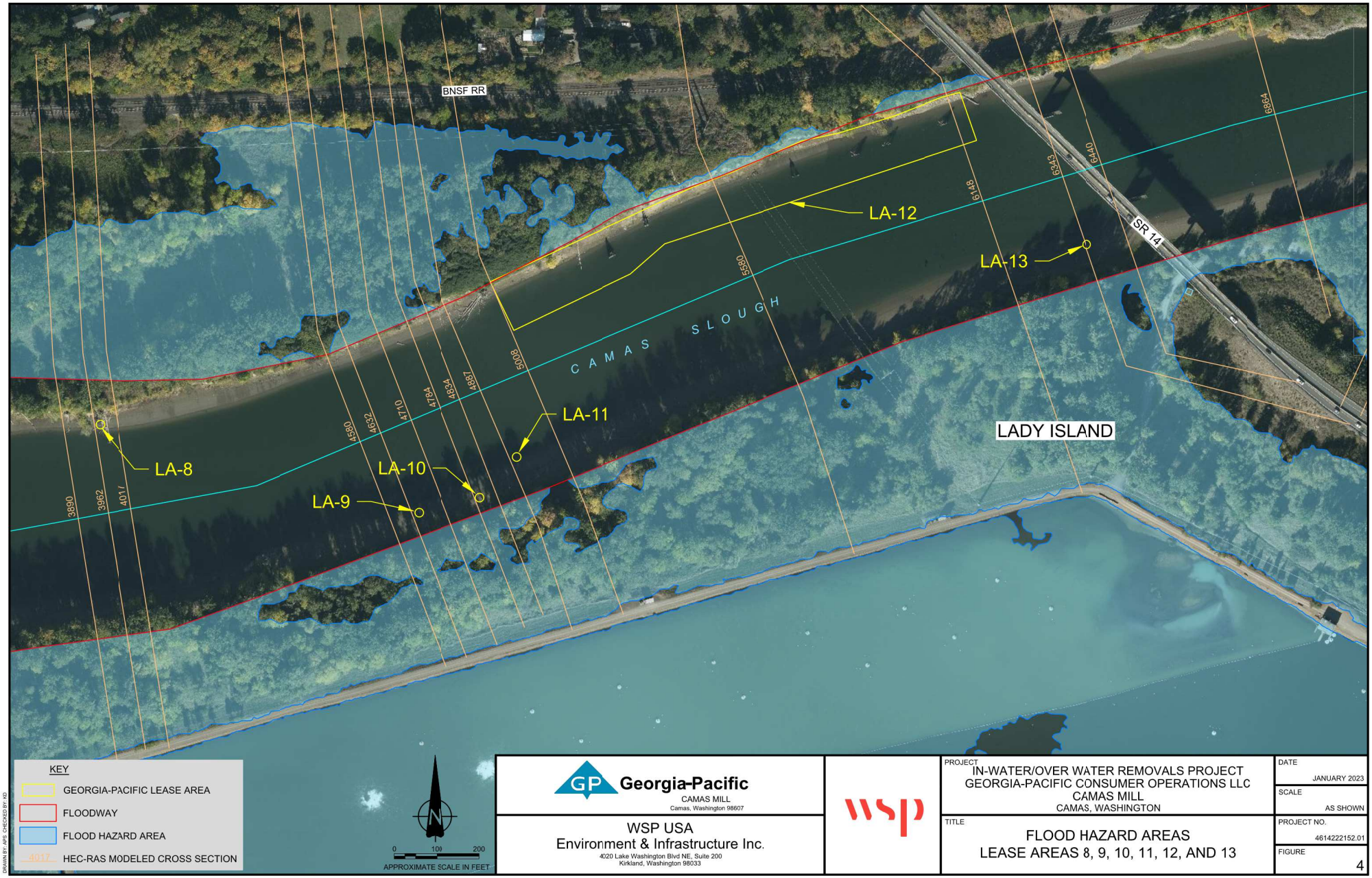
4020 Lake Washington Blvd NE, Suite 200
Kirkland, Washington 98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
LEASE AREAS 4, 5, AND 6

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 4614222152.01
FIGURE: 3



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Kirkland, Washington 98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
LEASE AREAS 8, 9, 10, 11, 12, AND 13

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SCALE: AS SHOWN
PROJECT NO.: 4614222152.01
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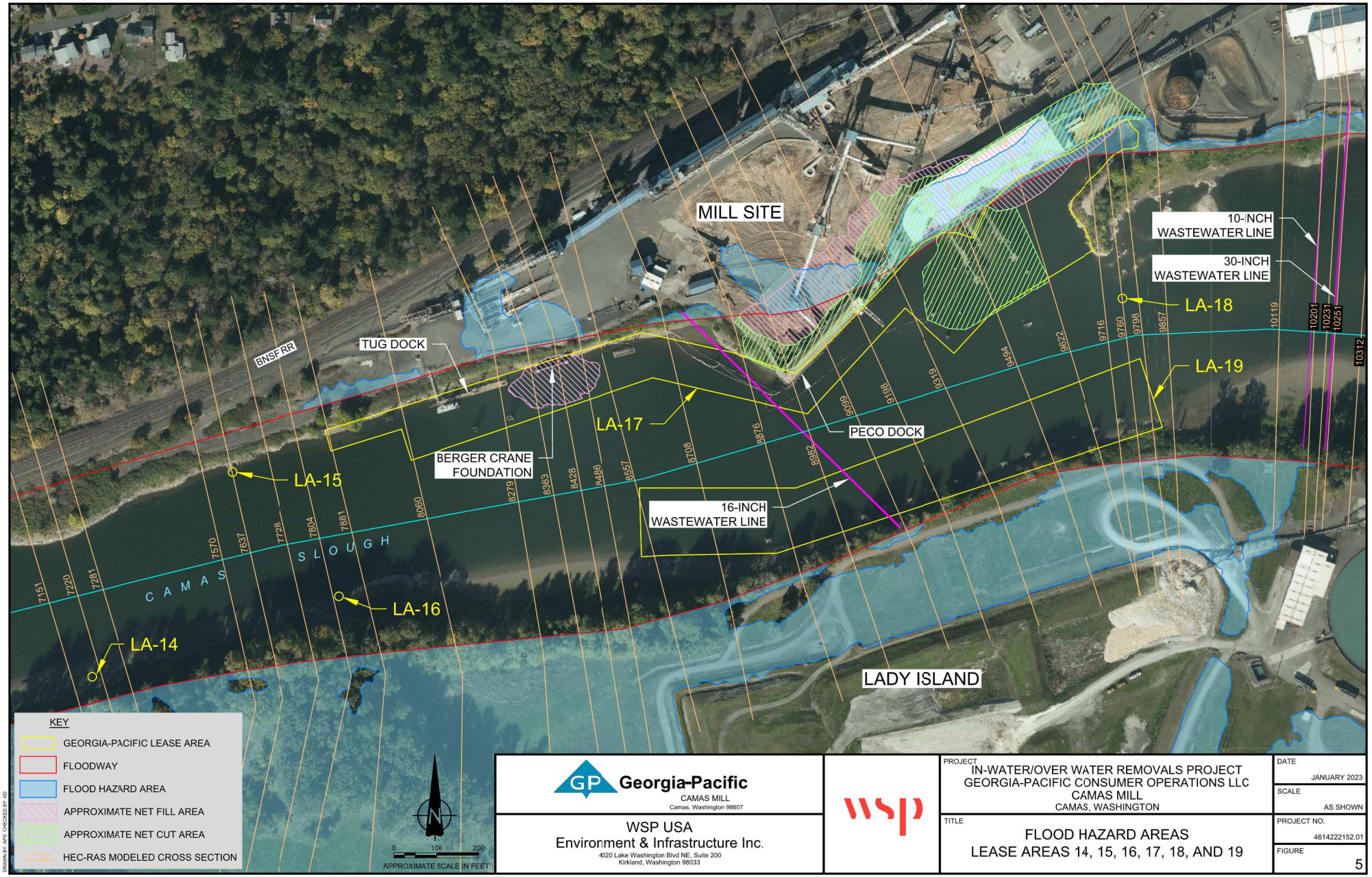

KEY

- GEORGIA-PACIFIC LEASE AREA
- FLOODWAY
- FLOOD HAZARD AREA
- APPROXIMATE NET FILL AREA
- APPROXIMATE NET CUT AREA
- 7728 HEC-RAS MODELED CROSS SECTION

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APPROXIMATE SCALE IN FEET

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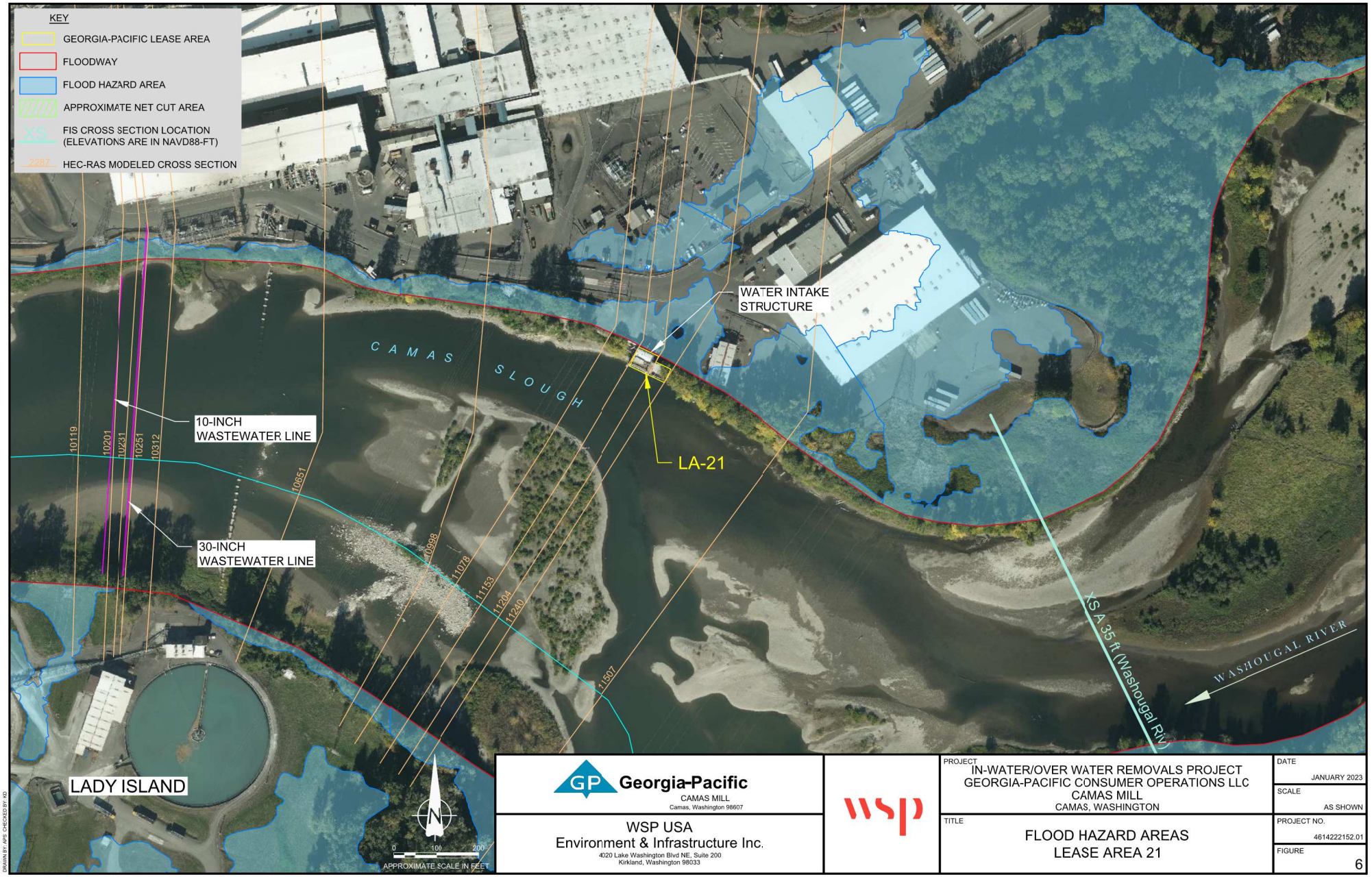
PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
LEASE AREAS 14, 15, 16, 17, 18, AND 19

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 4614222152.01
FIGURE: 5



Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

WSP USA
Environment & Infrastructure Inc.
4020 Lake Washington Blvd NE, Suite 200
Kirkland, Washington 98033

PROJECT
IN-WATER/OVER WATER REMOVALS PROJECT
GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

TITLE
FLOOD HAZARD AREAS
LEASE AREA 21

DATE: JANUARY 2023
SCALE: AS SHOWN
PROJECT NO.: 4614222152.01
FIGURE: 6

DRAWN BY: APS CHECKED BY: KD

C:\Users\adam.stenberg\OneDrive - Wood PLC\Wood\PS18200620\FromSeth\072320\dwg-floodway_APS_012523.dwg - LA-21- Jan. 27, 2023 11:43am - adam.stenberg

APPENDIX B:
FEMA FLOOD INSURANCE STUDY (FIS) INFORMATION

NOTES TO USERS

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To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov.

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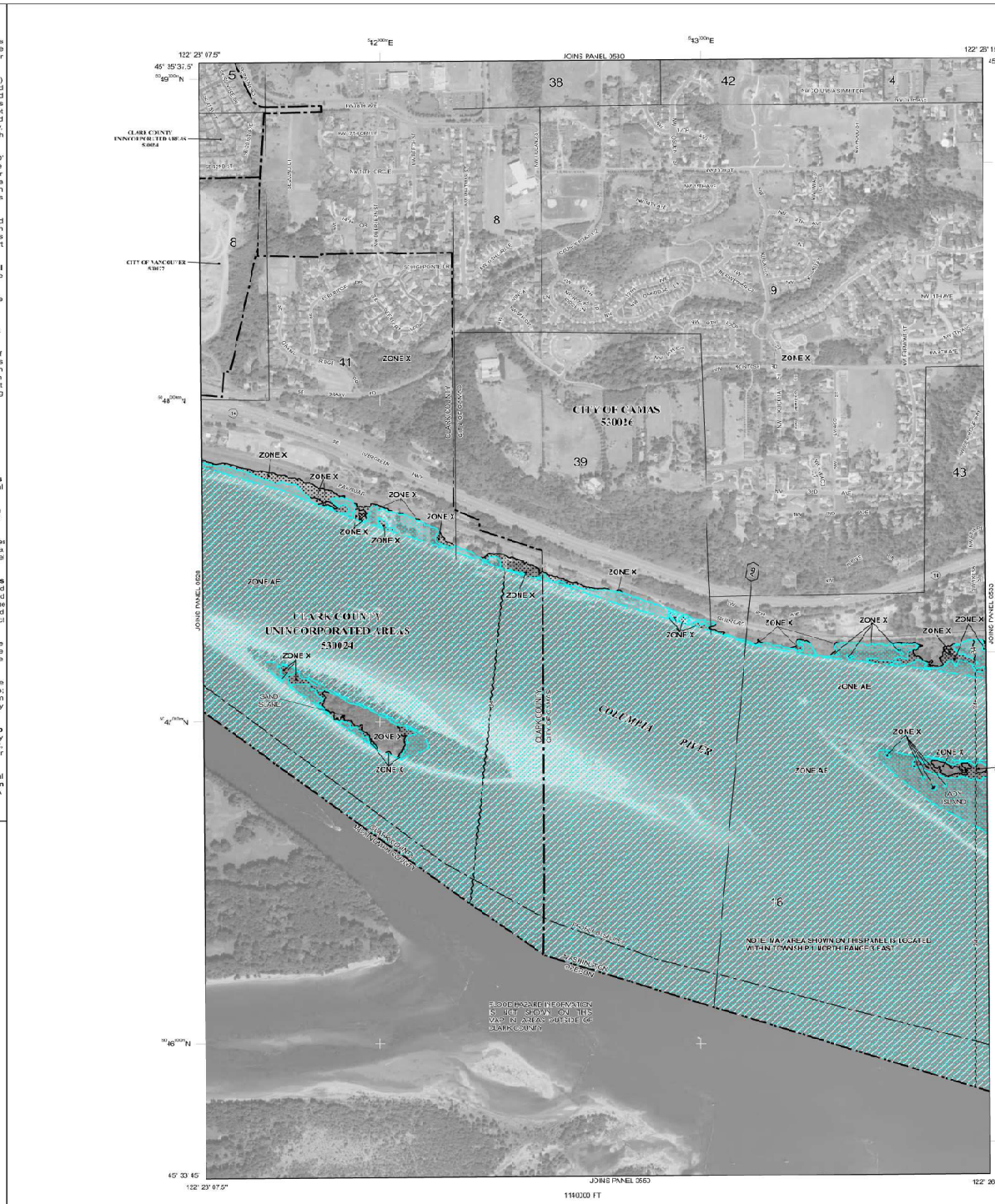

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** — No Base Flood Elevations determined.
- **ZONE AE** — Base Flood Elevations determined.
- **ZONE AH** — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** — Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway Boundary
- Zone D Boundary
- CBRS and OPA Boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, or flood depths, or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3000000 FT — 5000-foot ticks: Washington State Plane South Zone (FIPS Zone 4602), Lambert Conformal Conic projection
- 5000000 FT — 10000-meter Universal Transverse Mercator grid values, zone 10
- 5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 5, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
50 0 150 300 METERS

PANEL 0529D

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 529 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAMAS, CITY OF	530026	0529	D
CLARK COUNTY	530024	0529	D
VANCOUVER, CITY OF	530027	0529	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
5301'C0529D

DATE
2012

NATIONAL FLOOD INSURANCE PROGRAM

Federal Emergency

Exhibit 7 SHOR23-01

NOTES TO USERS

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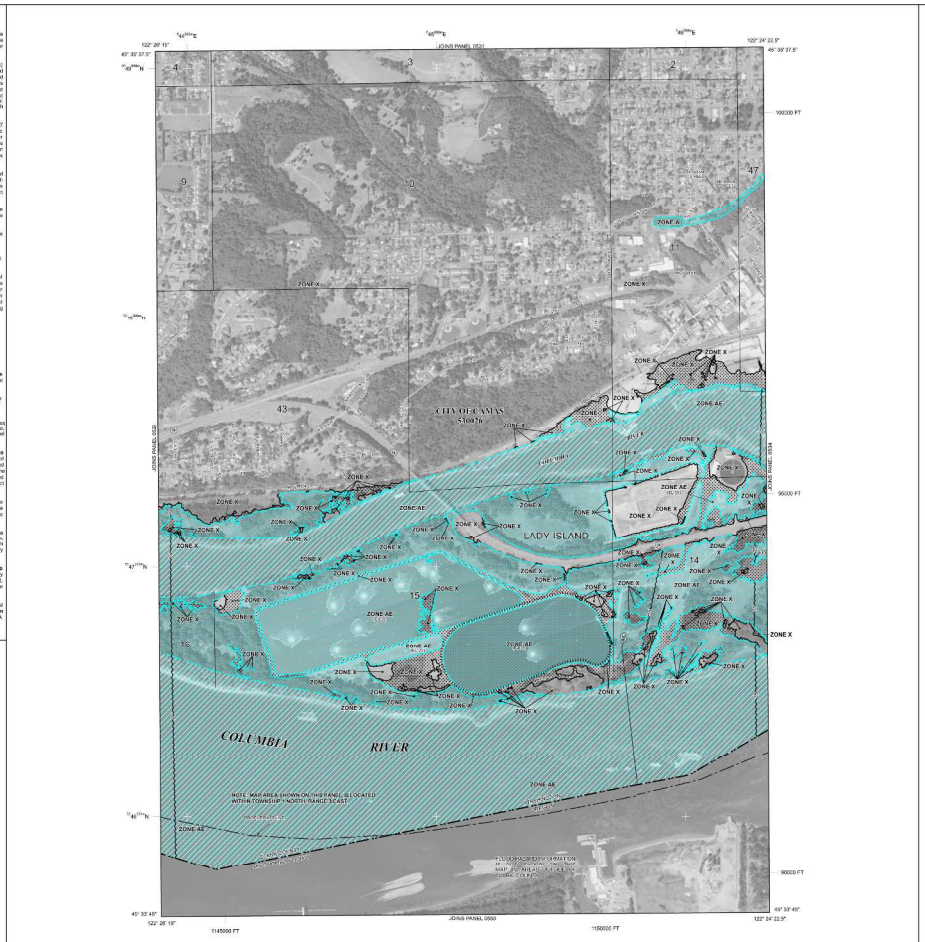

LEGEND

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FLOODWAY AREAS IN ZONE AE

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- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- (EL 987) Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- 45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 1000-meter Universal Transverse Mercator grid values, zone 10
- 5000-foot ticks: Washington State Plane South Zone (FIPS Zone 4602), Lambert Conformal Conic projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 5, 2012

EFFECTIVE DATA(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0533D

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 533 OF 600
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

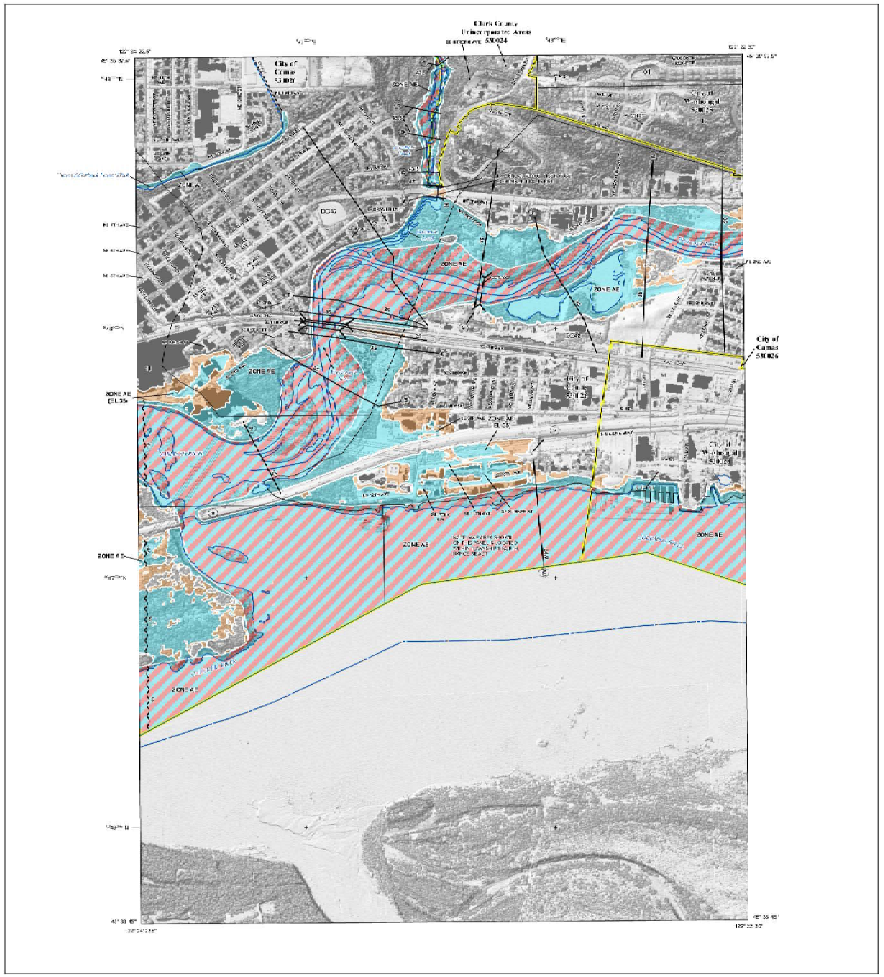
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAMAS, CITY OF	530076	0533	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53011C0533D
EFFECTIVE DATE
SEPTEMBER 5, 2012

Federal Emergency Management Agency



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND IMPORTANT FLOODPLAIN MANAGEMENT APPLICATION INFORMATION

HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS

OTHER AREAS OF FLOOD HAZARD

OTHER AREAS

GENERAL STRUCTURES

OTHER FEATURES

NOTES TO USERS

SCALE

1 inch = 500 feet 1:6,000

PANEL LOCATOR

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

CLARK COUNTY, WASHINGTON

PANEL 534 OF 600

FEMA

FLOODING SOURCE		FLOODWAY			1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F. P. S.)	REGULATORY (NAVD88)	WITHOUT FLOODWAY (NAVD88)	WITH FLOODWAY (NAVD88)	INCREASE
COLUMBIA RIVER								
AA	116.10	4,773 / 1,206[2]	178,406	3.2	33.7	33.2	34.1	0.9
AB	118.06	6,731 / 3,745[2]	210,779	2.7	34.2	33.6	34.4	0.8
AC	119.88	2,280 / 1,367[2]	127,035	4.4	34.6	33.9	35.0	0.9
AD	121.37	4,250 / 1,101[2]	157,277	3.6	34.9	34.3	35.1	0.8
AE	122.86	5,500 / 1,856[2]	189,310	2.9	35.1	34.7	35.5	0.8
AF	123.43	5,700 / 2,039[2]	197,499	2.8	35.3	34.8	35.7	0.9
AG	123.98	5,800 / 2,475[2]	206,916	2.7	35.4	34.8	35.7	0.9
AH	125.53	6,950 / 4,728[2]	198,505	2.8	35.6	35.1	36.0	0.9
AI	126.58	5,900 / 5,498[2]	173,646	3.2	35.8	35.2	36.1	0.9

(1)Stream distance in miles above mouth

(2)Elevations computed without consideration of backwater from Columbia River

(3)Elevations based on HEC-2 hydraulic model

(4)Width/width within county limits

(5)Width excluding island/right channel width looking downstream/width of right channel within corporate limits

TABLE 9

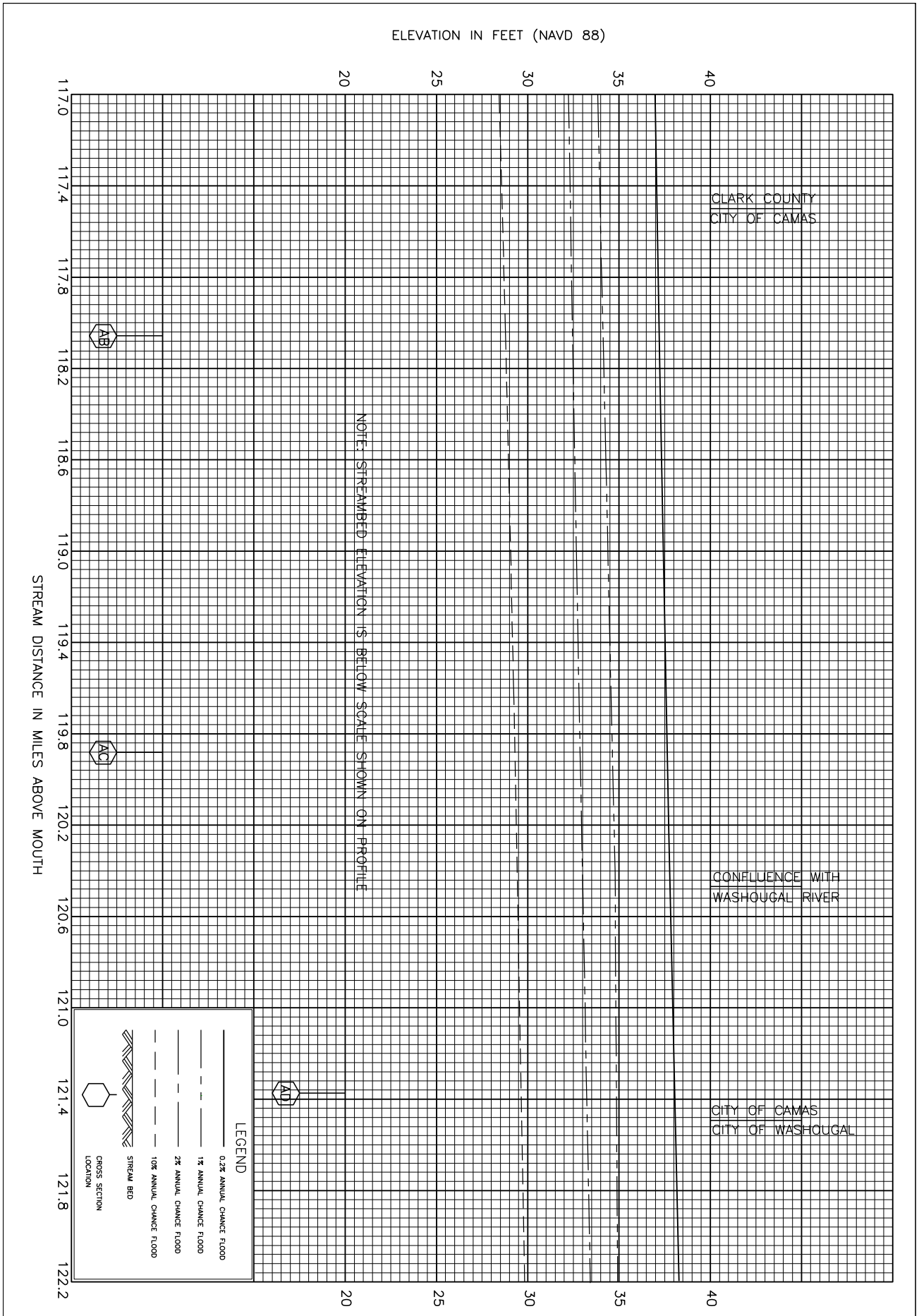
FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, WASHINGTON

AND INCORPORATED AREAS

FLOODWAY DATA

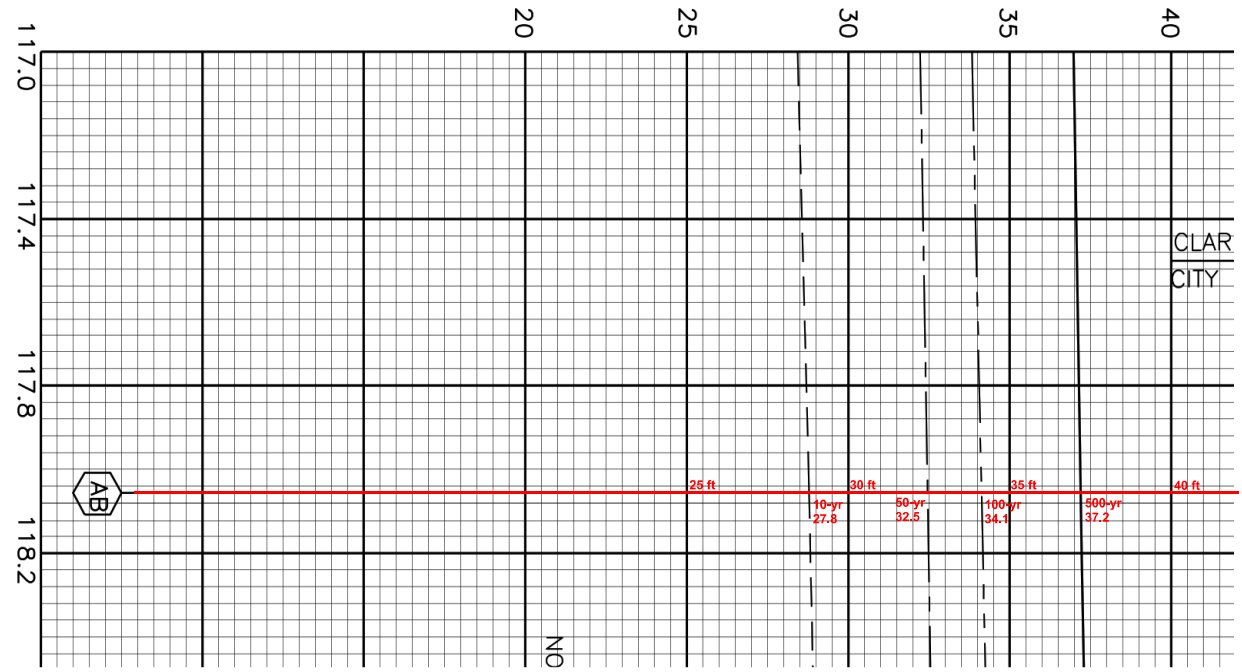
COLUMBIA RIVER



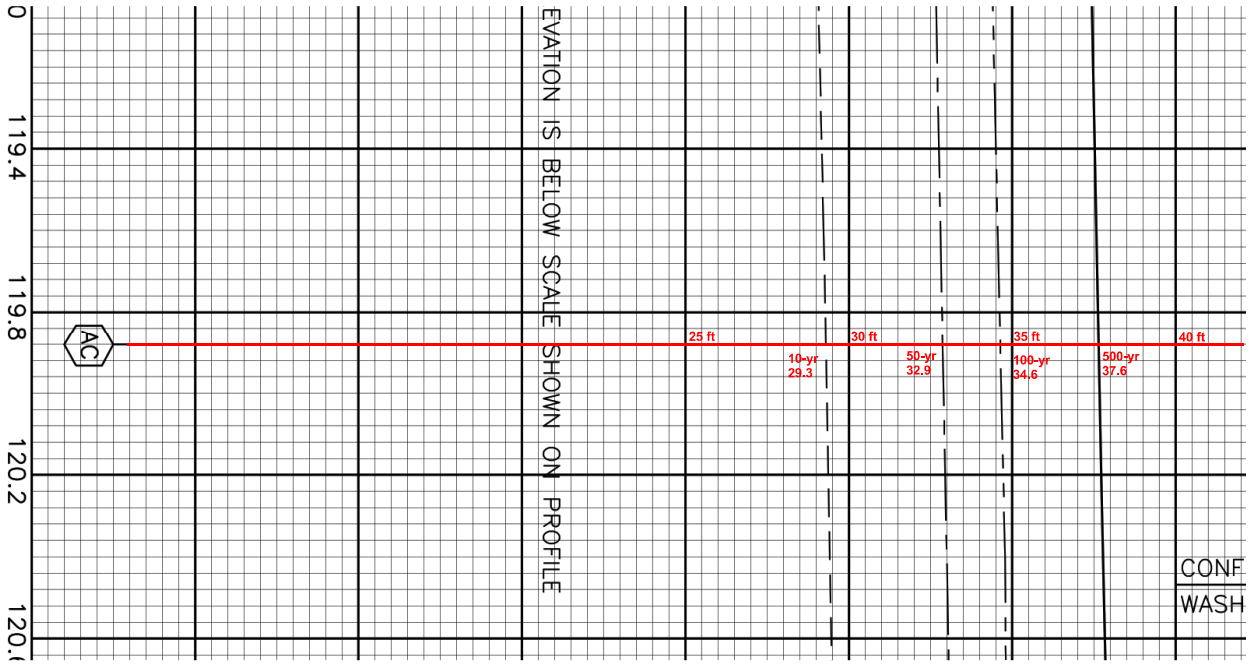
22P	FEDERAL EMERGENCY MANAGEMENT AGENCY CLARK COUNTY, WA AND INCORPORATED AREAS	FLOOD PROFILES COLUMBIA RIVER

Exhibit 7 SHOR23-01

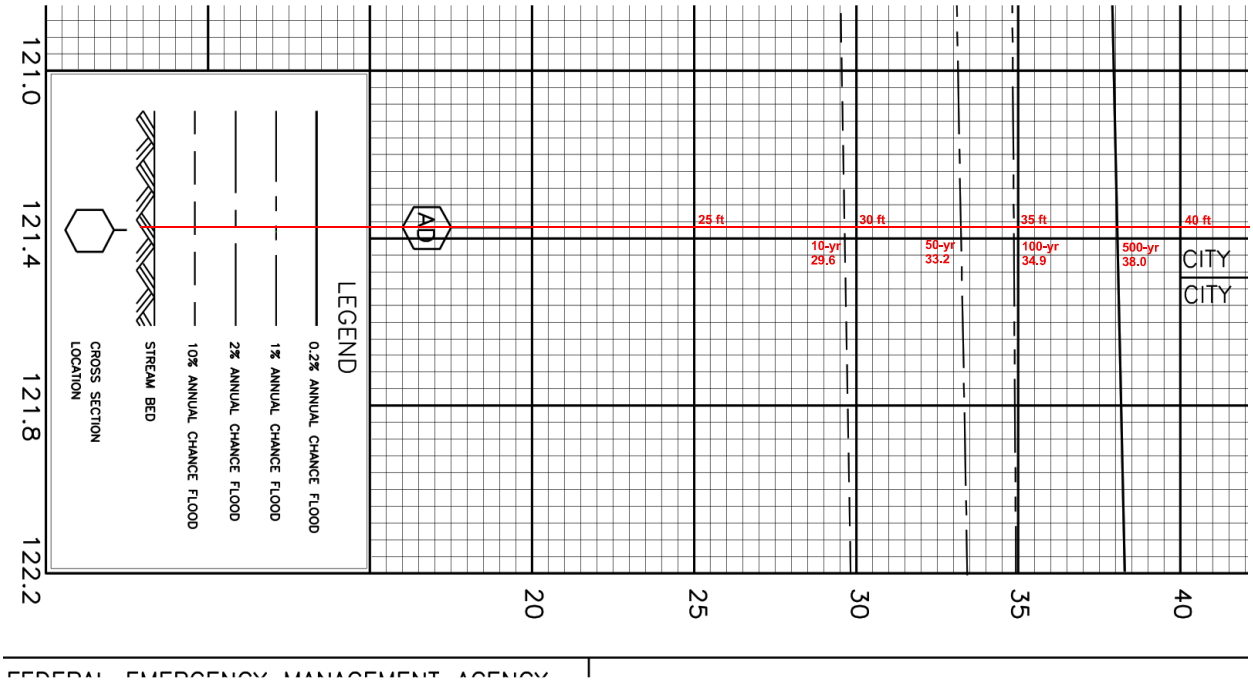
Appendix B. FEMA Flood Profiles near Camas Slough



FIRM Cross-Section AB on Columbia River Downstream of Camas Slough: 100-Year Water Level 34.1 ft



FIRM Cross-Section AC on Columbia River South of Lady Island: 100-Year Water Level 34.6 ft



FIRM Cross-Section AD on Columbia River Upstream of Camas Slough: 100-Year Water Level 34.9 ft

Cross-Section Location	River Mile	Feet	Water Surface Elevations (ft) 100-yr	10-yr
FEMA "AB"	**118.06**	**0**	34.2	27.8
Model "522" (Downstream)	**n/a**	**522**	34.2	27.9
FEMA "AC"	**119.88**	**9610**	34.6	29.3
Model "13120" (Upstream)	**n/a**	**13356**	34.7	n/a
FEMA "AD"	**121.37**	**17477**	34.9	n/a

Interpolation of Downstream and Upstream Elevations for Camas Slough Model

Notes: River Mile from the Floodway Data Table (miles above mouth)
Feet are calculated upstream of FEMA "AB".
100-yr Water Elevations from Floodway Data Table (34.2 ft); Others from FEMA Profiles.
10-yr water elevations used for the downstream boundary of the model with Washougal River.
Upstream model cross-section (ID 13120) is 4121 ft downstream of FEMA "AD".
Elevations are feet above the North American Vertical Datum of 1988 (NAVD88).

Table 6 – Summary of Discharges (Continued)
PEAK DISCHARGES (cfs)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
Below Mill Creek	72.0	2,710	3,730	4,210	5,430
Downstream of Confluence with Curtin Creek	60.0	2,330	3,250	3,700	4,860
Salmon Creek (Continued)					
At County Gage SMN045, NE 156th Street	45.0	1,960	2,740	3,110	4,090
Downstream of Confluence with Morgan Creek	31.0	1,290	1,920	2,240	3,140
At County Gage S-01, Battle Ground, WA	18.0	1,130	1,770	2,110	3,120
Spring Branch Creek					
At mouth	2.0	105	140	155	190
Unnamed Tributary to Gee Creek					
At mouth	2.0	85	100	105	125
Washougal River					
At Mouth	211	39,522	51,453	56,672	68,976
At Camas	146	28,063	36,534	40,241	48,977
At 3rd Street	146	27,971	36,416	40,110	48,818
At Route 140	144	27,703	36,066	39,725	48,350
Just Upstream of Little Washougal River	117	22,838	29,733	32,749	39,859
At Gage	107	21,017	27,362	30,138	36,681
Upstream of					

Flows for Washougal River at Mouth: 100-Year Flow 56,672 cfs

APPENDIX C:
MODEL OUTPUT TABLES

Table C-1. Camas Slough Output		EXISTING CAMAS SLOUGH - 100 YR / 35k cfs			PROPOSED CAMAS SLOUGH - DEMO OF PIERS / ETC			Rise in Elevations	
		Existing / Base Flood Model - Plan "p01"			Proposed Flood Model - Plan "p02"			(proposed minus base)	
River Station	Bottom Elev (ft)	Base WS Elev (ft)	Base Vel CH (ft/s)	Base EG (ft)	Proposed WS Elev (ft)	Proposed Vel CH (ft/s)	Proposed EG (ft)	WS Rise (ft)	EG Rise (ft)
13120	6.27	34.69	1.34	34.71	34.58	1.34	34.6	-0.11	-0.11
12625	3.58	34.66	1.84	34.71	34.55	1.85	34.6	-0.11	-0.11
12222	-4.99	34.37	4.15	34.63	34.25	4.16	34.52	-0.12	-0.11
12168		**East Bridge (SR-14/27N-S)**							
11974	-0.22	34.25	4.04	34.5	34.22	4.04	34.48	-0.03	-0.02
11507	-1.19	34.36	1.16	34.38	34.33	1.16	34.35	-0.03	-0.03
11240	6.94	34.35	1.23	34.38	34.33	1.23	34.35	-0.02	-0.03
11204	-2	34.35	1.36	34.38	34.32	1.36	34.35	-0.03	-0.03
11153	0.49	34.35	1.36	34.38	34.32	1.36	34.35	-0.03	-0.03
11078	0.07	34.35	1.33	34.38	34.32	1.33	34.35	-0.03	-0.03
10998	0.61	34.34	1.4	34.37	34.32	1.4	34.35	-0.02	-0.02
10651	-1.34	34.34	1.45	34.37	34.31	1.45	34.35	-0.03	-0.02
10312	0.67	34.33	1.6	34.37	34.3	1.6	34.34	-0.03	-0.03
10251	-2.15	34.33	1.57	34.37	34.3	1.57	34.34	-0.03	-0.03
10231	-0.94	34.33	1.59	34.37	34.3	1.59	34.34	-0.03	-0.03
10201	-1.29	34.32	1.64	34.37	34.3	1.64	34.34	-0.02	-0.03
10119	-2.39	34.32	1.68	34.37	34.3	1.68	34.34	-0.02	-0.03
9857	-3.94	34.32	1.75	34.36	34.29	1.75	34.34	-0.03	-0.02
9798	-7.83	34.32	1.67	34.36	34.29	1.67	34.34	-0.03	-0.02
9760	-7.17	34.32	1.67	34.36	34.29	1.68	34.34	-0.03	-0.02
9716	-6.84	34.32	1.57	34.36	34.3	1.67	34.33	-0.02	-0.03
9622	-8.14	34.32	1.4	34.35	34.3	1.42	34.33	-0.02	-0.02
9494	-9.49	34.31	1.53	34.35	34.3	1.44	34.33	-0.01	-0.02
9319	-13.13	34.31	1.51	34.35	34.3	1.44	34.33	-0.01	-0.02
9198	-14.95	34.31	1.6	34.35	34.29	1.55	34.33	-0.02	-0.02
9099	-12.43	34.3	1.69	34.34	34.28	1.68	34.33	-0.02	-0.01
8982	-10.92	34.28	1.98	34.34	34.27	1.87	34.33	-0.01	-0.01
8876	-7.24	34.29	1.77	34.33	34.28	1.64	34.32	-0.01	-0.01
8708	-6.84	34.29	1.55	34.33	34.28	1.55	34.32	-0.01	-0.01
8557	-7.77	34.29	1.56	34.33	34.28	1.56	34.32	-0.01	-0.01
8486	-8.48	34.29	1.58	34.33	34.28	1.6	34.32	-0.01	-0.01
8428	-9.02	34.29	1.59	34.32	34.27	1.64	34.32	-0.02	0
8363	-9.05	34.28	1.61	34.32	34.27	1.65	34.32	-0.01	0
8279	-8.81	34.28	1.6	34.32	34.27	1.61	34.31	-0.01	-0.01
8060	-10.14	34.27	1.75	34.32	34.26	1.76	34.31	-0.01	-0.01
7881	-12	34.26	1.99	34.32	34.25	1.99	34.31	-0.01	-0.01
7804	-12.29	34.26	1.96	34.31	34.25	1.95	34.31	-0.01	0
7728	-12.48	34.25	2	34.31	34.25	2	34.31	0	0
7637	-14.15	34.25	1.96	34.31	34.25	1.94	34.3	0	-0.01
7570	-15.32	34.25	1.92	34.31	34.25	1.92	34.3	0	-0.01
7281	-22.16	34.24	2.13	34.31	34.23	2.13	34.3	-0.01	-0.01
7220	-22.28	34.24	2.1	34.3	34.23	2.09	34.3	-0.01	0

Table C-1. Camas Slough Output (Continued)		EXISTING CAMAS SLOUGH - 100 YR / 35k cfs Existing / Base Flood Model - Plan "p01"			PROPOSED CAMAS SLOUGH - DEMO OF PIERS / ETC Proposed Flood Model - Plan "p02"			Rise in Elevations (proposed minus base)	
River Station	Bottom Elev (ft)	Base WS Elev (ft)	Base Vel CH (ft/s)	Base EG (ft)	Proposed WS Elev (ft)	Proposed Vel CH (ft/s)	Proposed EG (ft)	WS Rise (ft)	EG Rise (ft)
7151	-21.65	34.24	2.04	34.3	34.23	2.04	34.3	-0.01	0
6864	-18.39	34.25	1.8	34.3	34.24	1.8	34.29	-0.01	-0.01
6440	-15.13	34.24	1.78	34.29	34.24	1.78	34.29	0	0
6428		**West Bridge (SR-14/25)**							
6343	-14.63	34.24	1.71	34.29	34.23	1.71	34.28	-0.01	-0.01
6148	-14.9	34.23	1.77	34.28	34.23	1.77	34.28	0	0
5580	-16.11	34.23	1.72	34.28	34.23	1.72	34.27	0	-0.01
5008	-19.62	34.22	1.76	34.27	34.22	1.76	34.27	0	0
4887	-19.87	34.22	1.73	34.27	34.22	1.72	34.27	0	0
4834	-19.86	34.22	1.72	34.27	34.22	1.72	34.27	0	0
4784	-20.06	34.22	1.72	34.27	34.22	1.71	34.27	0	0
4710	-19.46	34.22	1.68	34.27	34.22	1.68	34.27	0	0
4632	-19.4	34.22	1.67	34.27	34.22	1.66	34.26	0	-0.01
4580	-19.08	34.22	1.69	34.27	34.22	1.69	34.26	0	-0.01
4017	-21.17	34.22	1.63	34.26	34.22	1.63	34.26	0	0
3962	-21.47	34.22	1.64	34.26	34.22	1.63	34.26	0	0
3890	-21.09	34.22	1.59	34.26	34.22	1.59	34.26	0	0
3467	-18.81	34.22	1.56	34.26	34.22	1.56	34.26	0	0
2856	-13.11	34.22	1.33	34.25	34.22	1.33	34.25	0	0
2287	-16.77	34.22	1.23	34.25	34.22	1.23	34.25	0	0
1911	-18.58	34.22	1.2	34.25	34.22	1.2	34.24	0	-0.01
1782	-29.48	34.22	1.21	34.24	34.22	1.21	34.24	0	0
1670	-40.87	34.23	1.04	34.24	34.22	1.04	34.24	-0.01	0
1589	-38.32	34.22	1.06	34.24	34.22	1.05	34.24	0	0
1265	-21.1	34.22	1.16	34.24	34.22	1.15	34.24	0	0
975	-15.93	34.22	1.17	34.24	34.22	1.16	34.24	0	0
689	-14.95	34.2	1.64	34.24	34.2	1.64	34.24	0	0
612	-20.24	34.19	1.74	34.24	34.19	1.74	34.24	0	0
552	-24.96	34.2	1.48	34.23	34.2	1.48	34.23	0	0

WS (ft) - Water surface elevation (ft NAVD88)
Vel CH (ft/s) - Velocity of flow in channel (ft/second)
EG (ft) - Energy grade (ft NAVD88)

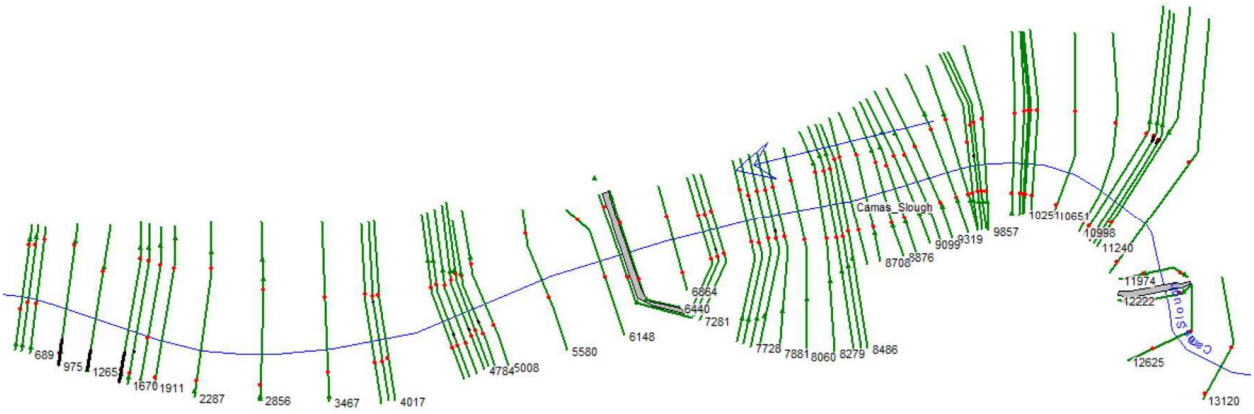
Table C-2. Washougal River / Camas Slough Output		EXISTING WASHOUGAL / CAMAS SLOUGH - 100 YR Existing / Base Flood Model - Plan "p11" - 56672 cfs			PROPOSED WASHOUGAL / CAMAS SLOUGH - DEMO OF PIERS / ETC Proposed Flood Model - Plan "p12"			Rise in Elevations (proposed minus base)	
River Station	Bottom Elev (ft)	Base WS Elev (ft)	Base Vel CH (ft/s)	Base EG (ft)	Proposed WS Elev (ft)	Proposed Vel CH (ft/s)	Proposed EG (ft)	WS Rise (ft)	EG Rise (ft)
13159 (*)	9.39	28.68	4.07	28.91	28.56	4.1	28.8	-0.12	-0.11
12653 (*)	8.61	28.55	4.47	28.85	28.43	4.5	28.73	-0.12	-0.12
12111 (*)	5.98	28.55	3.74	28.77	28.43	3.76	28.65	-0.12	-0.12
11507	-1.19	28.61	2.41	28.7	28.49	2.43	28.59	-0.12	-0.11
11240	6.94	28.57	2.54	28.69	28.45	2.55	28.57	-0.12	-0.12
11204	-2	28.56	2.84	28.69	28.44	2.86	28.57	-0.12	-0.12
11153	0.49	28.56	2.83	28.68	28.44	2.85	28.57	-0.12	-0.11
11078	0.07	28.56	2.78	28.68	28.44	2.8	28.56	-0.12	-0.12
10998	0.61	28.54	2.94	28.67	28.42	2.95	28.56	-0.12	-0.11
10651	-1.34	28.52	2.98	28.66	28.4	3	28.54	-0.12	-0.12
10312	0.67	28.47	3.29	28.64	28.35	3.3	28.52	-0.12	-0.12
10251	-2.15	28.47	3.21	28.63	28.36	3.23	28.52	-0.11	-0.11
10231	-0.94	28.47	3.25	28.63	28.35	3.27	28.52	-0.12	-0.11
10201	-1.29	28.45	3.37	28.63	28.34	3.39	28.51	-0.11	-0.12
10119	-2.39	28.44	3.44	28.63	28.32	3.46	28.51	-0.12	-0.12
9857	-3.94	28.41	3.55	28.61	28.3	3.57	28.49	-0.11	-0.12
9798	-7.83	28.42	3.47	28.6	28.3	3.49	28.49	-0.12	-0.11
9760	-7.17	28.41	3.51	28.6	28.3	3.53	28.48	-0.11	-0.12
9716	-6.84	28.42	3.26	28.58	28.31	3.46	28.48	-0.11	-0.1
9622	-8.14	28.45	2.74	28.56	28.34	2.79	28.46	-0.11	-0.1
9494	-9.49	28.41	3.02	28.55	28.33	2.8	28.46	-0.08	-0.09
9319	-13.13	28.41	2.88	28.54	28.33	2.77	28.45	-0.08	-0.09
9198	-14.95	28.38	3.07	28.53	28.31	2.98	28.45	-0.07	-0.08
9099	-12.43	28.35	3.32	28.52	28.28	3.25	28.44	-0.07	-0.08
8982	-10.92	28.27	3.89	28.5	28.22	3.67	28.43	-0.05	-0.07
8876	-7.24	28.29	3.5	28.48	28.25	3.26	28.41	-0.04	-0.07
8708	-6.84	28.3	3.04	28.45	28.26	3.04	28.4	-0.04	-0.05
8557	-7.77	28.29	3.07	28.44	28.25	3.07	28.4	-0.04	-0.04
8486	-8.48	28.28	3.12	28.43	28.24	3.18	28.39	-0.04	-0.04
8428	-9.02	28.27	3.15	28.43	28.22	3.28	28.39	-0.05	-0.04
8363	-9.05	28.27	3.19	28.42	28.22	3.29	28.39	-0.05	-0.03
8279	-8.81	28.26	3.18	28.42	28.22	3.19	28.38	-0.04	-0.04
8060	-10.14	28.21	3.5	28.4	28.18	3.5	28.37	-0.03	-0.03
7881	-12	28.15	3.94	28.39	28.12	3.94	28.36	-0.03	-0.03
7804	-12.29	28.15	3.84	28.38	28.13	3.82	28.35	-0.02	-0.03
7728	-12.48	28.13	3.96	28.37	28.1	3.96	28.34	-0.03	-0.03
7637	-14.15	28.13	3.88	28.37	28.11	3.84	28.34	-0.02	-0.03
7570	-15.32	28.14	3.79	28.36	28.11	3.8	28.33	-0.03	-0.03
7281	-22.16	28.07	4.15	28.34	28.05	4.15	28.31	-0.02	-0.03
7220	-22.28	28.08	4.07	28.33	28.05	4.04	28.31	-0.03	-0.02

Table C-2. Washougal River / Camas Slough Output (continued)		EXISTING WASHOUGAL / CAMAS SLOUGH - 100 YR Existing / Base Flood Model - Plan "p11"			PROPOSED WASHOUGAL / CAMAS SLOUGH - DEMO OF PIERS / ETC Proposed Flood Model - Plan "p12"			Rise in Elevations (proposed minus base)	
River Station	Bottom Elev (ft)	Base WS Elev (ft)	Base Vel CH (ft/s)	Base EG (ft)	Proposed WS Elev (ft)	Proposed Vel CH (ft/s)	Proposed EG (ft)	WS Rise (ft)	EG Rise (ft)
7151	-21.65	28.09	3.94	28.33	28.06	3.94	28.3	-0.03	-0.03
6864	-18.39	28.11	3.48	28.3	28.08	3.48	28.27	-0.03	-0.03
6440	-15.13	28.1	3.46	28.28	28.07	3.46	28.26	-0.03	-0.02
6428		**West Bridge (SR-14/25)**							
6343	-14.63	28.08	3.36	28.26	28.06	3.37	28.23	-0.02	-0.03
6148	-14.9	28.06	3.45	28.25	28.04	3.46	28.22	-0.02	-0.03
5580	-16.11	28.04	3.34	28.22	28.03	3.35	28.2	-0.01	-0.02
5008	-19.62	28.01	3.4	28.19	28	3.4	28.18	-0.01	-0.01
4887	-19.87	28.01	3.34	28.18	28	3.31	28.17	-0.01	-0.01
4834	-19.86	28.01	3.32	28.18	28	3.32	28.17	-0.01	-0.01
4784	-20.06	28.01	3.3	28.18	28	3.28	28.17	-0.01	-0.01
4710	-19.46	28.01	3.24	28.17	28	3.24	28.17	-0.01	0
4632	-19.4	28.01	3.21	28.17	28.01	3.19	28.16	0	-0.01
4580	-19.08	28	3.25	28.17	28	3.25	28.16	0	-0.01
4017	-21.17	28	3.13	28.15	27.99	3.13	28.14	-0.01	-0.01
3962	-21.47	27.99	3.17	28.15	27.99	3.15	28.14	0	-0.01
3890	-21.09	27.99	3.08	28.14	27.99	3.08	28.14	0	0
3467	-18.81	27.99	3.01	28.13	27.98	3.01	28.12	-0.01	-0.01
2856	-13.11	27.99	2.66	28.1	27.99	2.66	28.1	0	0
2287	-16.77	27.99	2.49	28.09	27.99	2.49	28.08	0	-0.01
1911	-18.58	27.99	2.39	28.08	27.98	2.39	28.07	-0.01	-0.01
1782	-29.48	27.99	2.43	28.07	27.98	2.43	28.07	-0.01	0
1670	-40.87	28	2.03	28.06	28	2.01	28.06	0	0
1589	-38.32	28	2.06	28.06	27.99	2.04	28.06	-0.01	0
1265	-21.1	27.98	2.25	28.06	27.98	2.21	28.05	0	-0.01
975	-15.93	27.97	2.29	28.05	27.97	2.26	28.05	0	0
689	-14.95	27.89	3.19	28.04	27.89	3.19	28.04	0	0
612	-20.24	27.87	3.38	28.03	27.87	3.38	28.03	0	0
552	-24.96	27.9	2.83	28.02	27.9	2.83	28.02	0	0

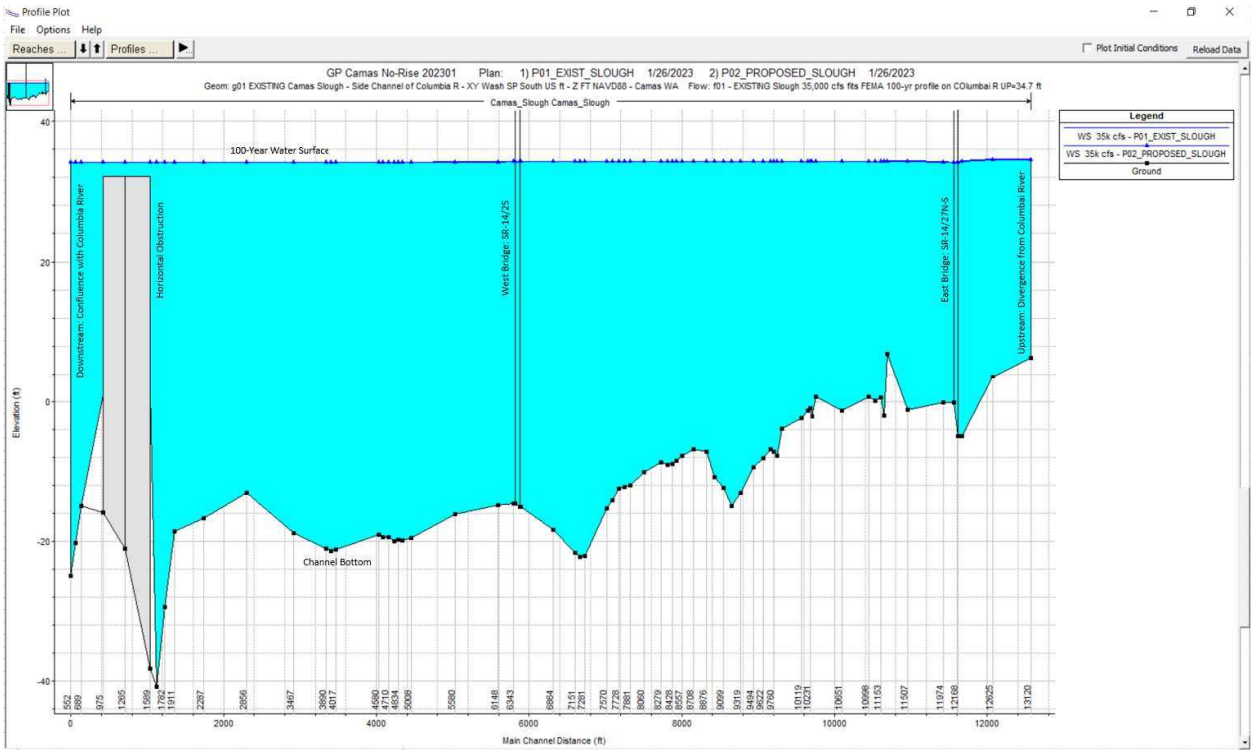
WS (ft) - Water surface elevation (ft NAVD88)
Vel CH (ft/s) - Velocity of flow in channel (ft/second)
EG (ft) - Energy grade (ft NAVD88)
(*) Three cross-sections added for Washougal River above Camas Slough

APPENDIX D:
EXISTING-CONDITION DATA FOR CAMAS SLOUGH MODEL

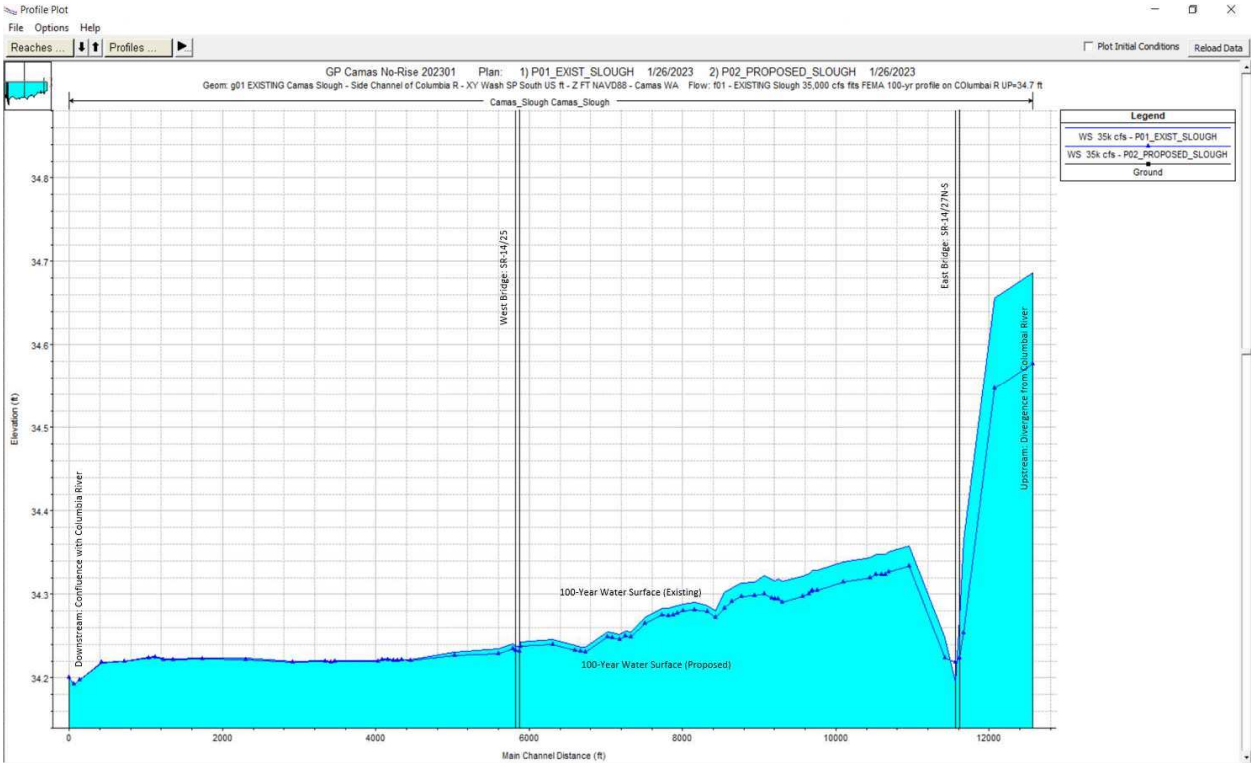
Appendix D. HEC-RAS Hydraulic Model Data for Existing Conditions



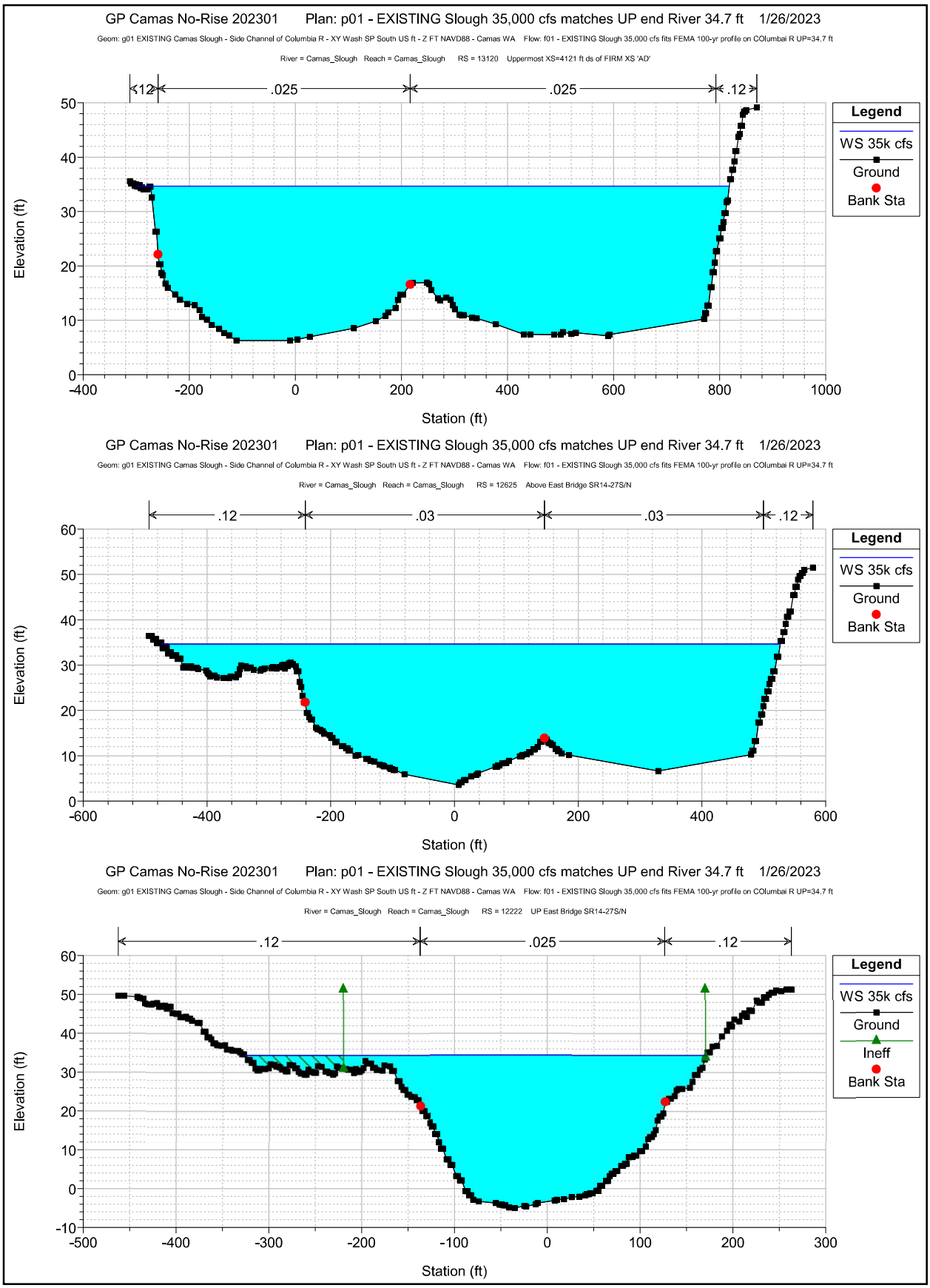
Schematic of Camas Slough Model Cross-Section Locations



Profile of Camas Slough Model (Full-Scale; Cross-Sections Labeled)



Profile of Camas Slough Model (Expanded Scale)

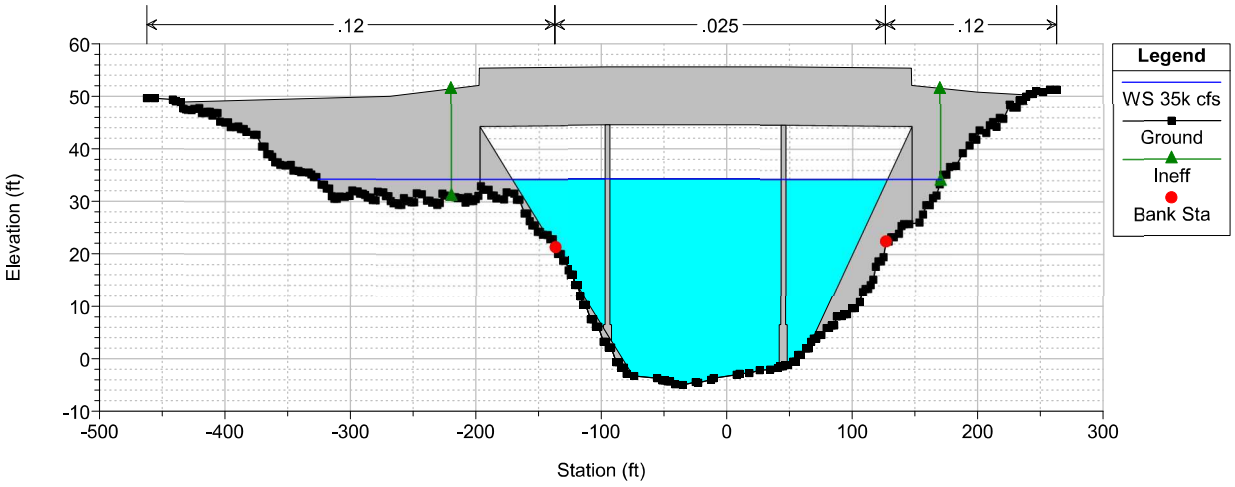

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 13120 Uppermost XS=4121 ft ds of FIRM XS 'AD'
.12
.025
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 12625 Above East Bridge SR14-27S/N
.12
.03
.03
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 12222 UP East Bridge SR14-27S/N
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

1

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

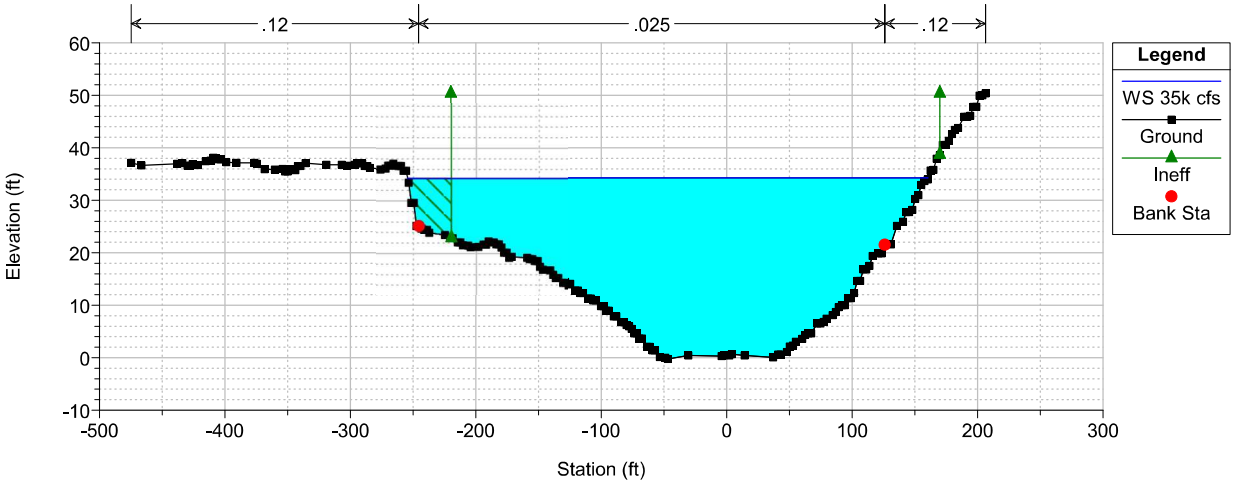
River = Camas_Slough Reach = Camas_Slough RS = 12168 BR East Bridge SR14-27S/N



GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

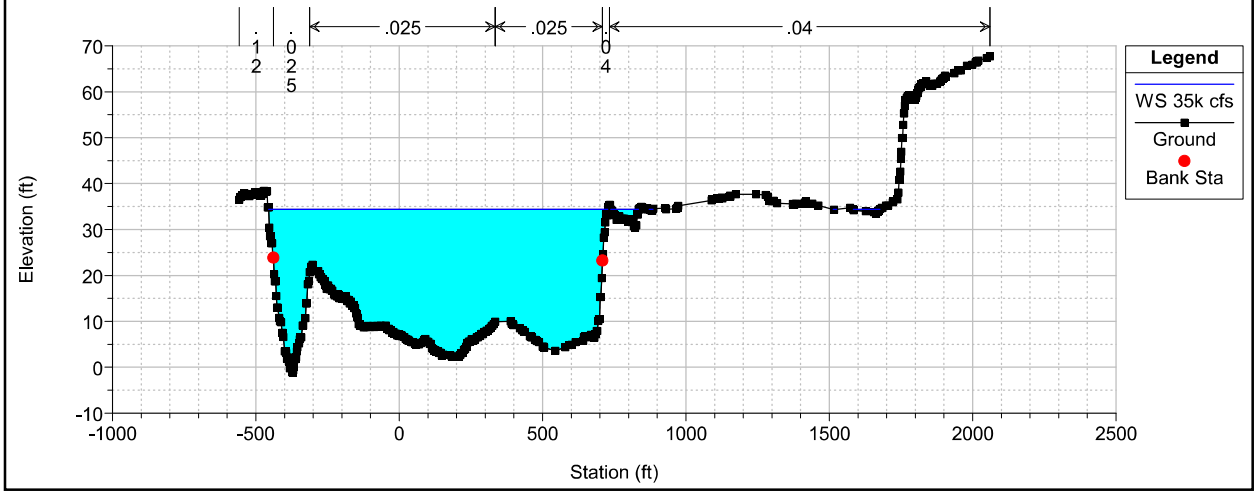
River = Camas_Slough Reach = Camas_Slough RS = 11974 Shifted these LEFT 80 FT to align channel (shift left 6 ft to al

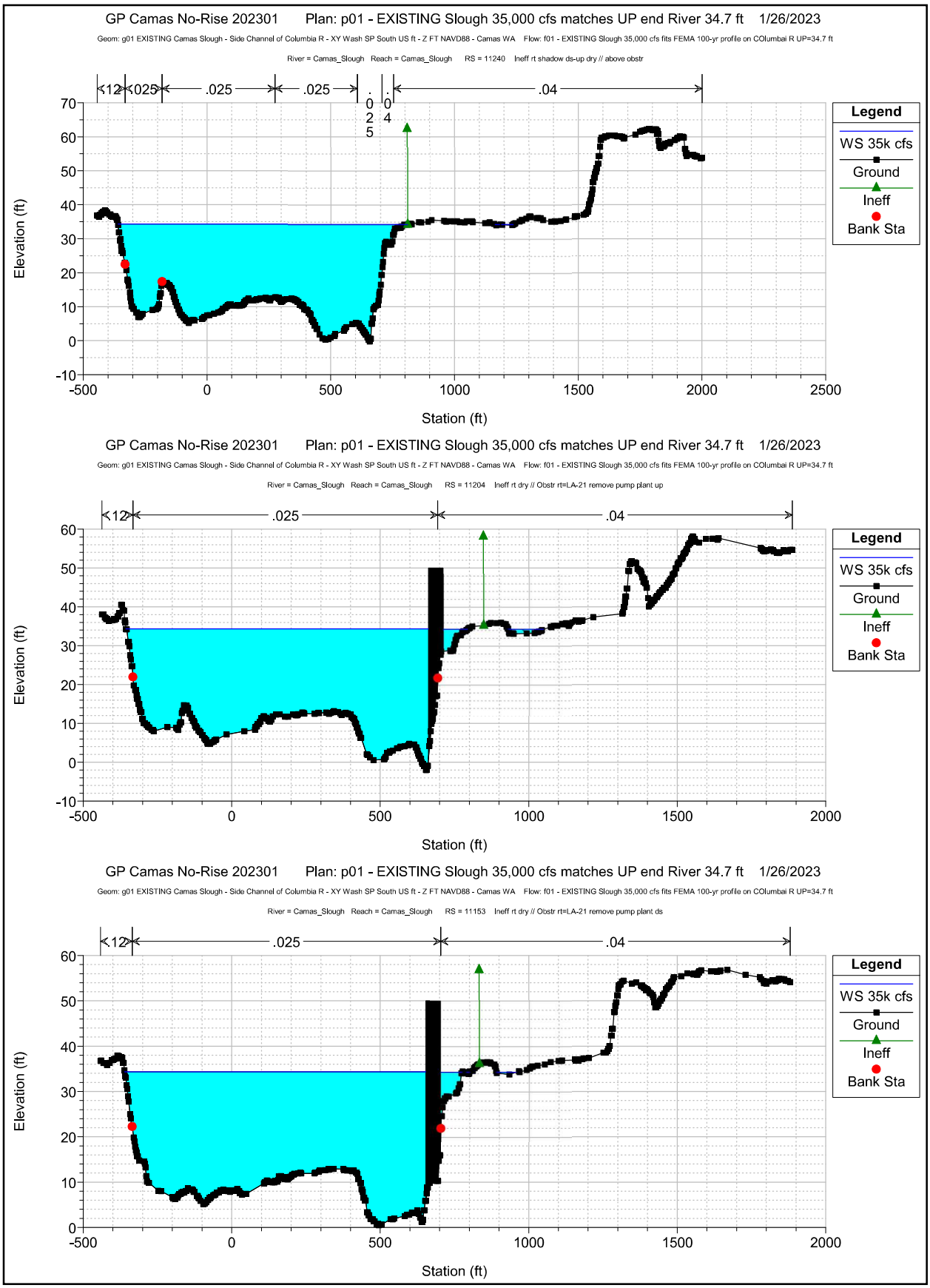


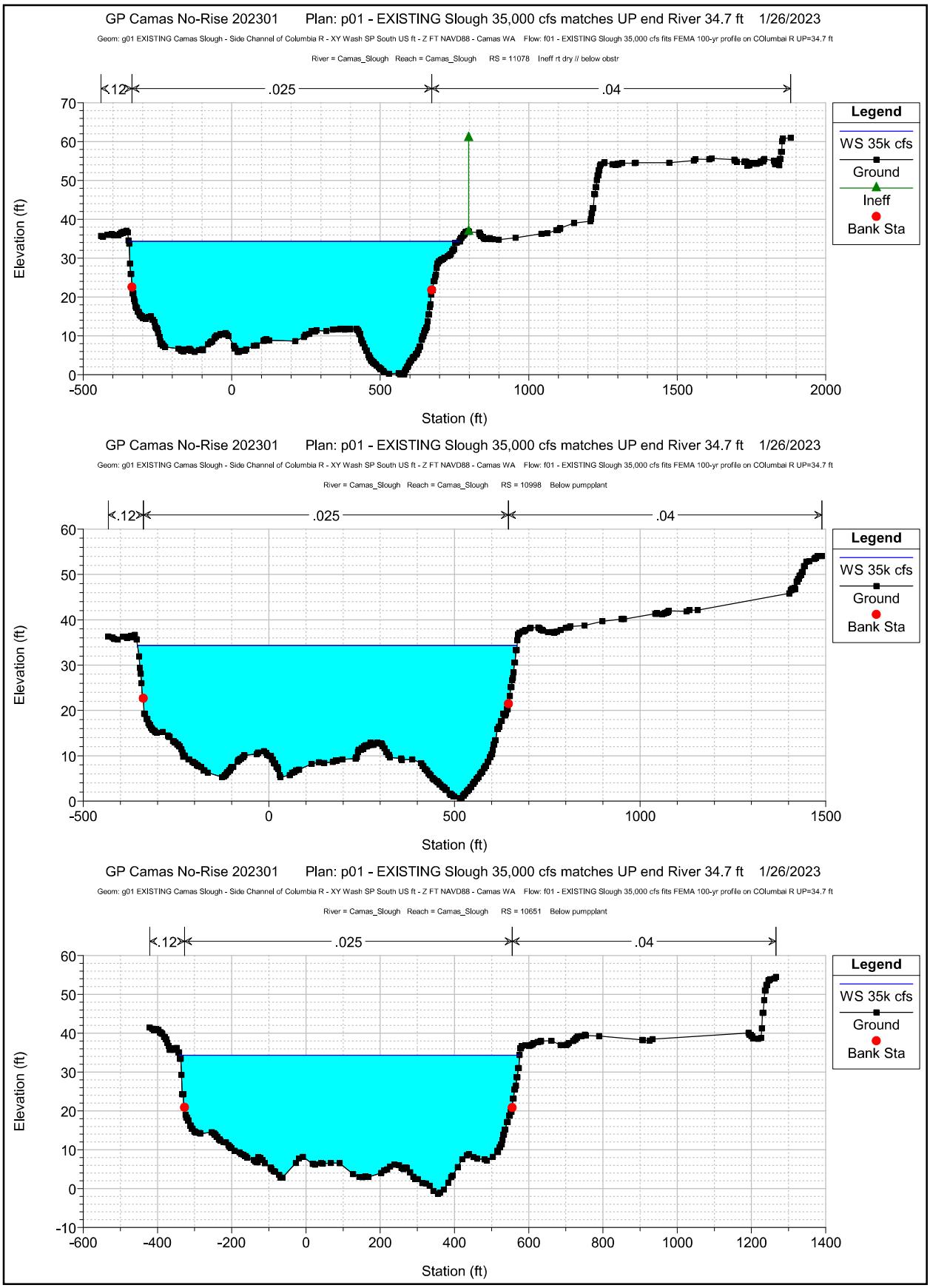
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023

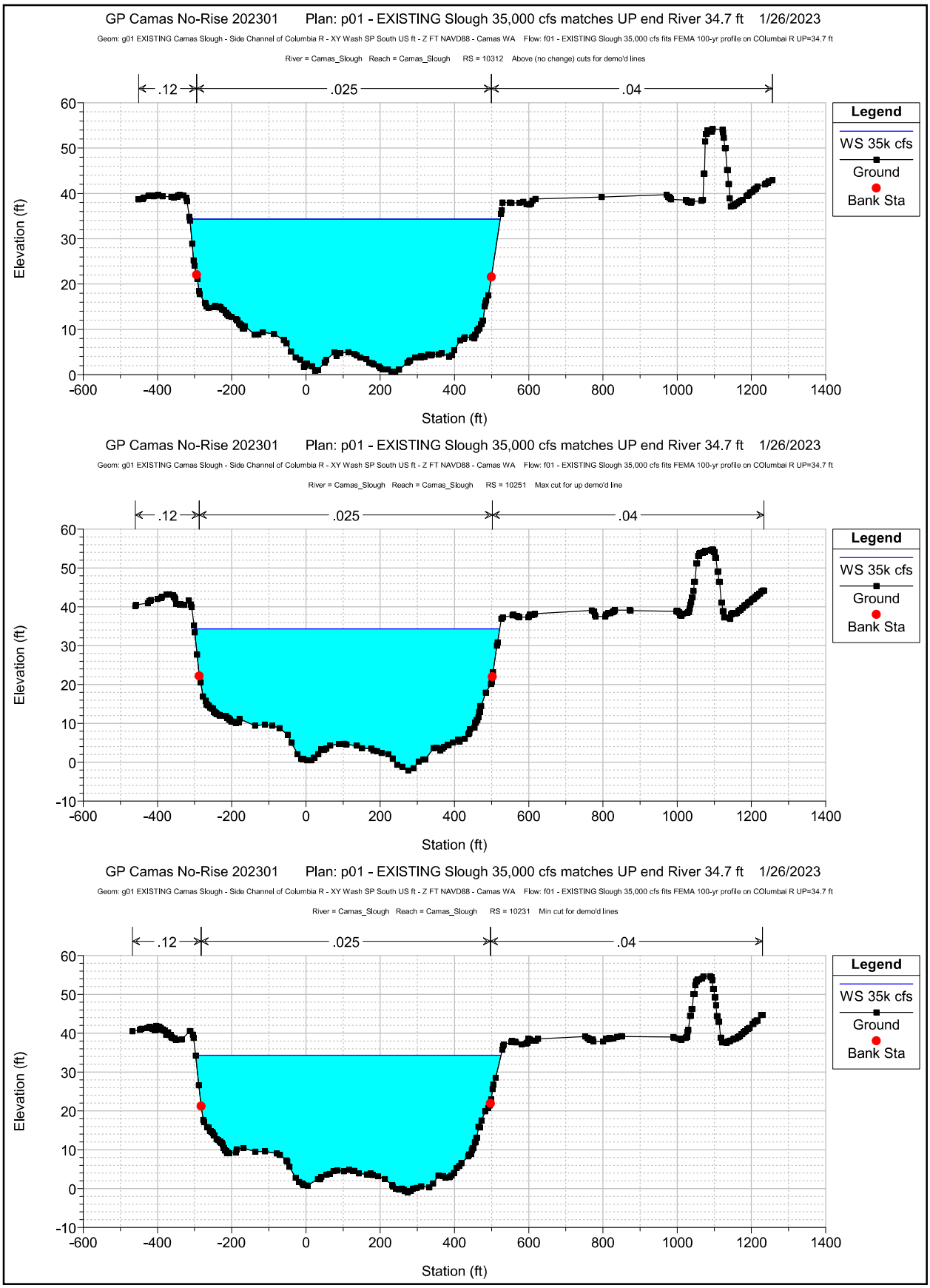
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

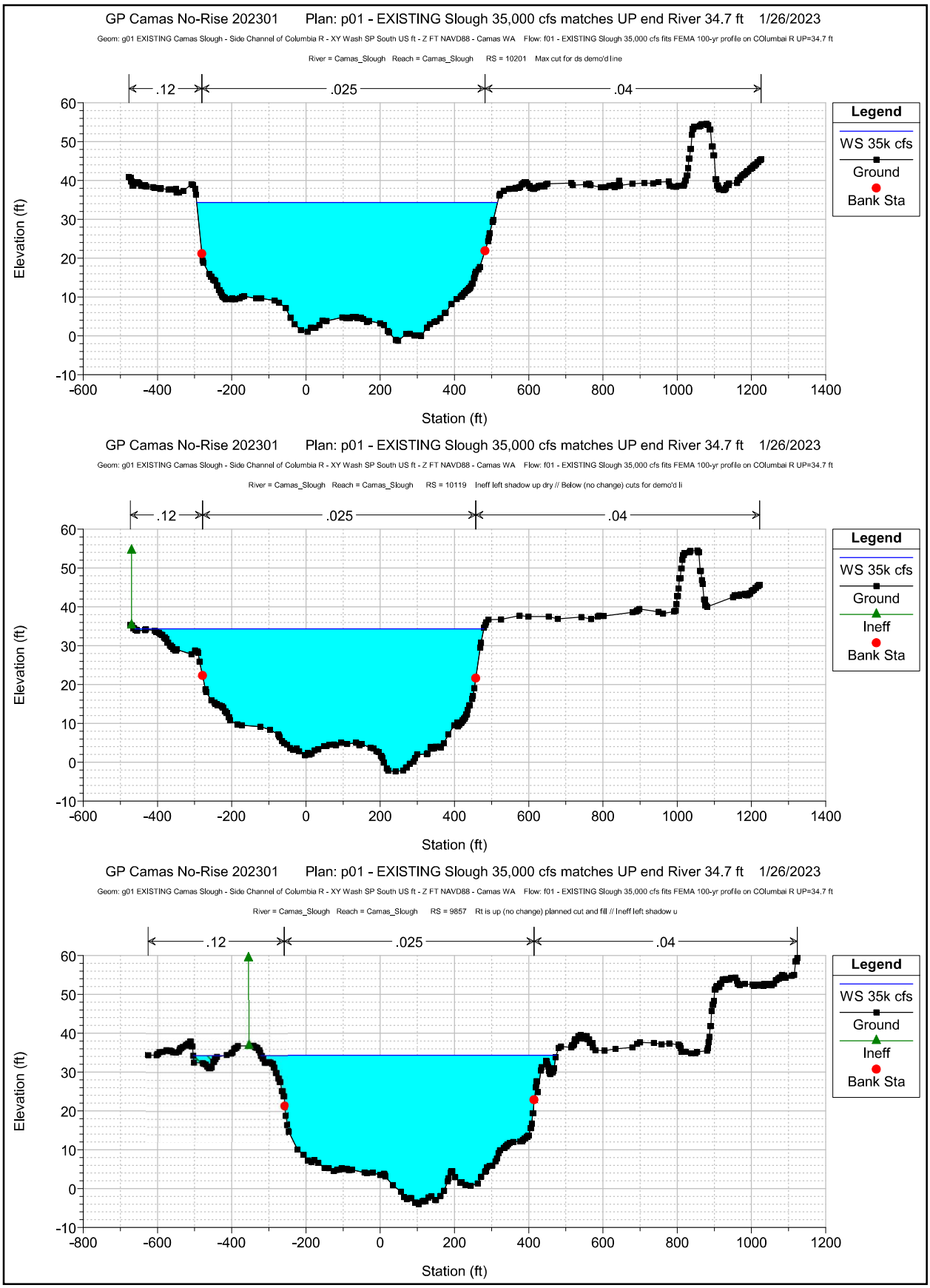
River = Camas_Slough Reach = Camas_Slough RS = 11507 Expanded East Bridge SR14-27S/N=JCT Washougal XS's

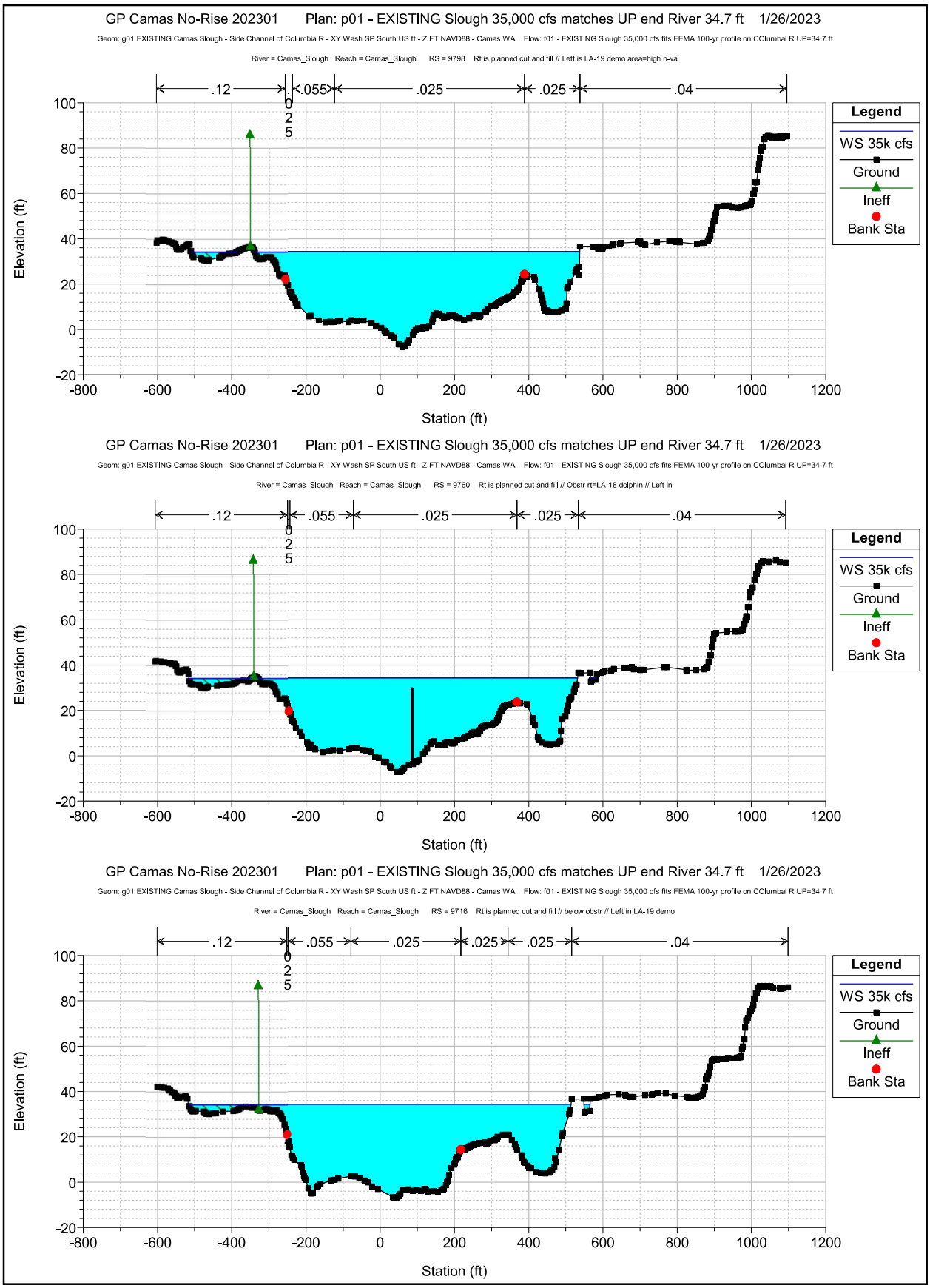


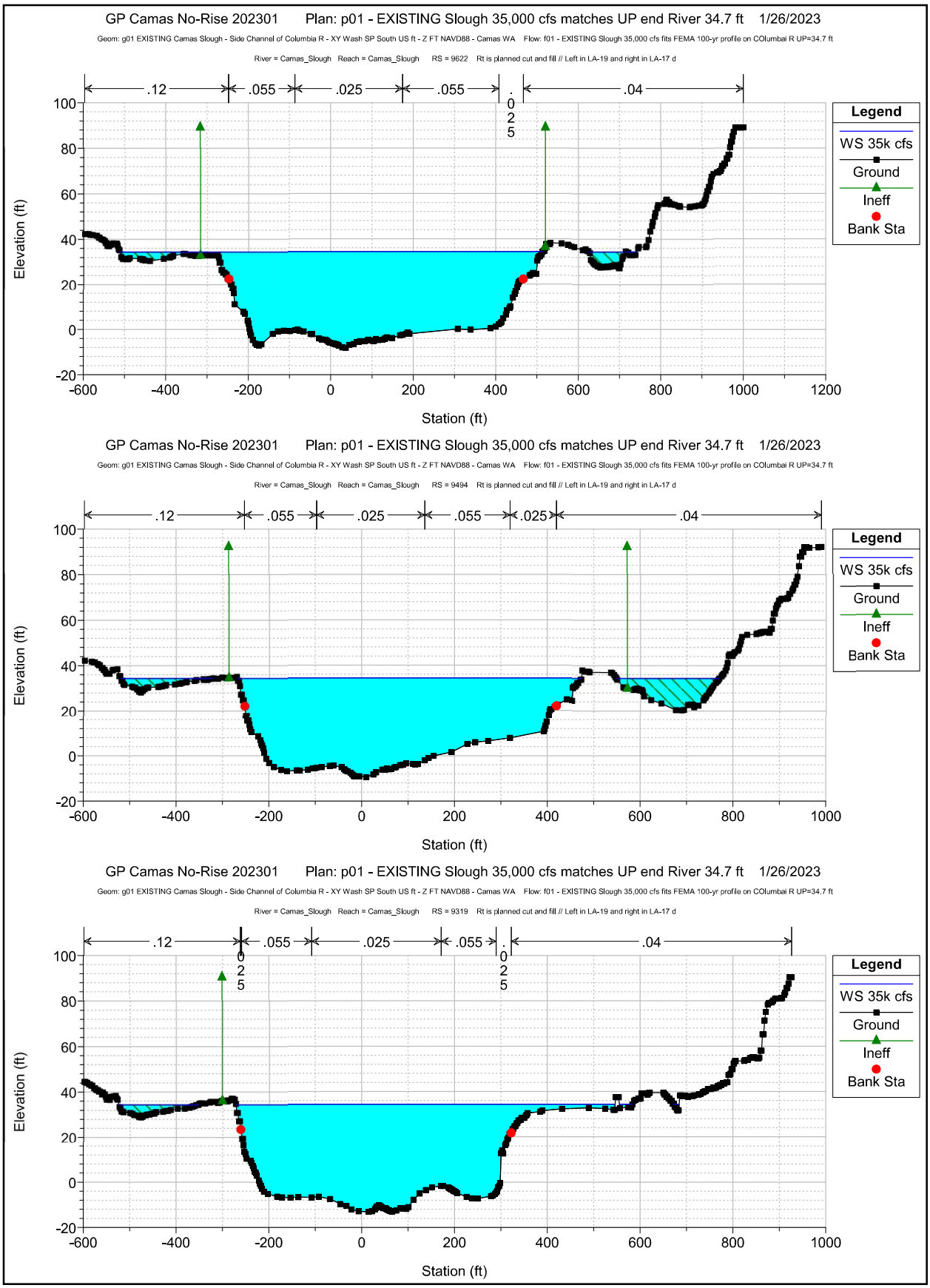

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11240 Ineff rt shadow ds-up dry // above obstr
.12
.025
.025
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11204 Ineff rt dry // Obstr rt=LA-21 remove pump plant up
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11153 Ineff rt dry // Obstr rt=LA-21 remove pump plant ds
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

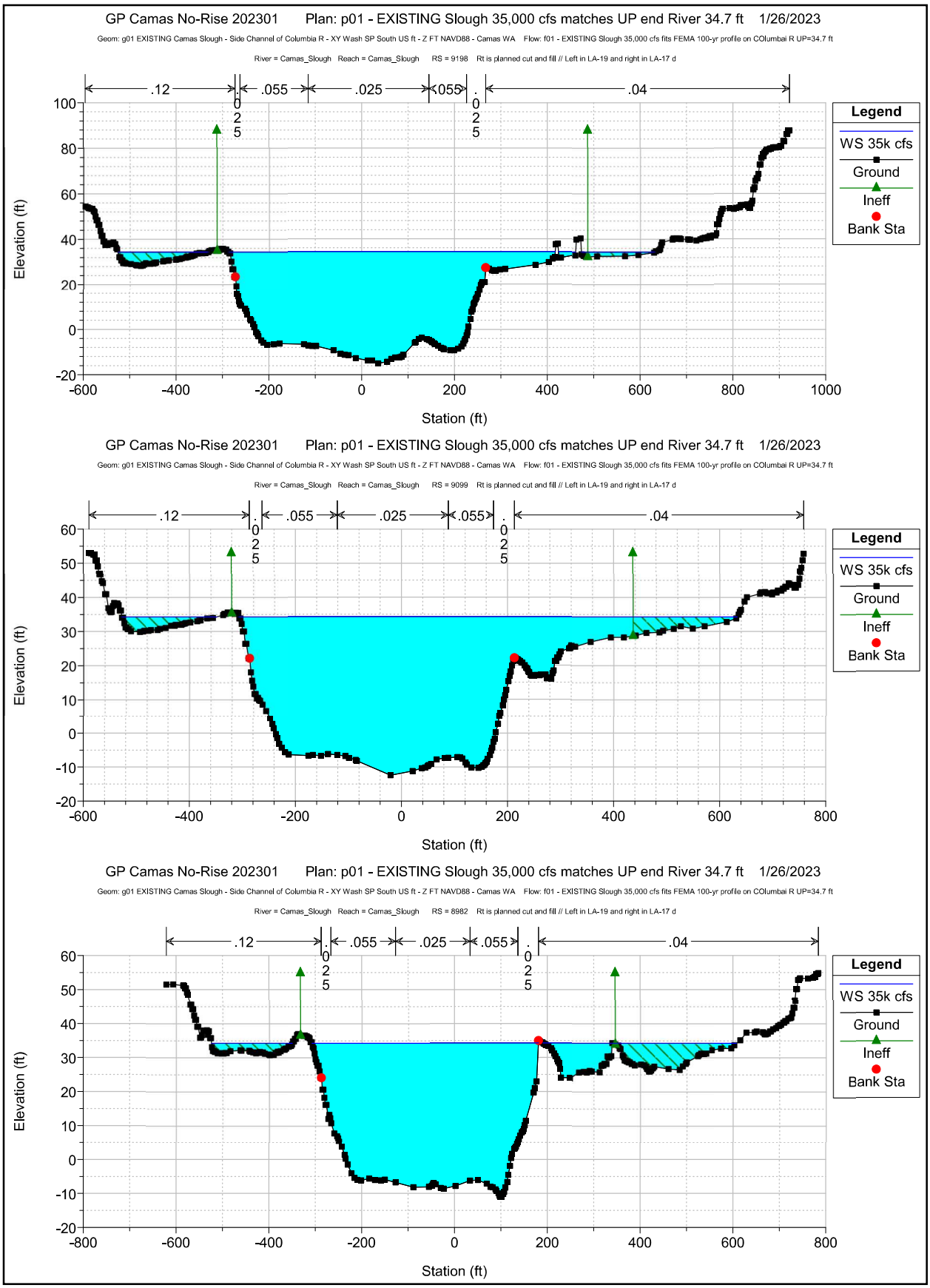

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11078 Ineff rt dry // below obstr
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10998 Below pumpplant
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10651 Below pumpplant
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

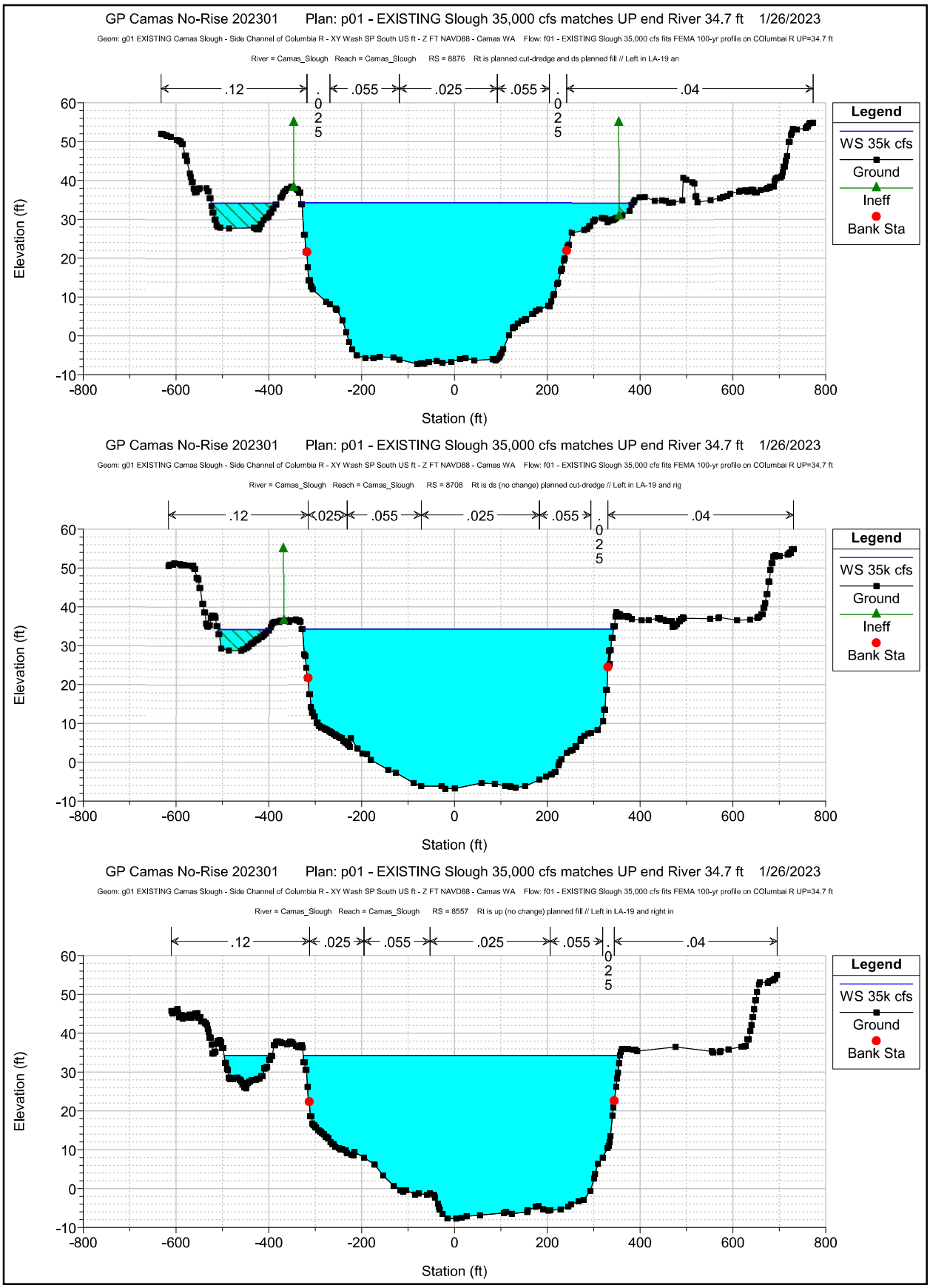

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10312 Above (no change) cuts for demo'd lines
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10251 Max cut for up demo'd line
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10231 Min cut for demo'd lines
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

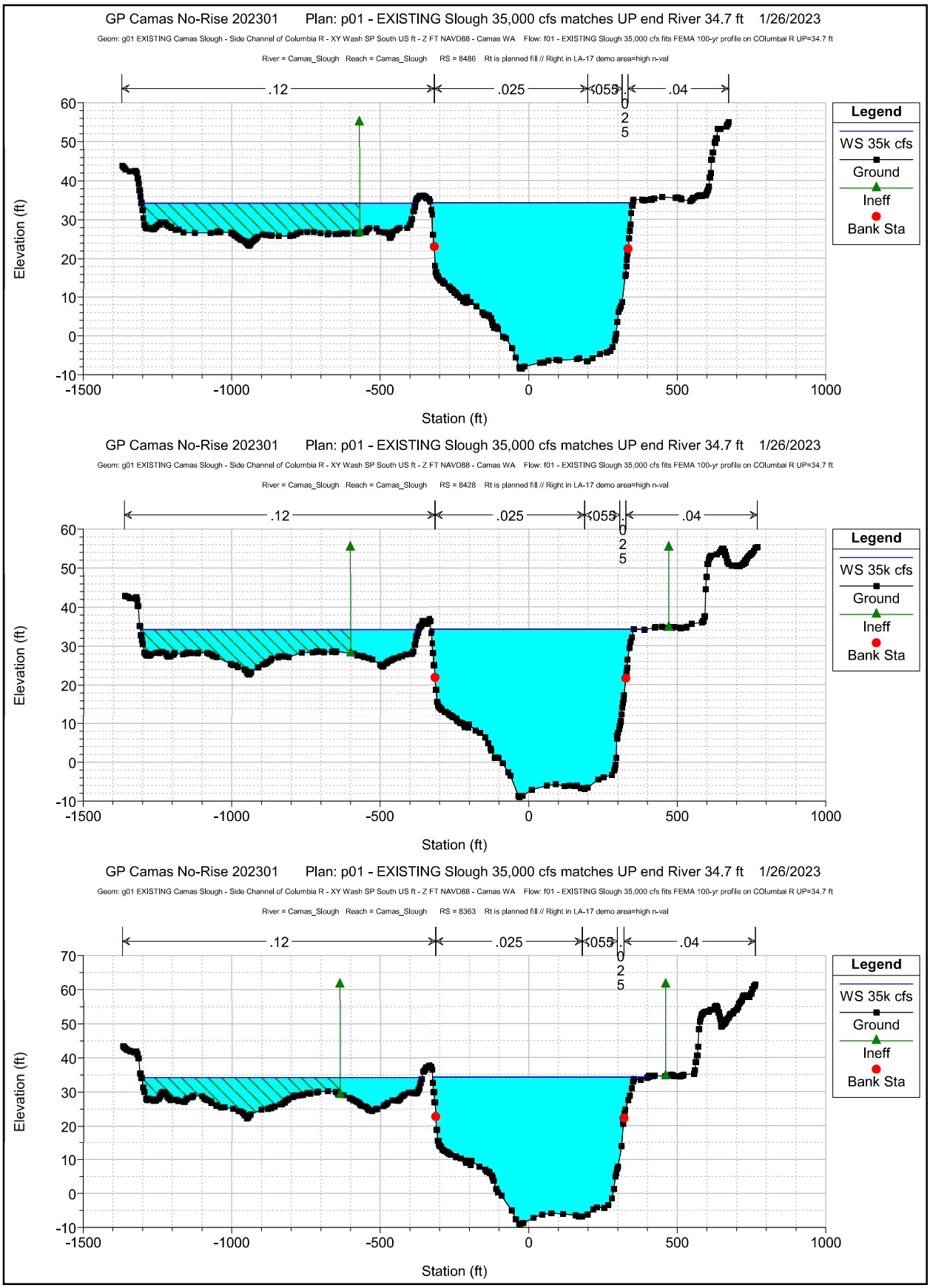

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10201 Max cut for ds demo'd line
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10119 Ineff left shadow up dry // Below (no change) cuts for demo'd li
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9857 Rt is up (no change) planned cut and fill // Ineff left shadow u
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

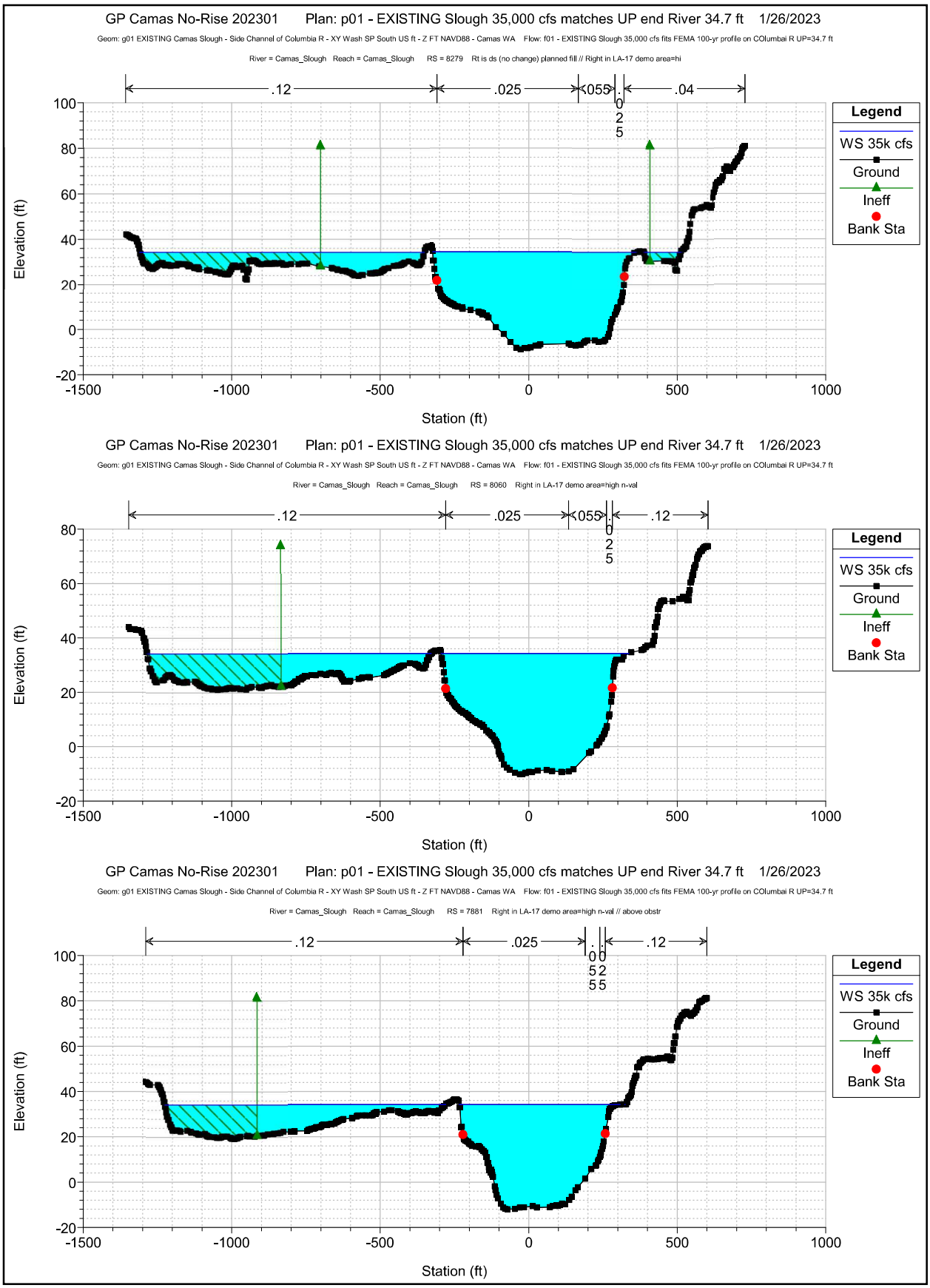

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9798 Rt is planned cut and fill // Left is LA-19 demo area=high n-val
.12
.055
.025
.025
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9760 Rt is planned cut and fill // Obstr rt=LA-18 dolphin // Left in
.12
.055
.025
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9716 Rt is planned cut and fill // below obstr // Left in LA-19 demo
.12
.055
.025
.025
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

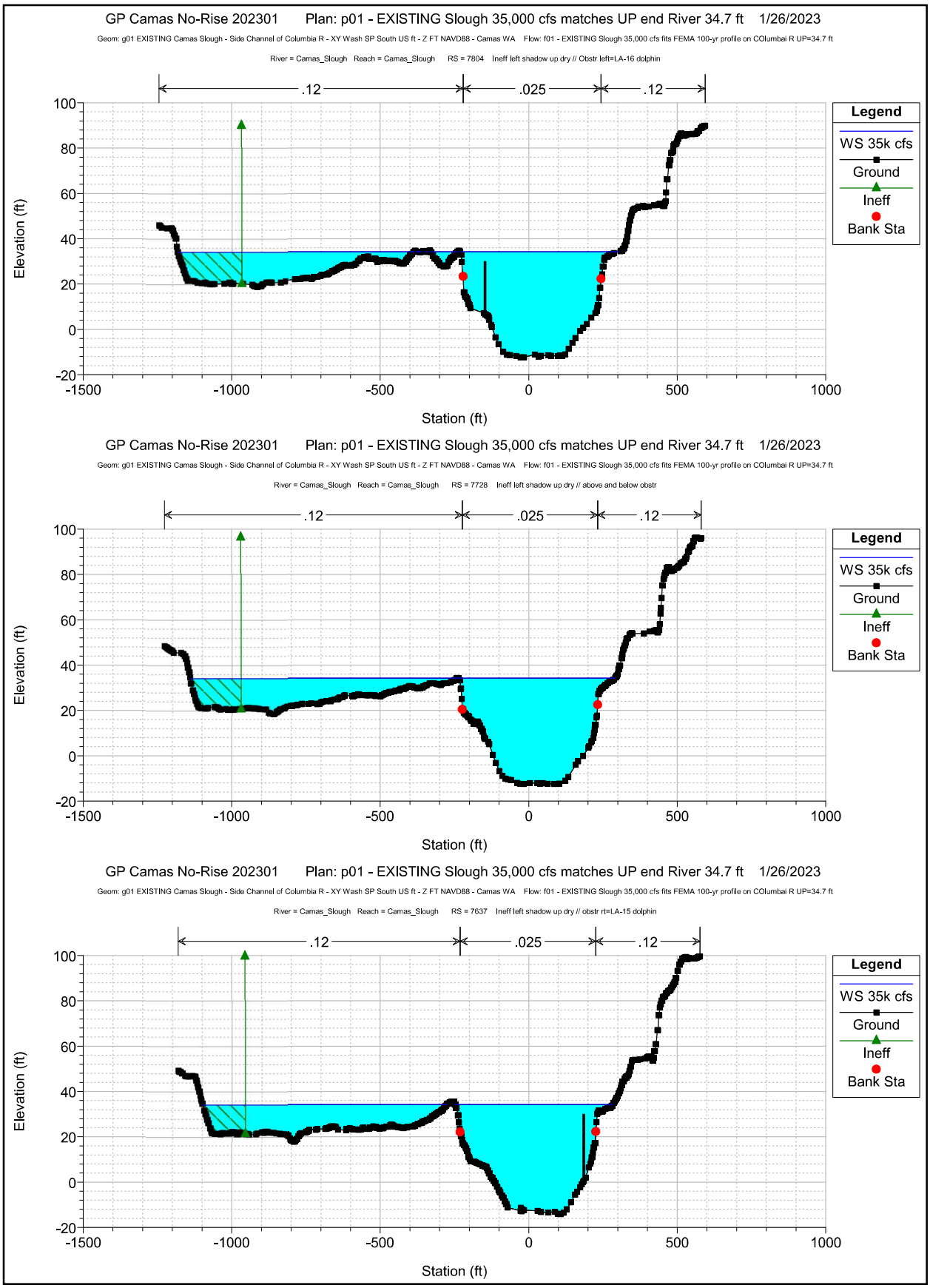

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9622 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9494 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9319 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

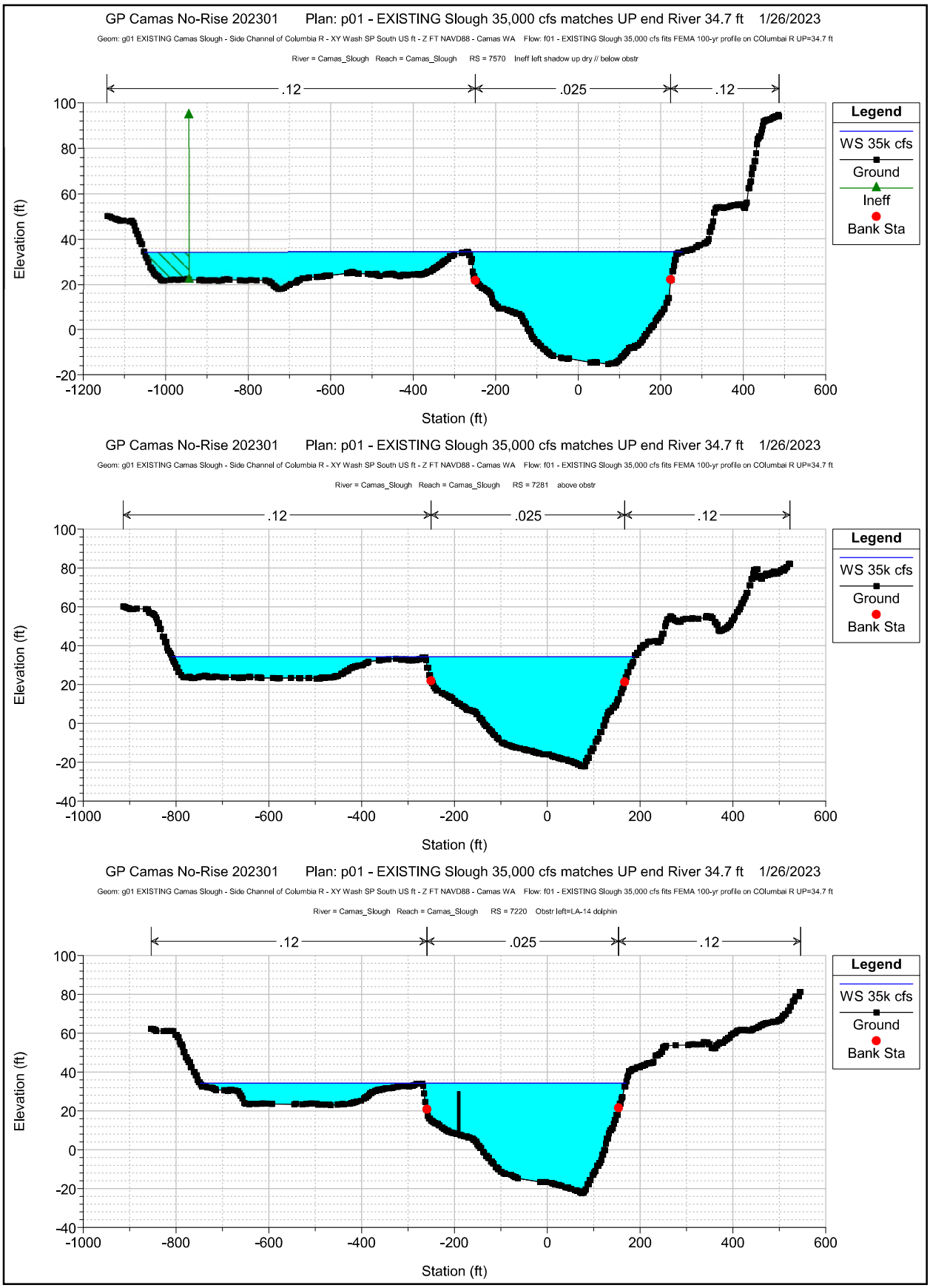

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9198 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.04
.025
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9099 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.04
.025
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8982 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.04
.025
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8876 Rt is planned cut-dredge and ds planned fill // Left in LA-19 an
.12
.025
.055
.025
.055
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8708 Rt is ds (no change) planned cut-dredge // Left in LA-19 and rig
.12
.025
.055
.025
.055
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8557 Rt is up (no change) planned fill // Left in LA-19 and right in
.12
.025
.055
.025
.055
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8486 Rt is planned fill // Right in LA-17 demo area=high n-val
.12
.025
.055
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8428 Rt is planned fill // Right in LA-17 demo area=high n-val
.12
.025
.055
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8363 Rt is planned fill // Right in LA-17 demo area=high n-val
.12
.025
.055
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8279 Rt is ds (no change) planned fill // Right in LA-17 demo area=hi
.12
.025
.055
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8060 Right in LA-17 demo area=high n-val
.12
.025
.055
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7881 Right in LA-17 demo area=high n-val // above obstr
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7804 Ineff left shadow up dry // Obstr left=LA-16 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7728 Ineff left shadow up dry // above and below obstr
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7637 Ineff left shadow up dry // obstr rt=LA-15 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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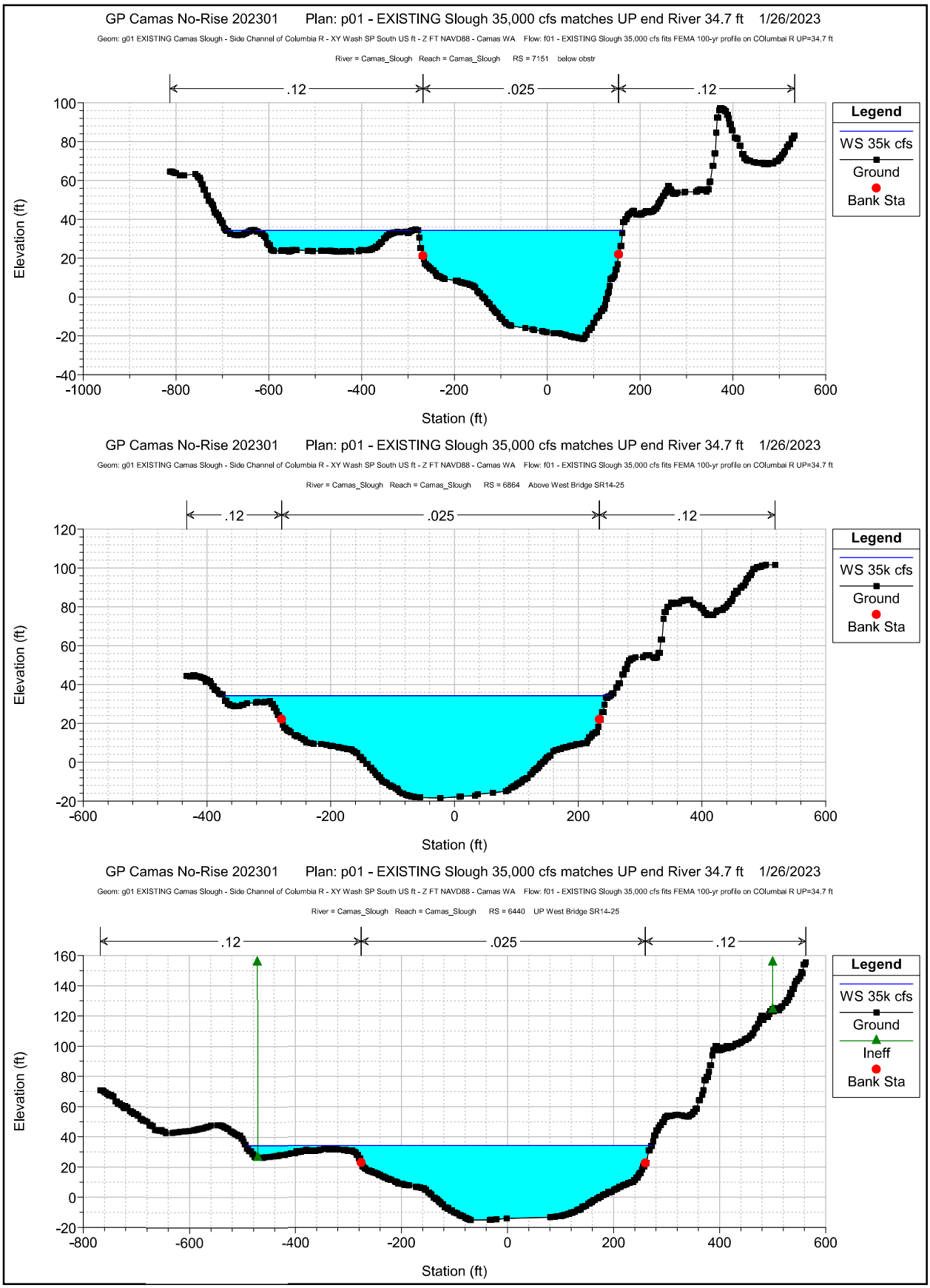
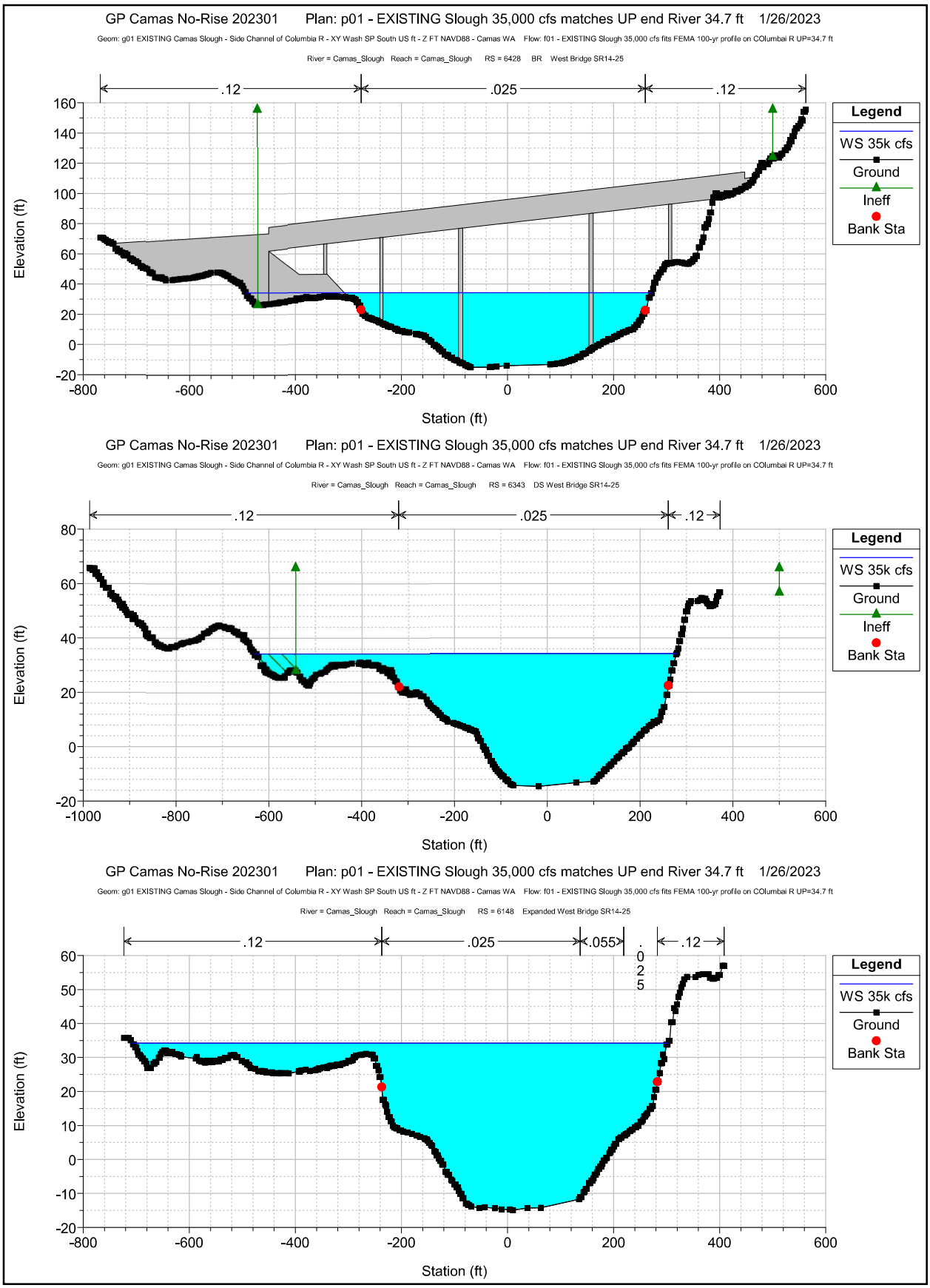
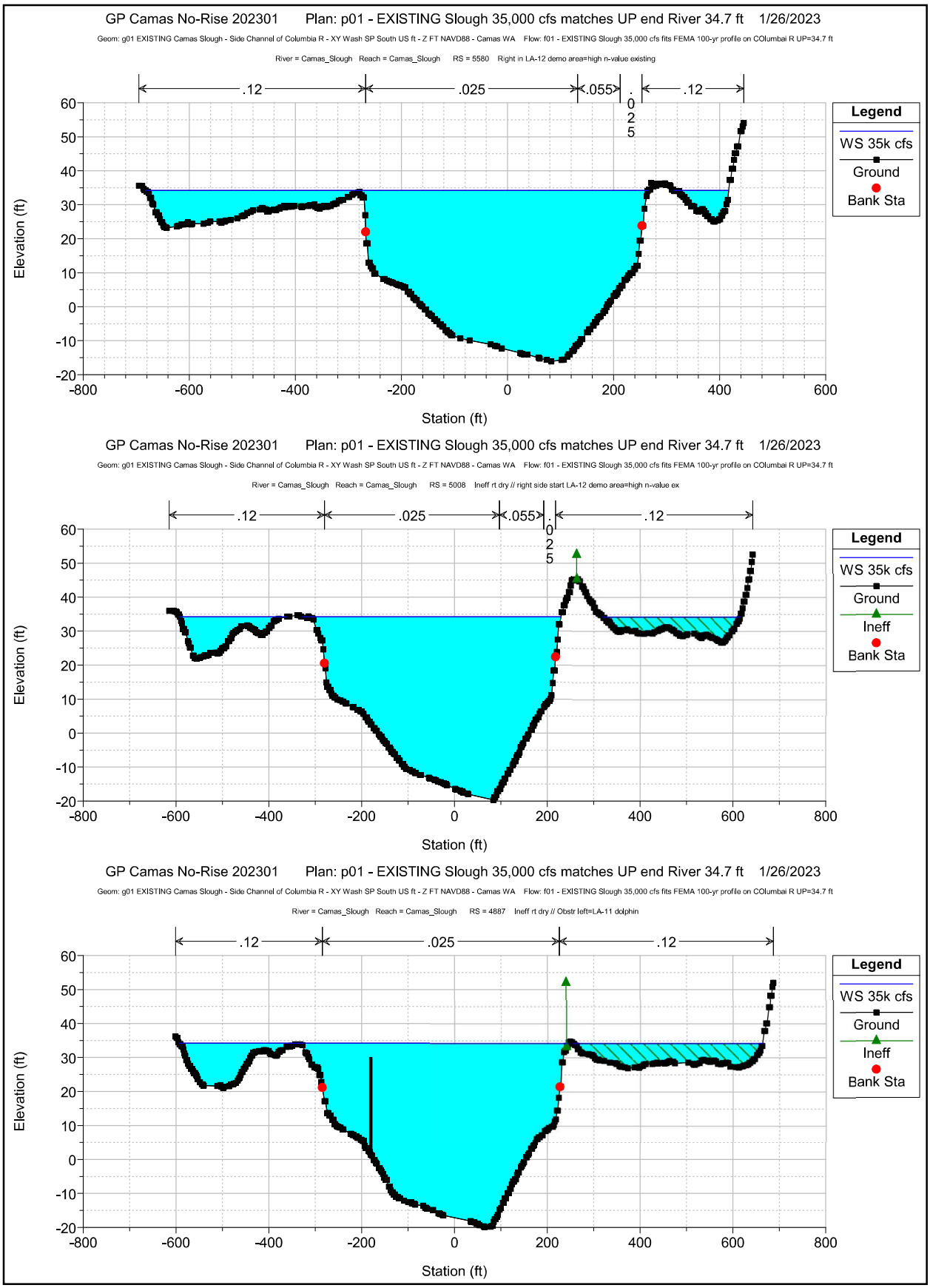
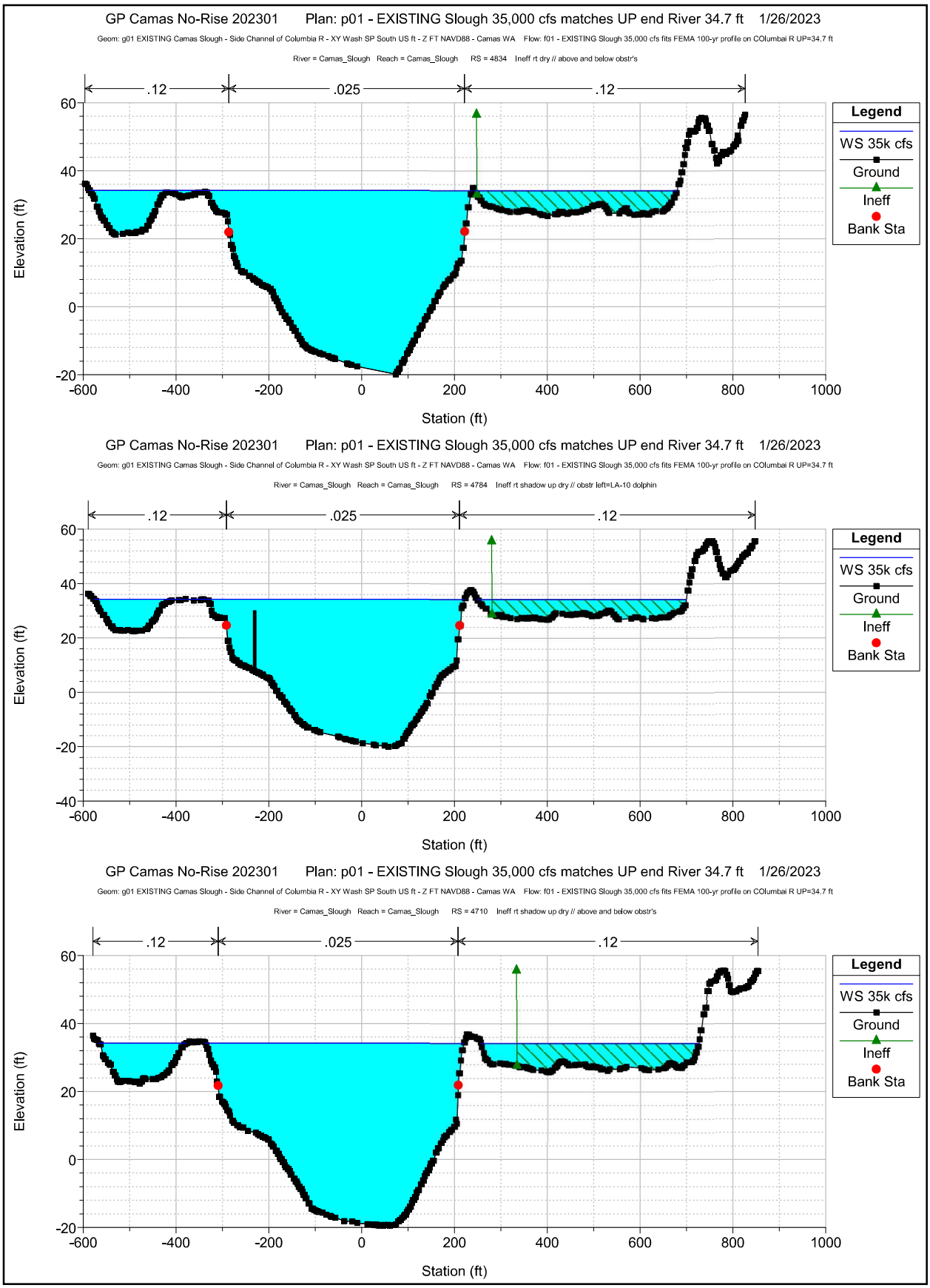
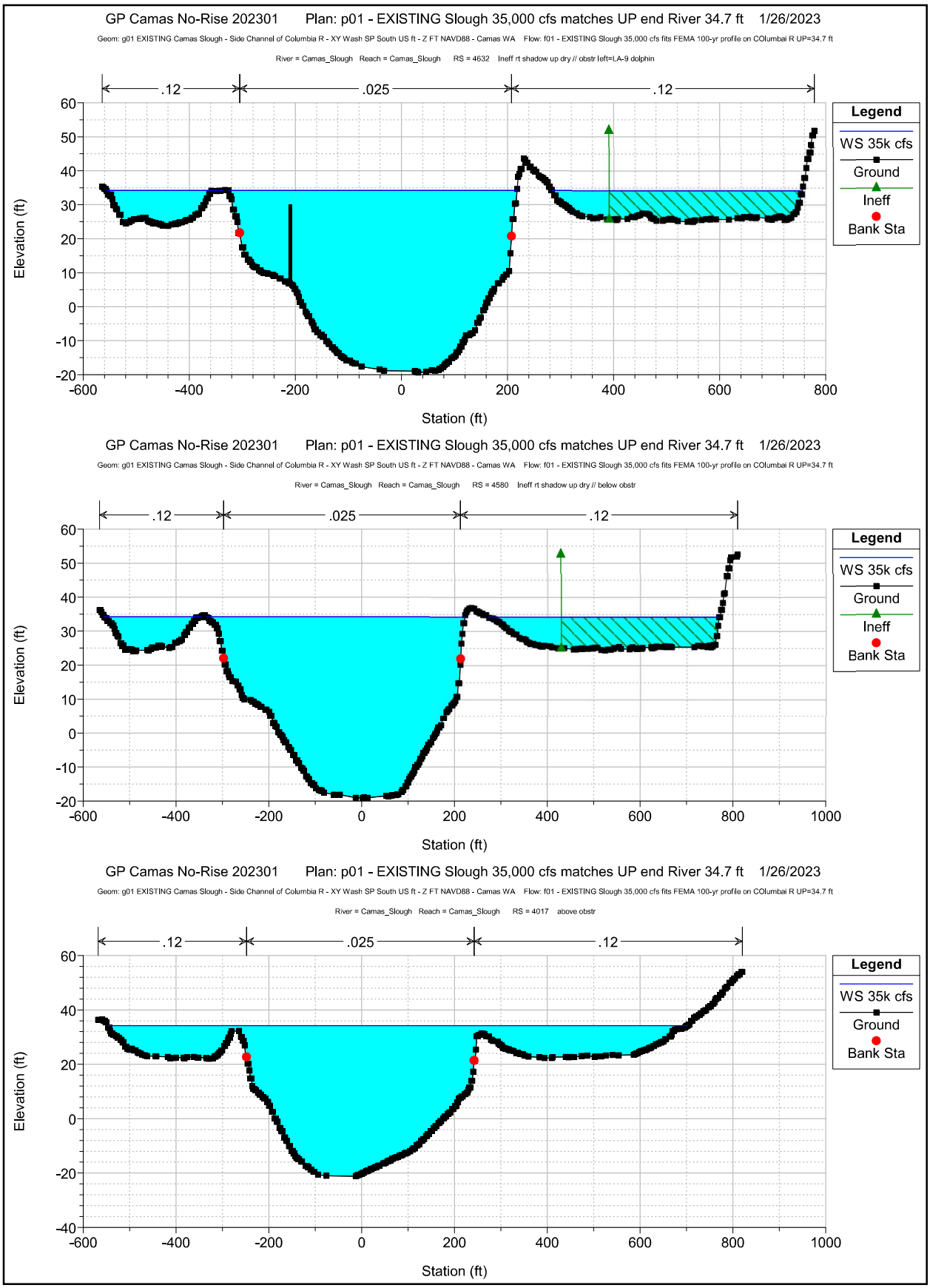
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7570 Ineff left shadow up dry // below obstr
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7281 above obstr
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7220 Obstr left=LA-14 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7151 below obstr
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 6864 Above West Bridge SR14-25
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 6440 UP West Bridge SR14-25
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 6428 BR West Bridge SR14-25
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 6343 DS West Bridge SR14-25
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 6148 Expanded West Bridge SR14-25
.12
.025
.055
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 5580 Right in LA-12 demo area=high n-value existing
.12
.025
.055
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 5008 Ineff rt dry // right side start LA-12 demo area=high n-value ex
.12
.025
.055
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4887 Ineff rt dry // Obstr left=LA-11 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

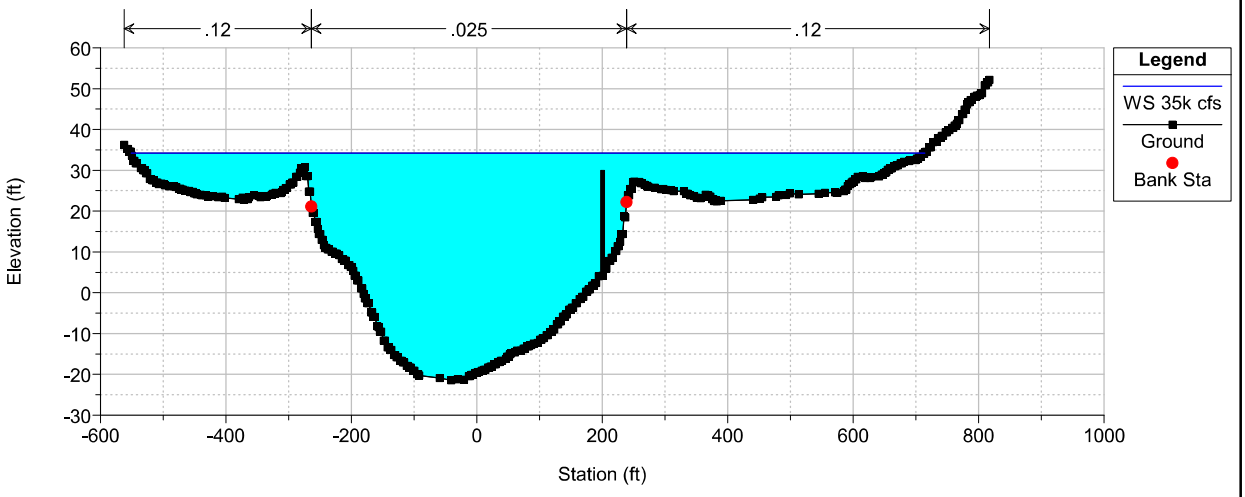

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4834 Ineff rt dry // above and below obstr's
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4784 Ineff rt shadow up dry // obstr left=LA-10 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4710 Ineff rt shadow up dry // above and below obstr's
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4632 Ineff rt shadow up dry // obstr left=LA-9 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4580 Ineff rt shadow up dry // below obstr
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4017 above obstr
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

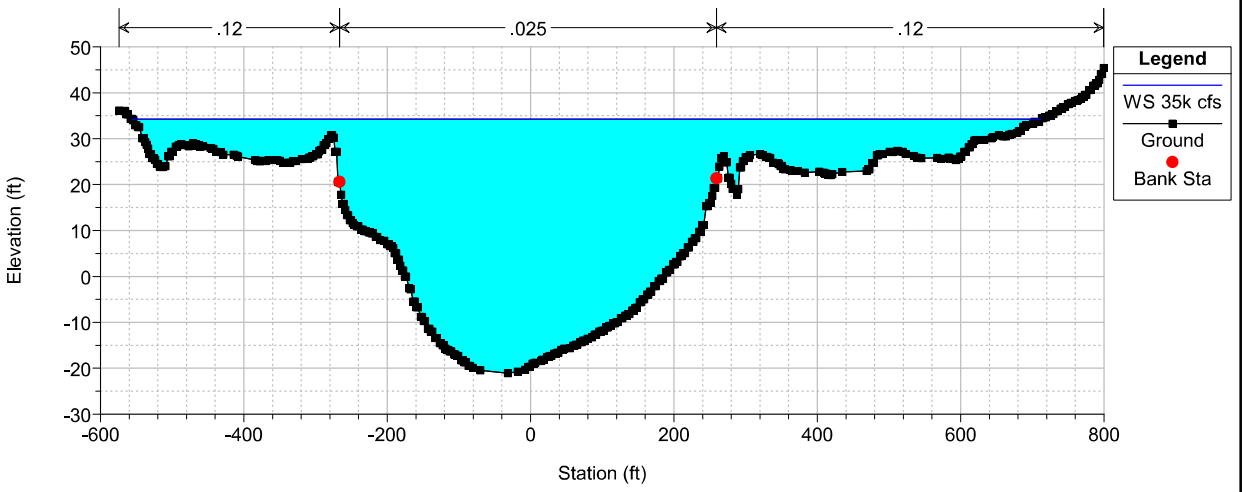
River = Camas_Slough Reach = Camas_Slough RS = 3962 Obstr rt=LA-8 dolphin



GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

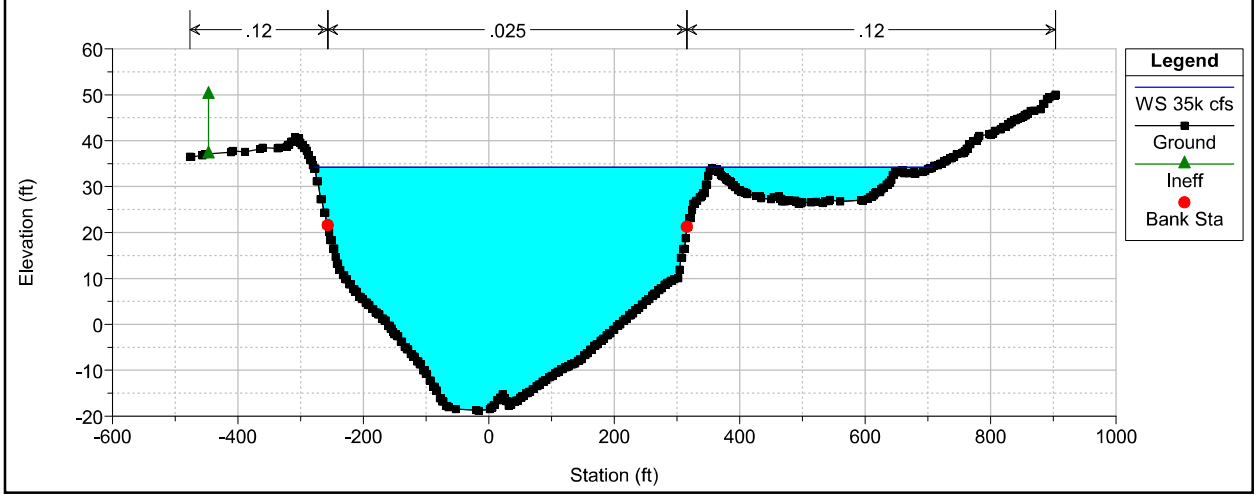
River = Camas_Slough Reach = Camas_Slough RS = 3890 ds obstr

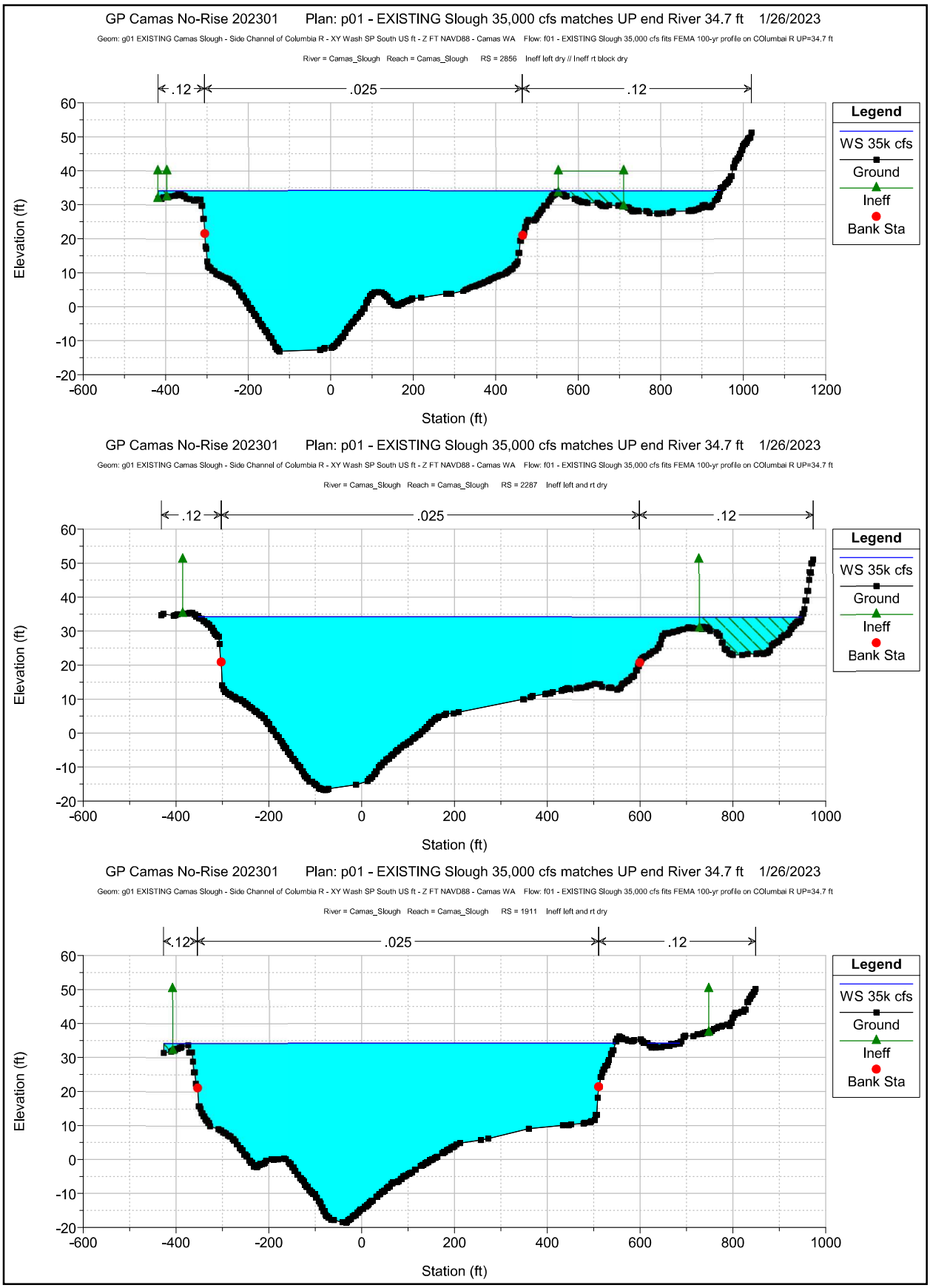


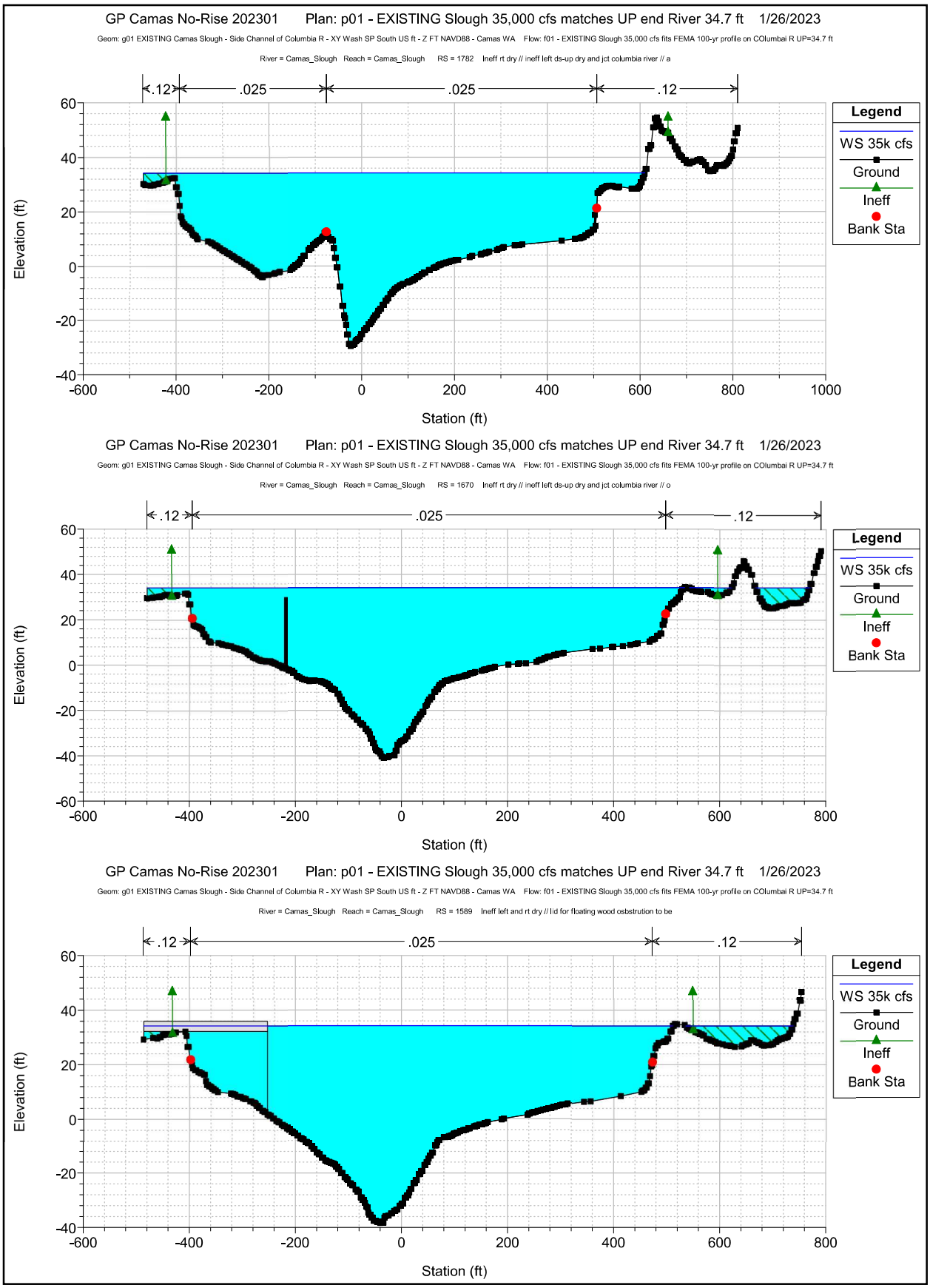
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

River = Camas_Slough Reach = Camas_Slough RS = 3467 Ineff left dry




GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 2856 Ineff left dry // Ineff rt block dry
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 2287 Ineff left and rt dry
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 1911 Ineff left and rt dry
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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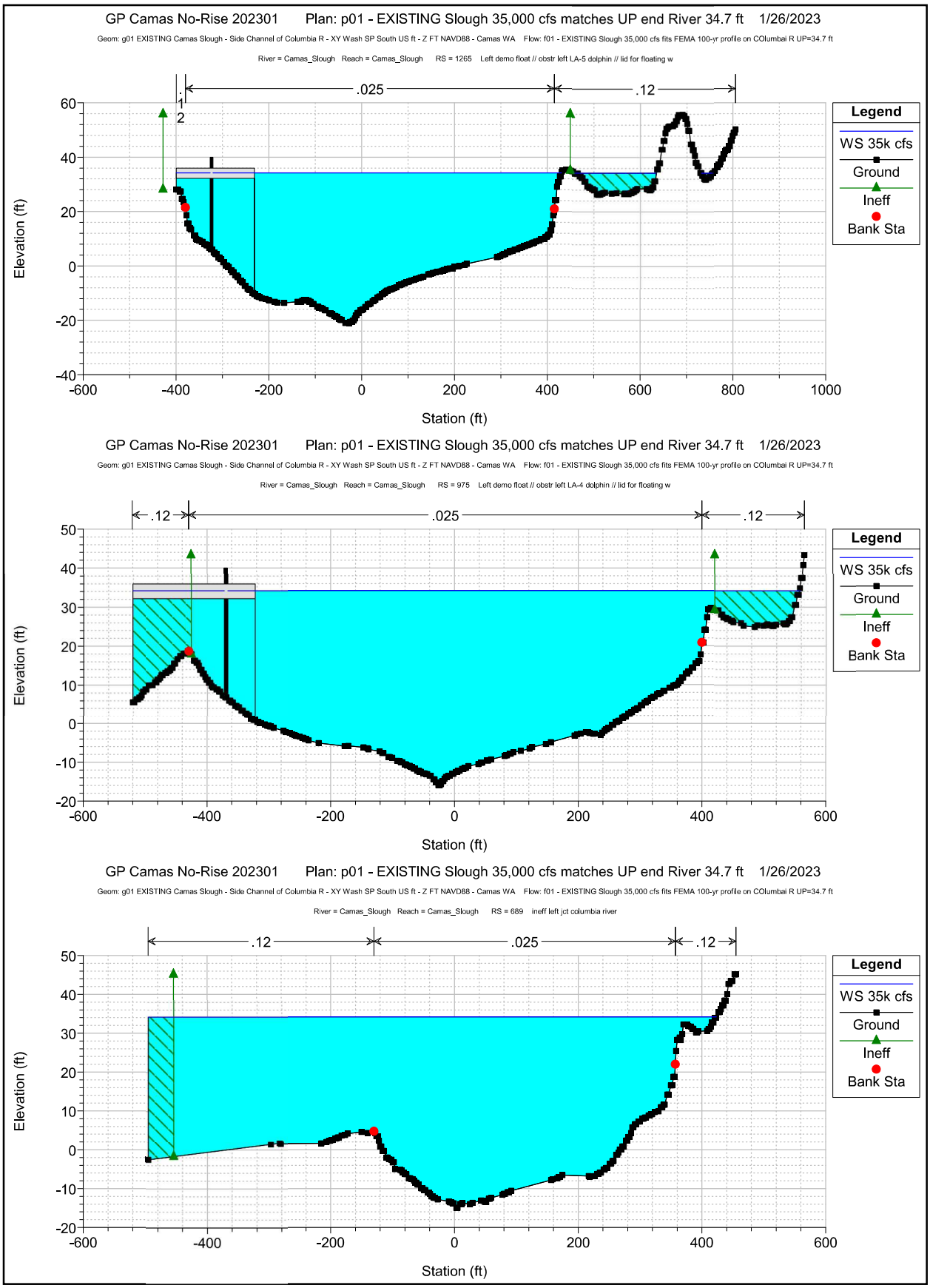
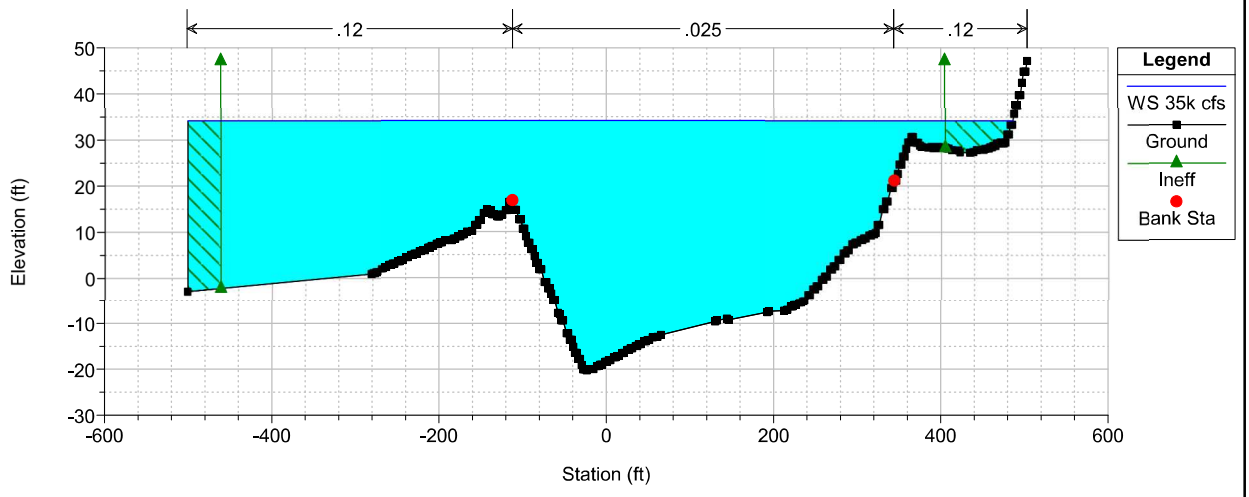
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 1782 Ineff rt dry // ineff left ds-up dry and jct columbia river // a
.12
.025
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 1670 Ineff rt dry // ineff left ds-up dry and jct columbia river // o
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 1589 Ineff left and rt dry // lid for floating wood osbstrution to be
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 1265 Left demo float // obstr left LA-5 dolphin // lid for floating w
.1
.2
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 975 Left demo float // obstr left LA-4 dolphin // lid for floating w
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 689 ineff left jct columbia river
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

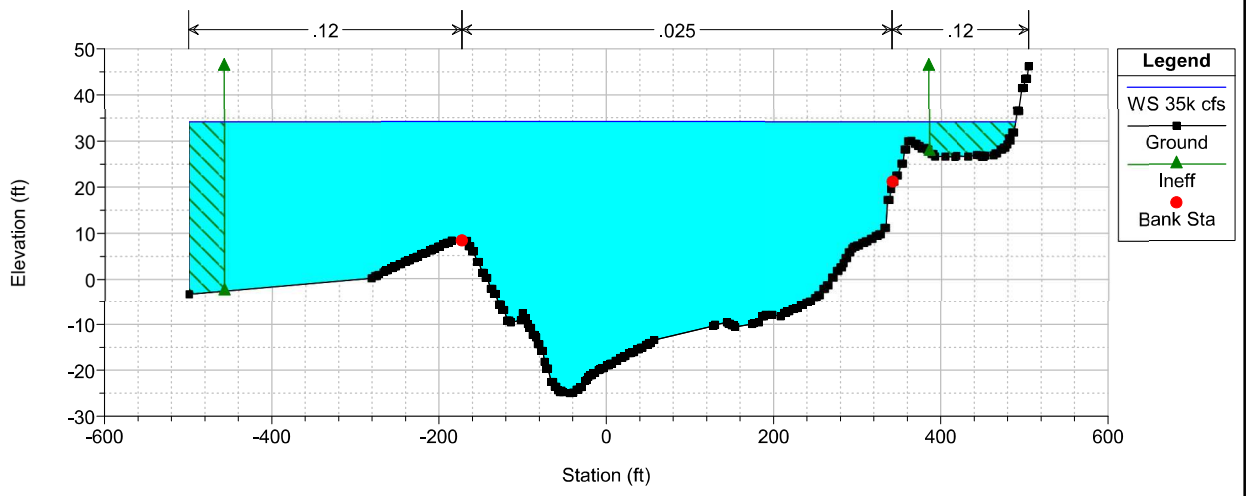
River = Camas_Slough Reach = Camas_Slough RS = 612 Ineff rt shadow b/c ds dry // ineff left jct columbia river



GP Camas No-Rise 202301 Plan: p01 - EXISTING Slough 35,000 cfs matches UP end River 34.7 ft 1/26/2023

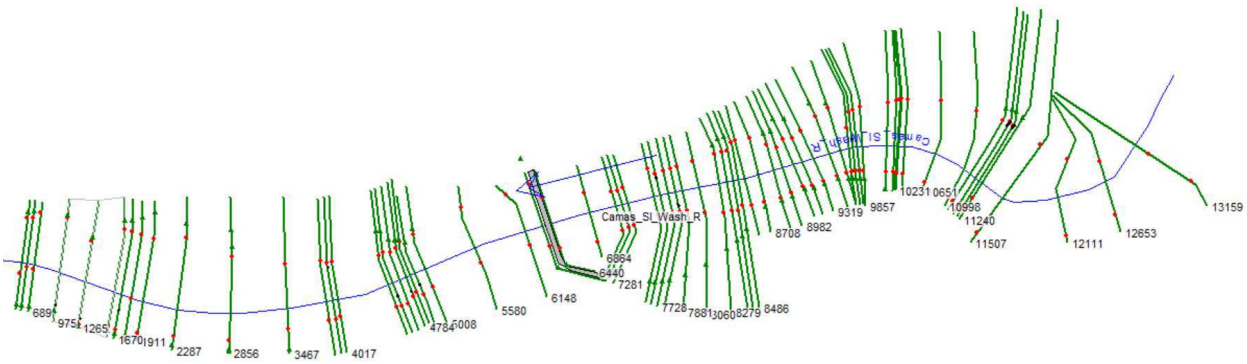
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

River = Camas_Slough Reach = Camas_Slough RS = 552 Lowermost XS=552 ft up of FIRM XS 'AB'

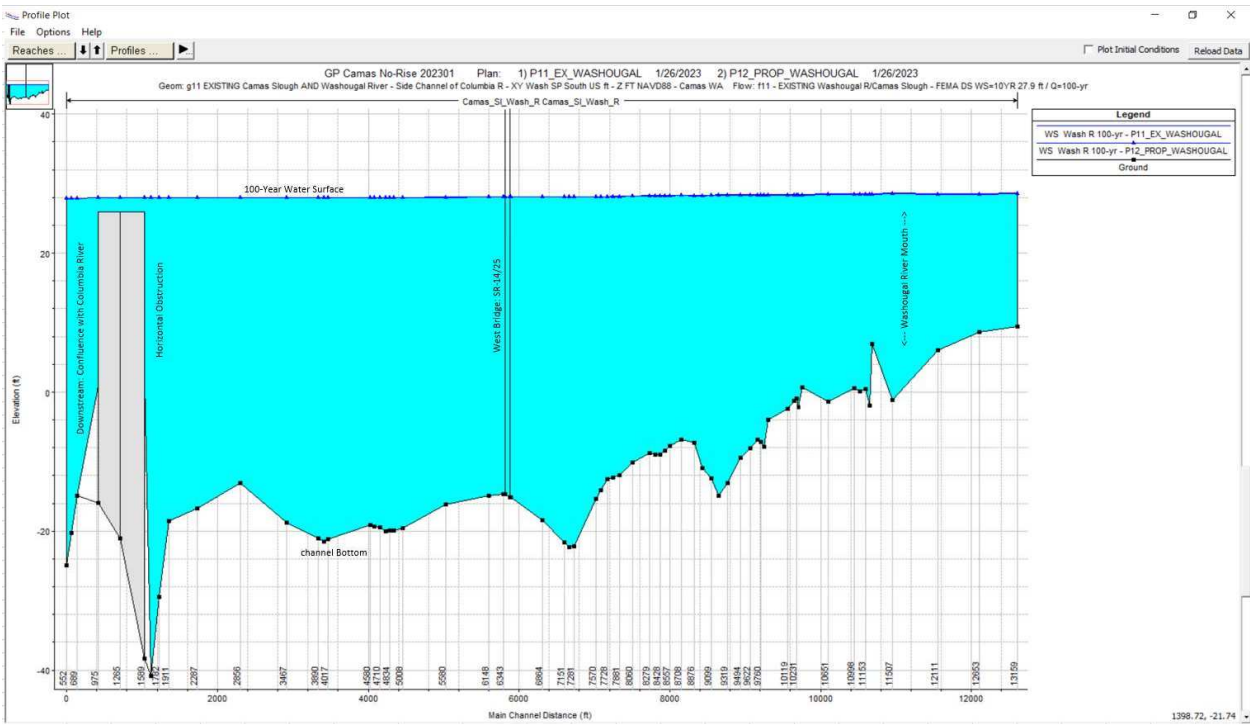


APPENDIX E:
EXISTING-CONDITION DATA FOR WASHOUGAL RIVER WITH CAMAS SLOUGH MODEL

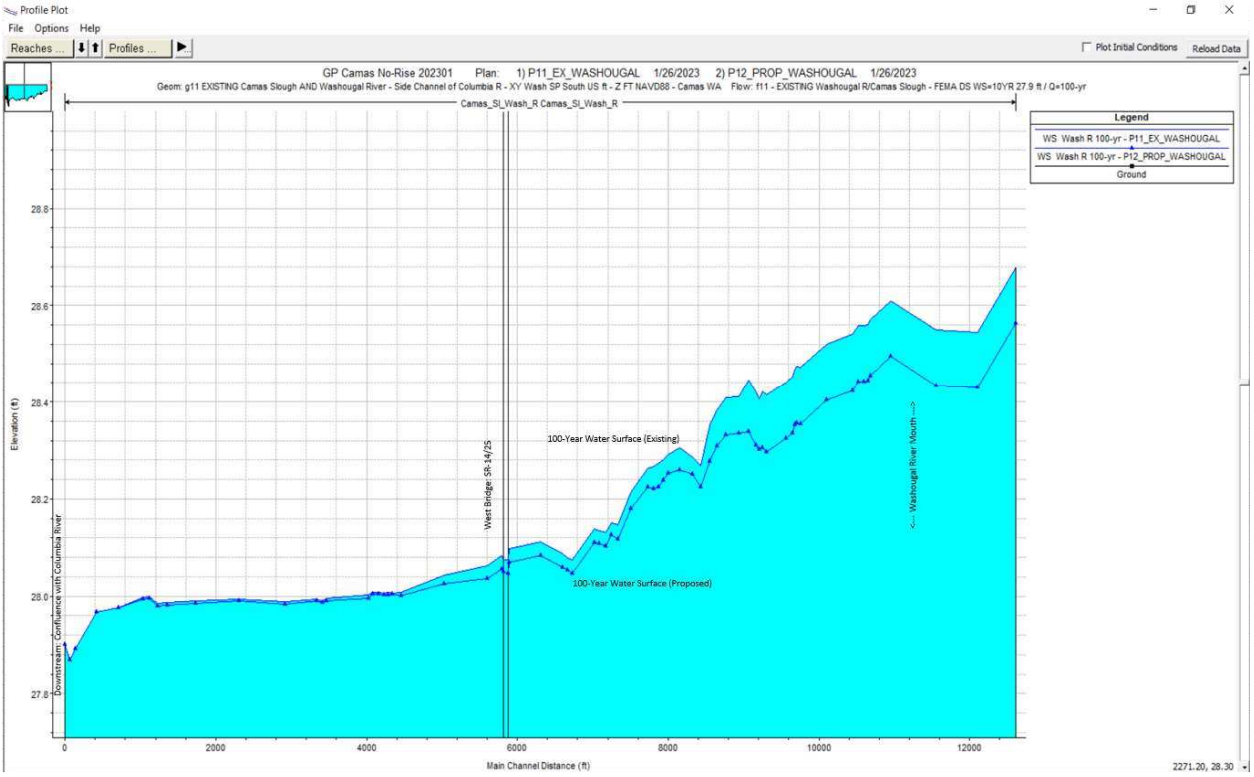
Appendix E. HEC-RAS Hydraulic Model Data for Washougal River/ Camas Slough Existing Conditions



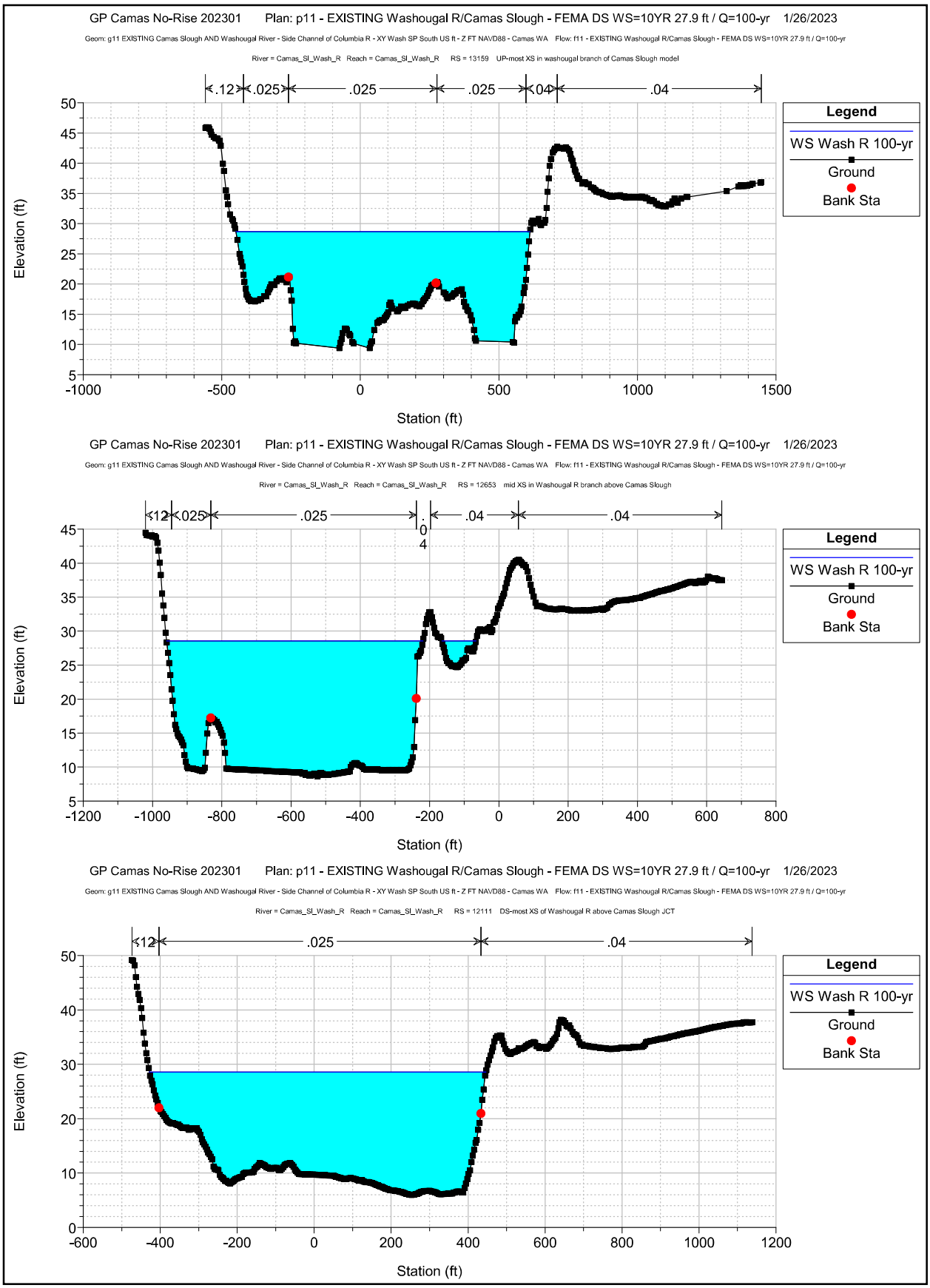
Schematic of Washougal River/ Camas Slough Model Cross-Section Locations



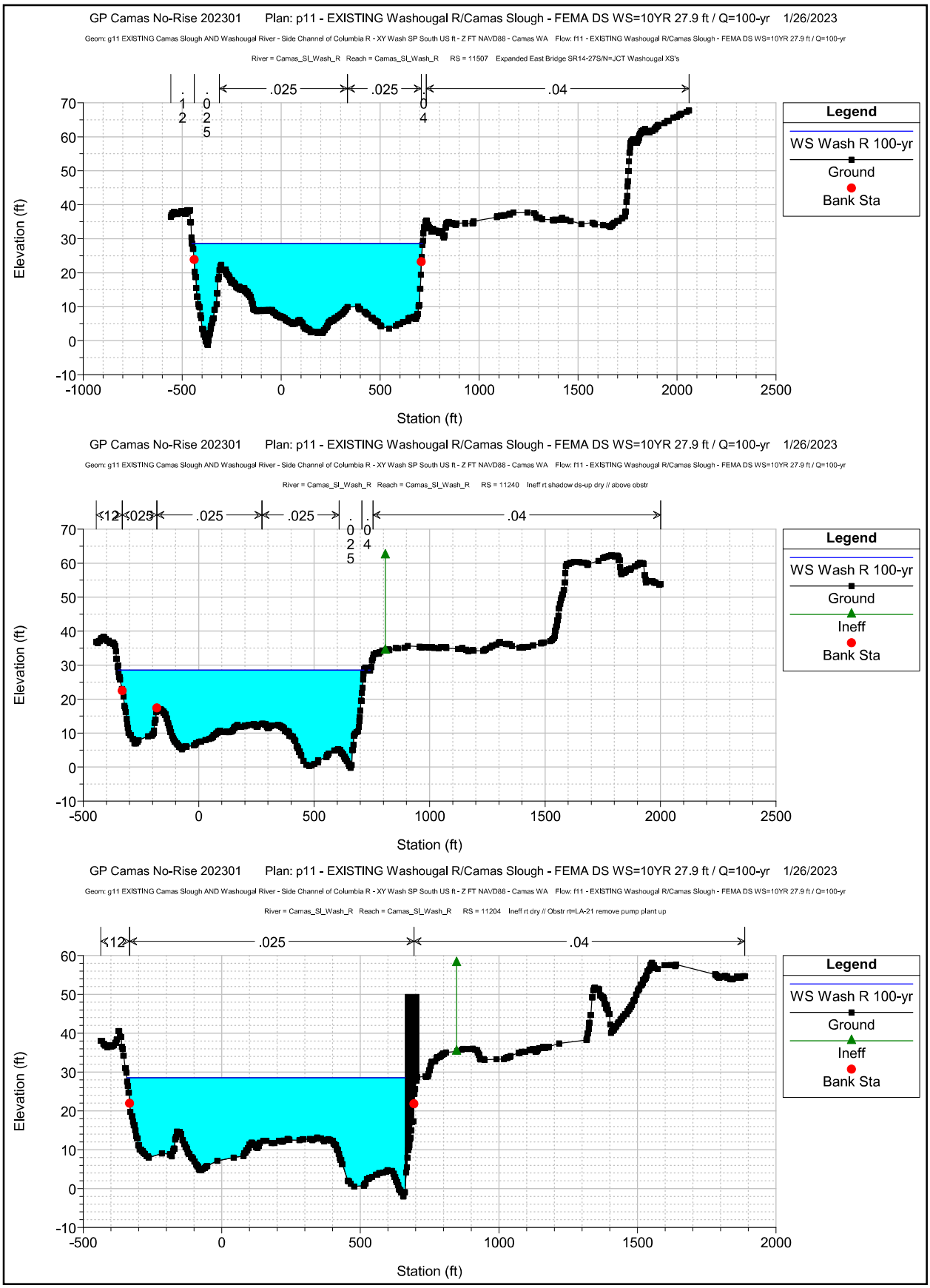
Profile of Washougal River/ Camas Slough Model (Full-Scale; Cross-Sections Labeled)



Profile of Washougal River/ Camas Slough Model (Expanded Scale)


GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 13159 UP-most XS in washougal branch of Camas Slough model
.12
.025
.025
.025
.04
.04
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 12653 mid XS in Washougal R branch above Camas Slough
.12
.025
.025
.04
.04
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 12111 DS-most XS of Washougal R above Camas Slough JCT
.12
.025
.04
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

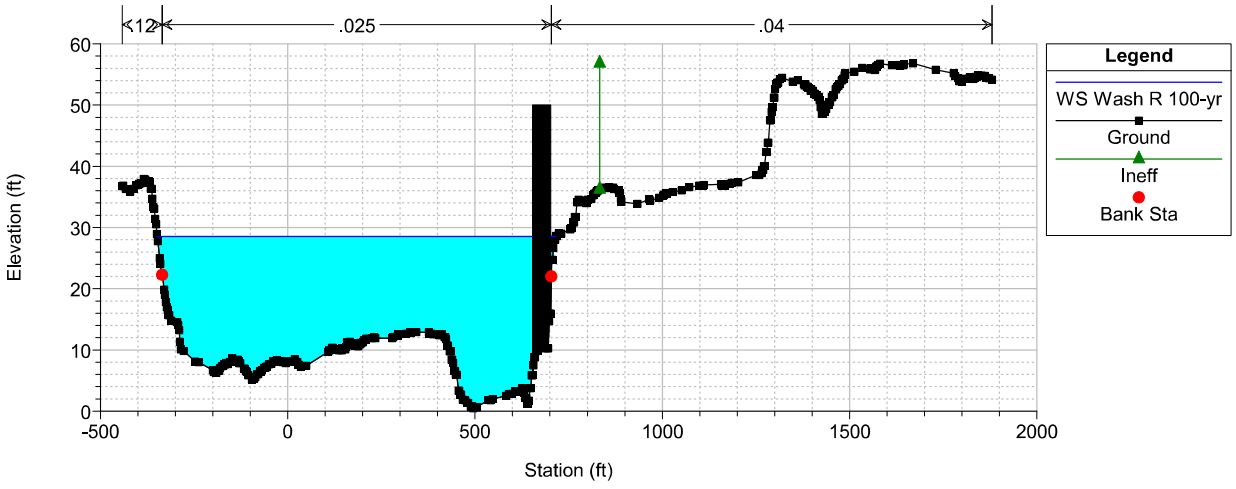
1


GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 11507 Expanded East Bridge SR14-27S/N=JCT Washougal XS's
.12
.025
.025
.025
.04
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 11240 Ineff rt shadow ds-up dry // above obstr
.12
.025
.025
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 11204 Ineff rt dry // Obstr rt=LA-21 remove pump plant up
.12
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023

Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr

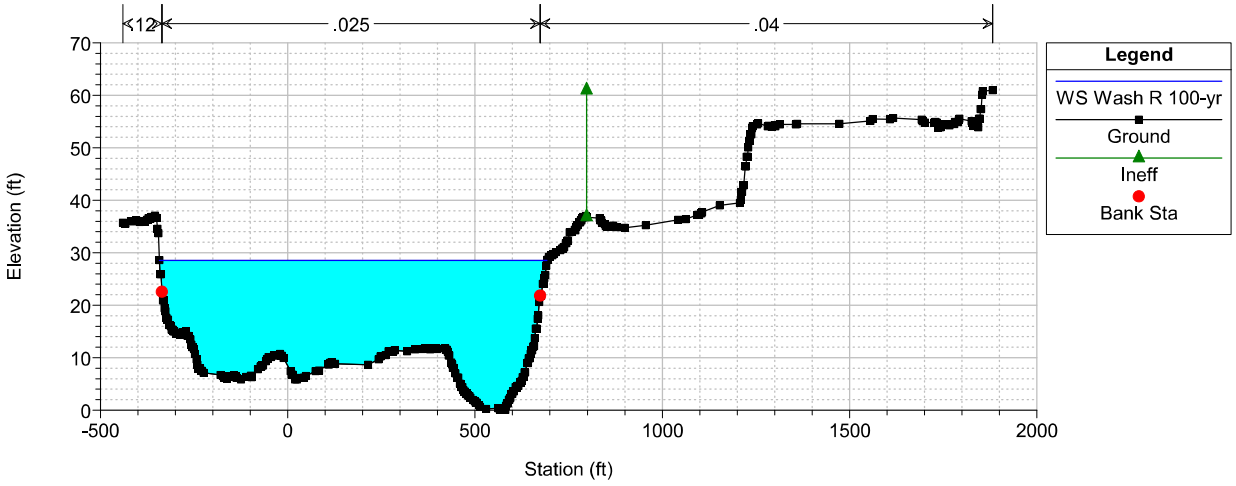
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 11153 Ineff rt dry // Obstr rt=LA-21 remove pump plant ds



GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023

Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr

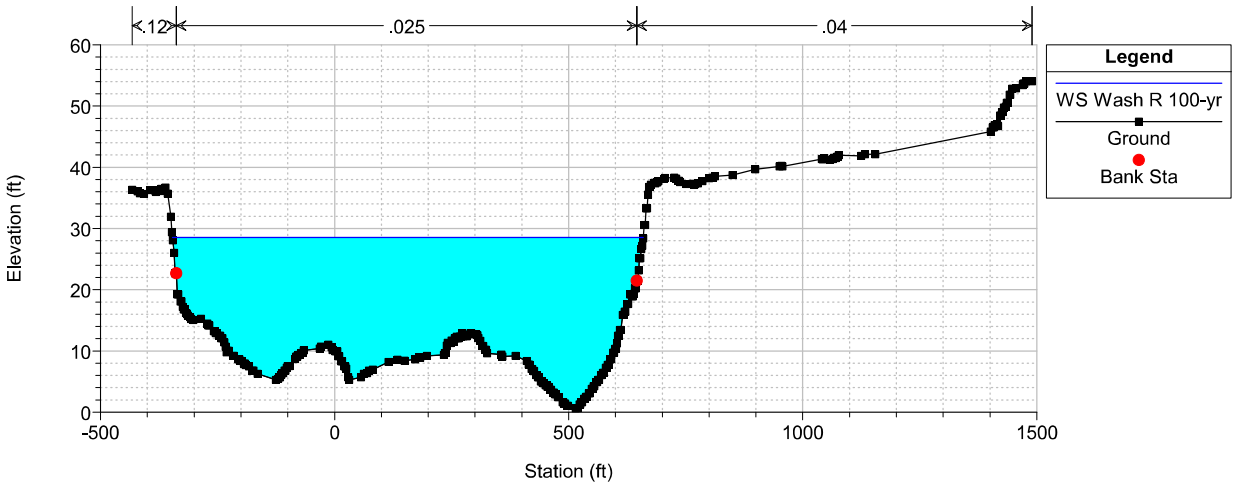
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 11078 Ineff rt dry // below obstr

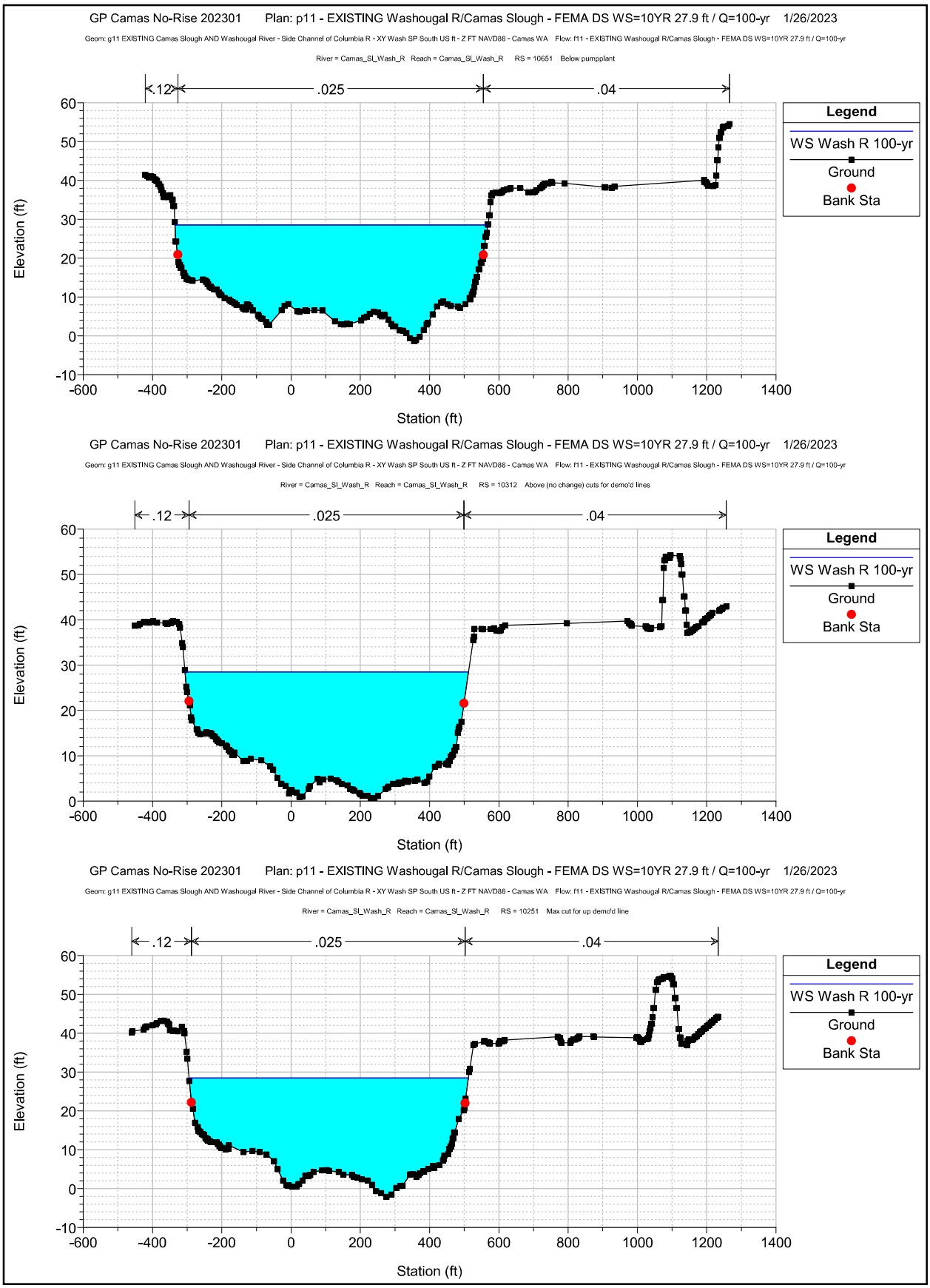


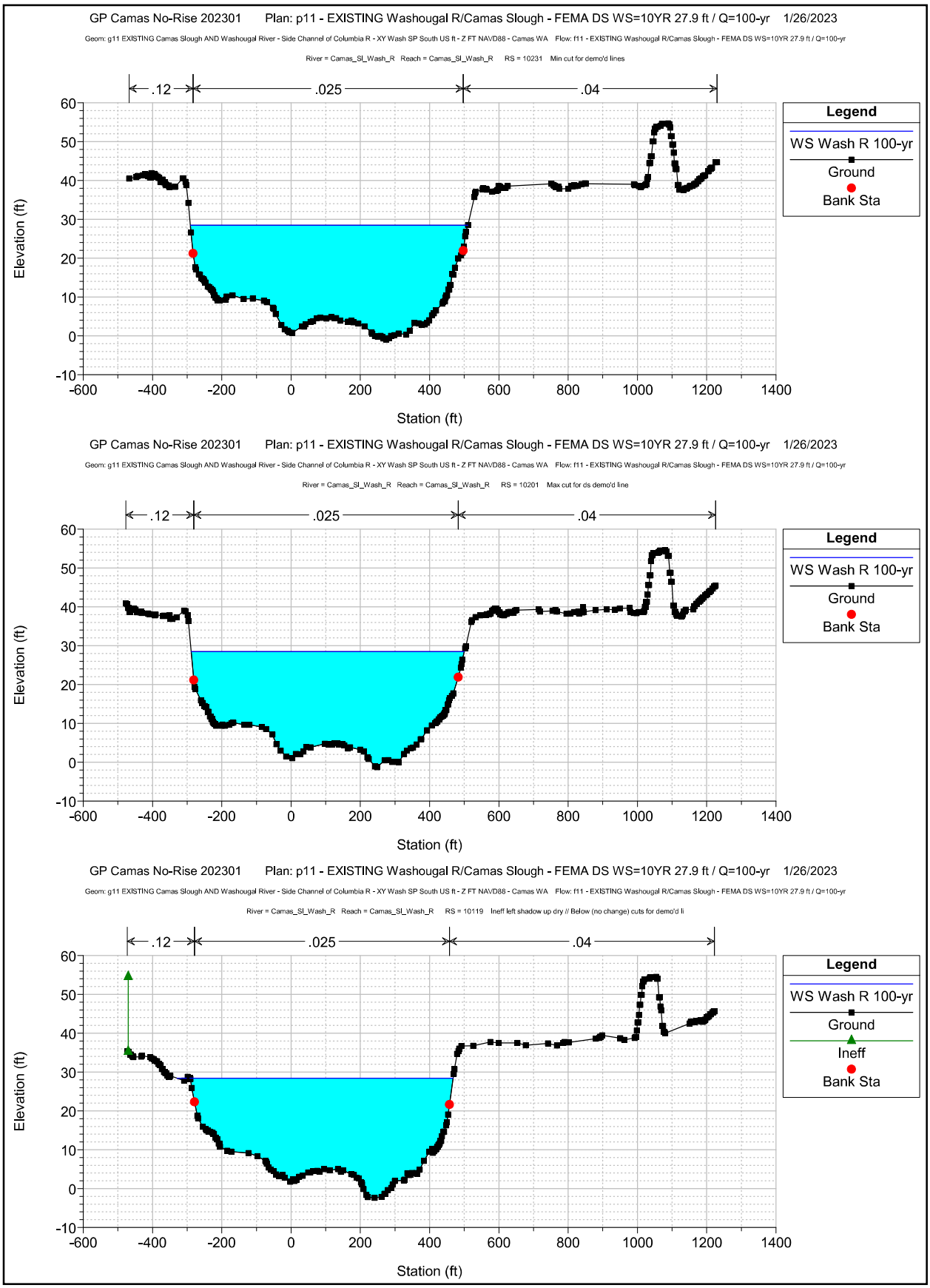
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023

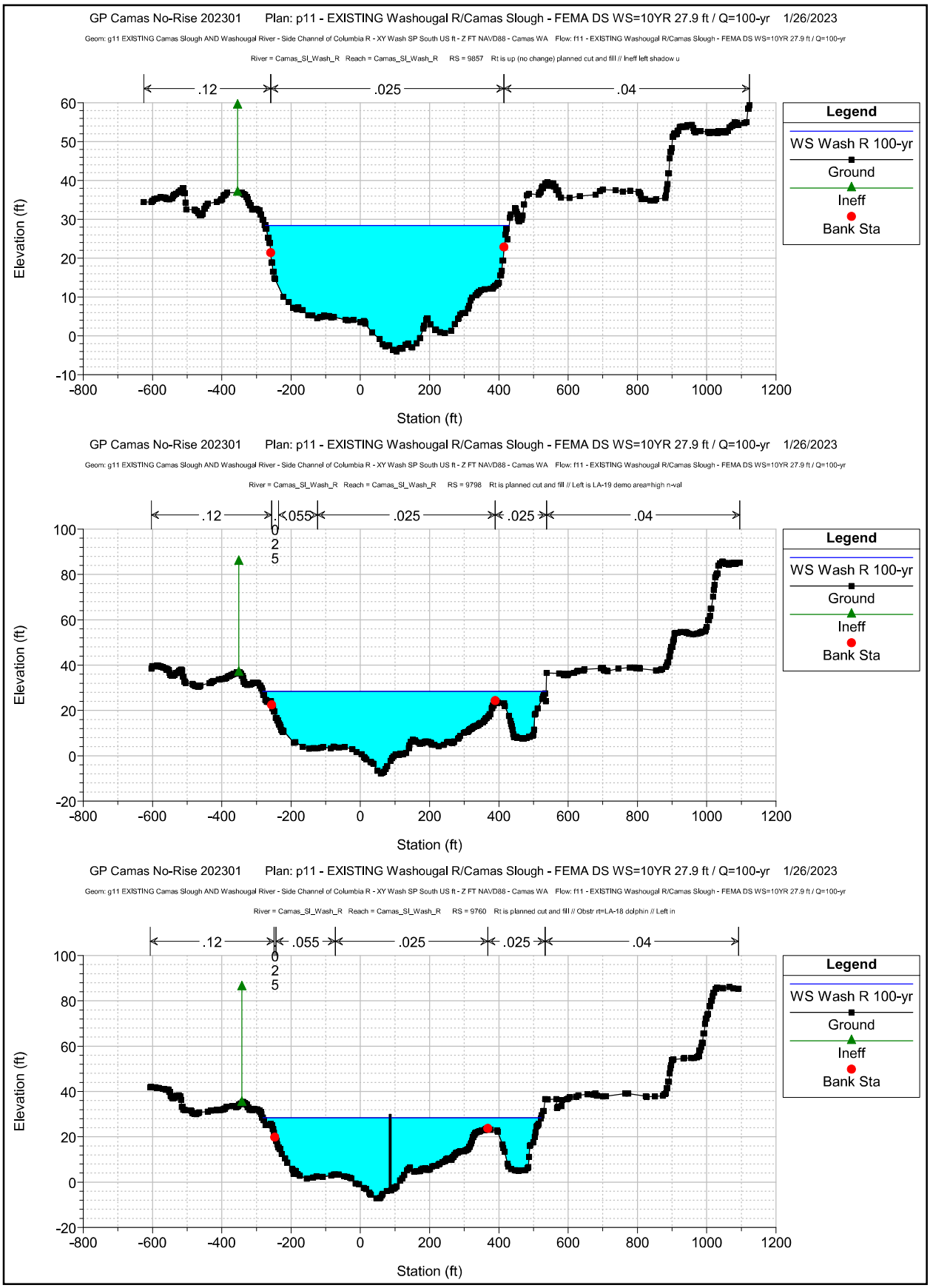
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr

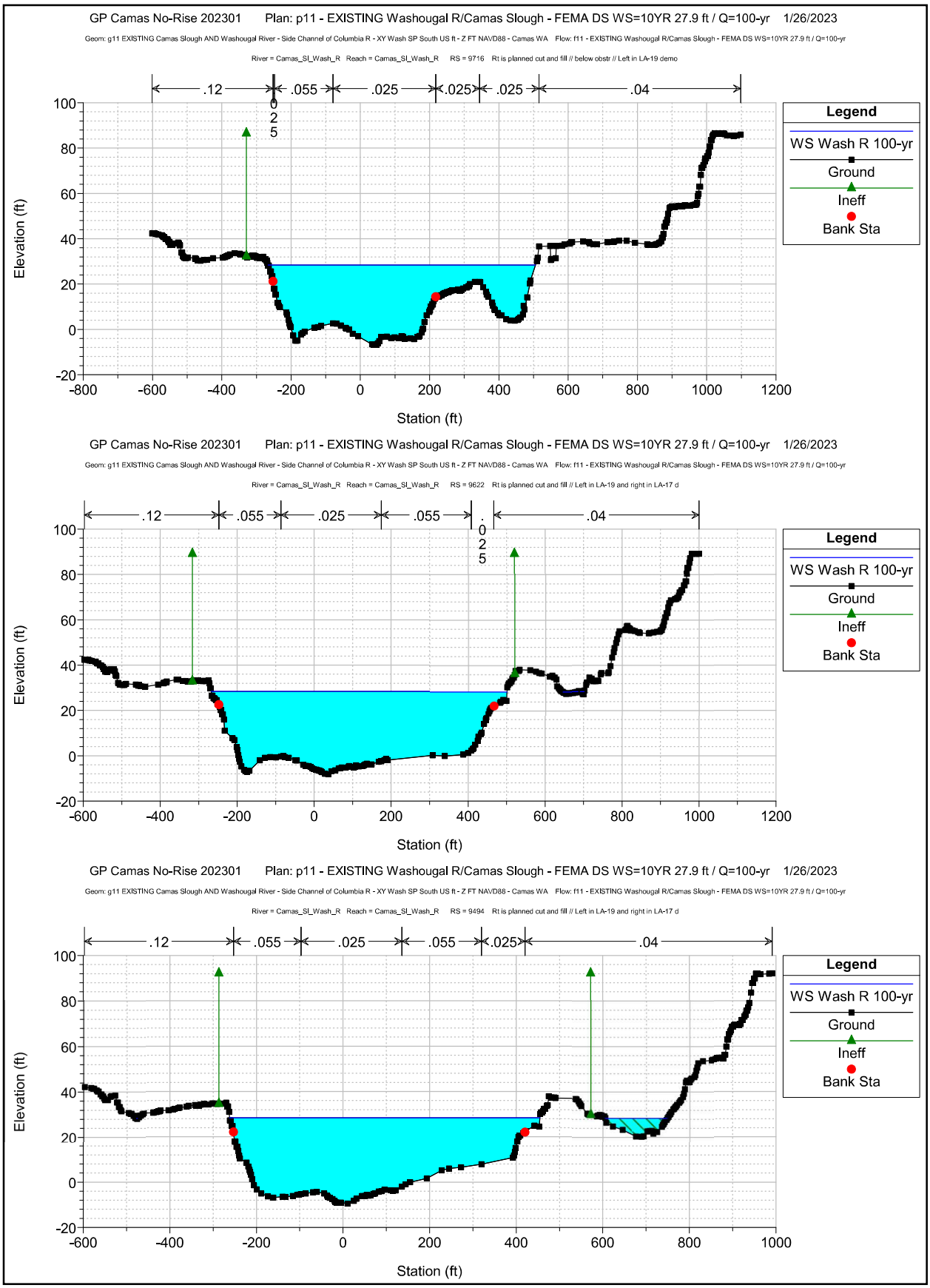
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 10998 Below pumpplant



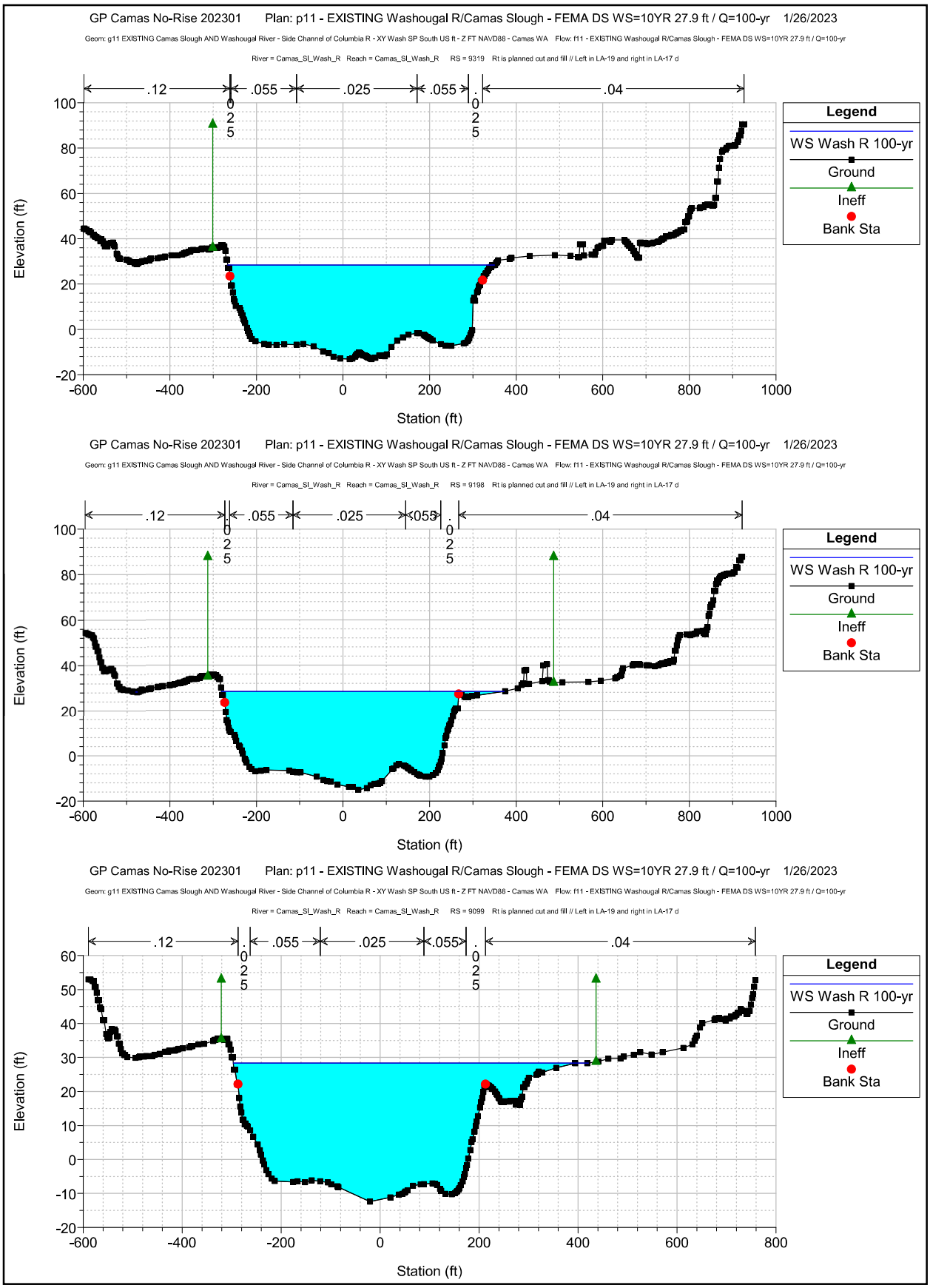

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 10651 Below pumpplant
.12
.025
.04
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 10312 Above (no change) cuts for demo'd lines
.12
.025
.04
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 10251 Max cut for up demo'd line
.12
.025
.04
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

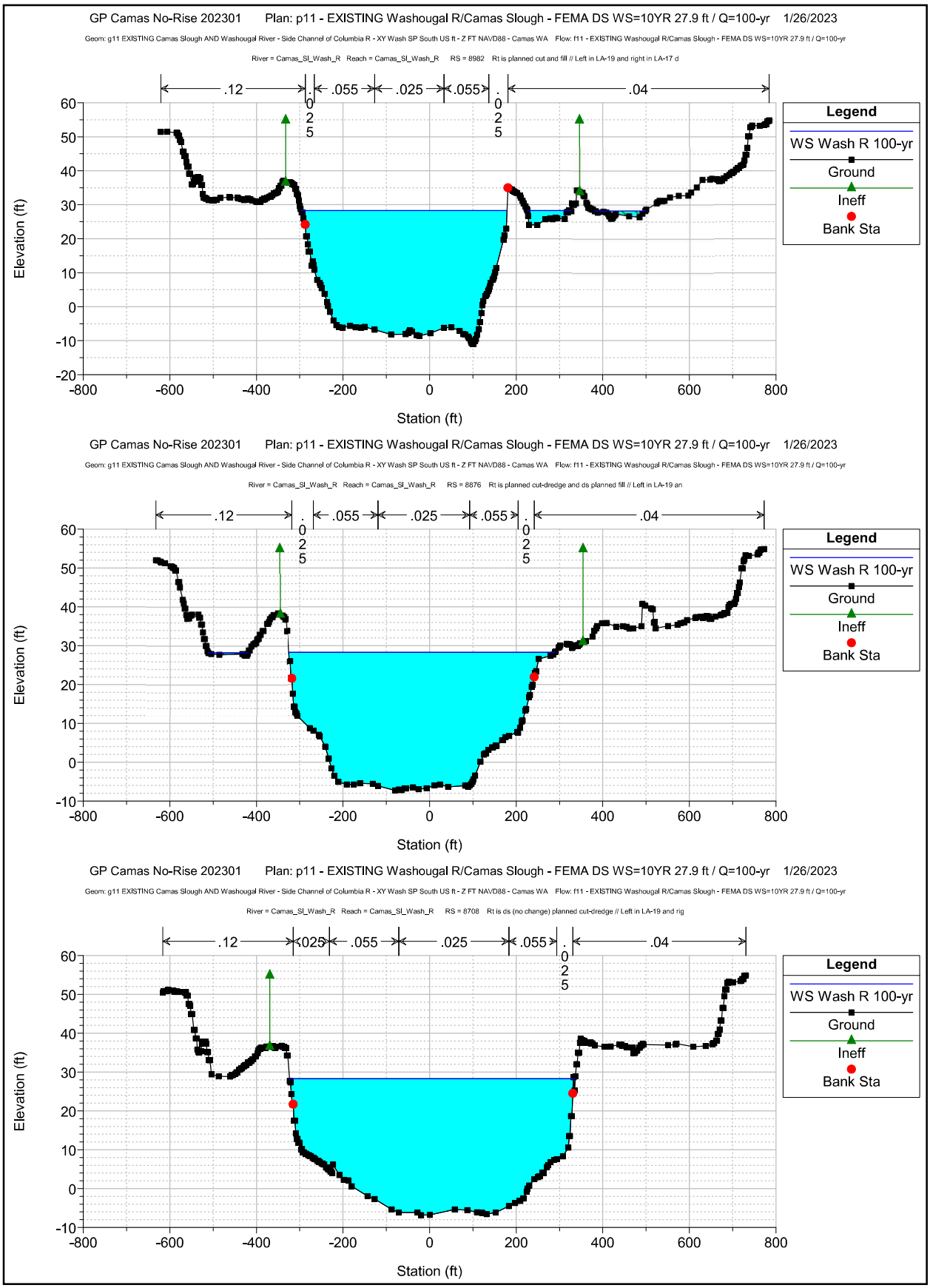

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 10231 Min cut for demo'd lines
.12
.025
.04
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 10201 Max cut for ds demo'd line
.12
.025
.04
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 10119 Ineff left shadow up dry // Below (no change) cuts for demo'd li
.12
.025
.04
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta

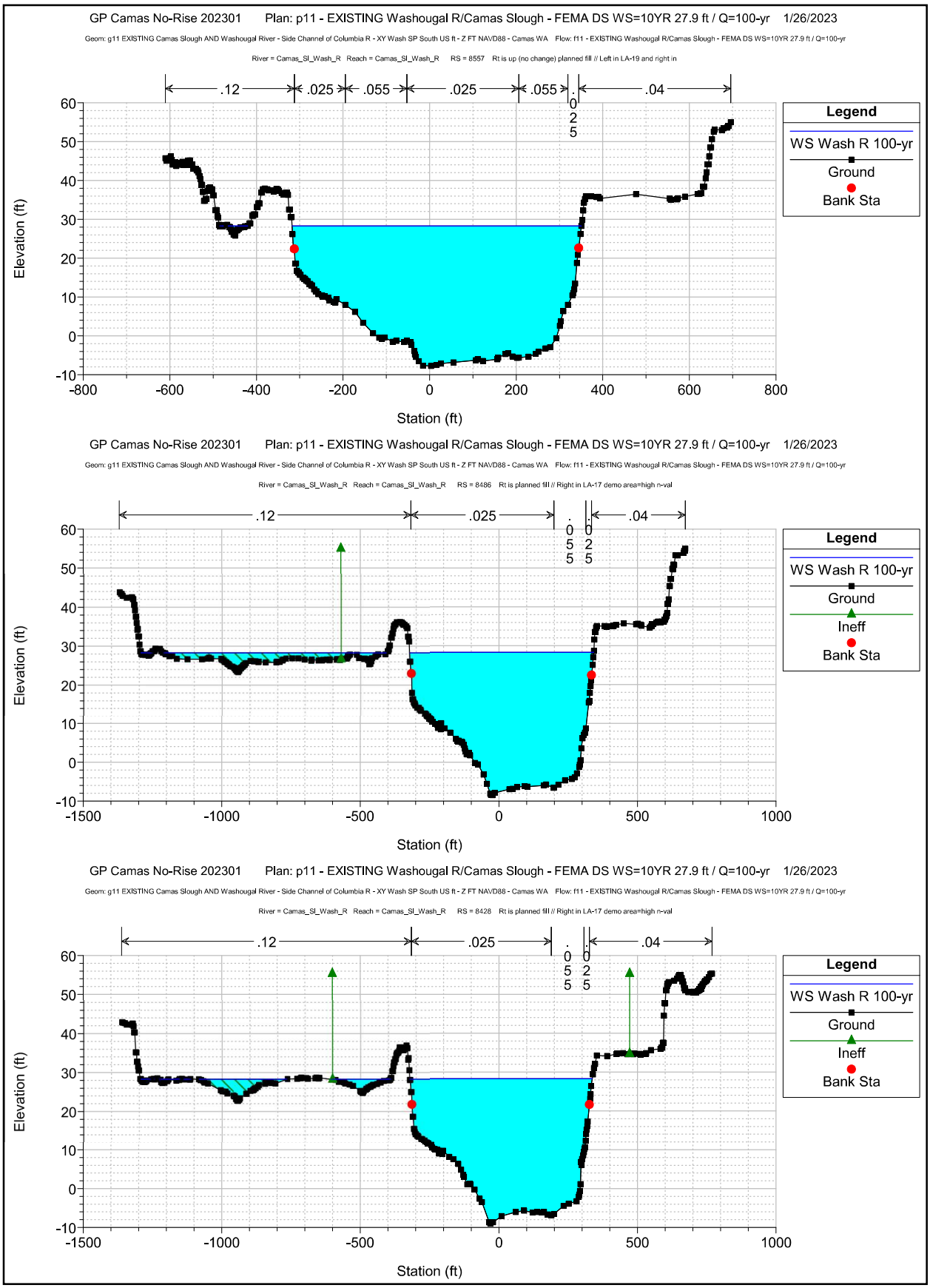

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 9857 Rt is up (no change) planned cut and fill // Ineff left shadow u
.12
.025
.04
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 9798 Rt is planned cut and fill // Left is LA-19 demo area=high n-val
.12
.055
.025
.025
.04
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 9760 Rt is planned cut and fill // Obstr rt=LA-18 dolphin // Left in
.12
.055
.025
.025
.04
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta

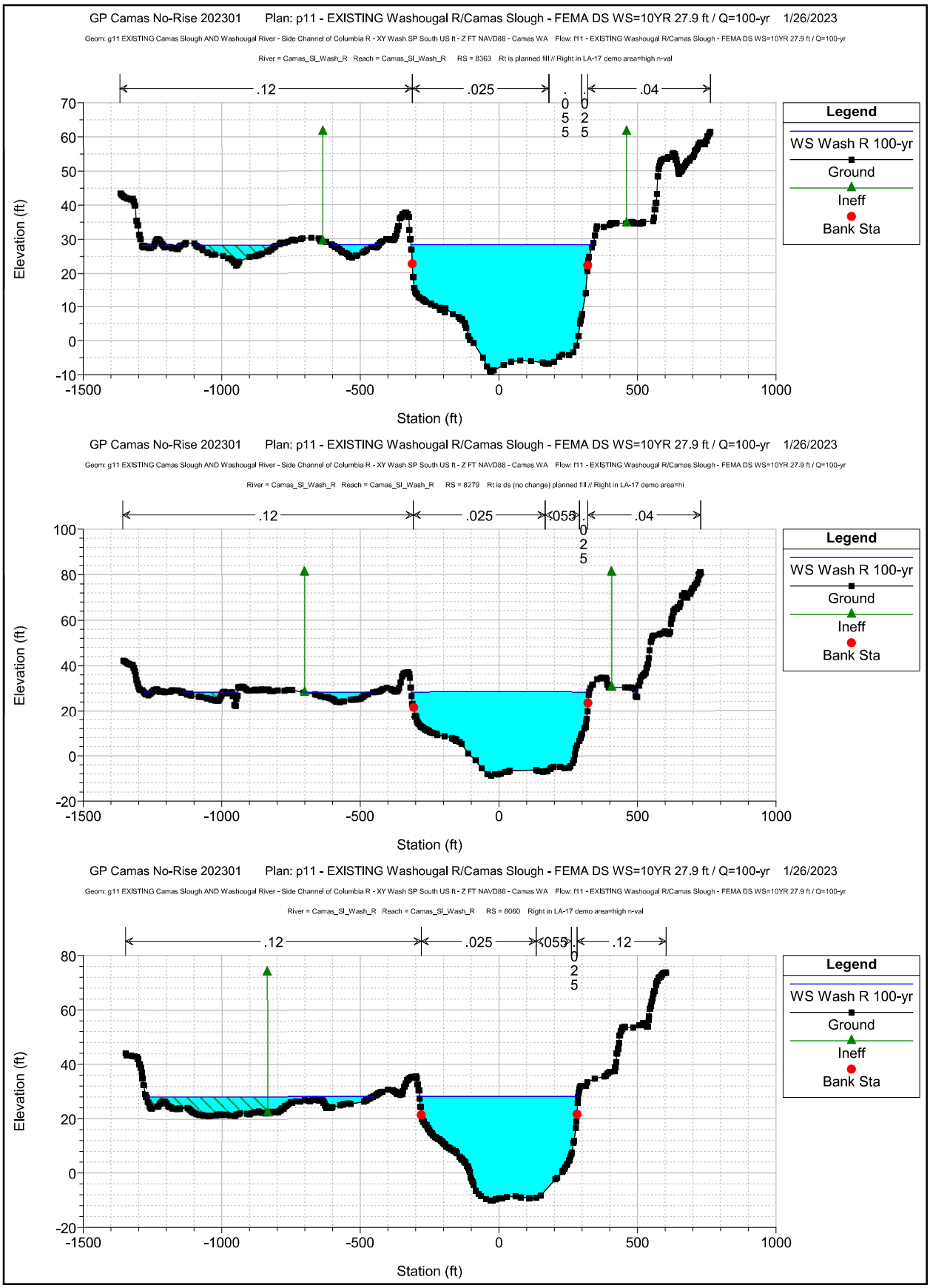

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 9716 Rt is planned cut and fill // below obstr // Left in LA-19 demo
.12
.055
.025
.025
.025
.04
0
2
5
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 9622 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.
0
2
5
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 9494 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

7


GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 9319 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 9198 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 9099 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.055
.025
.055
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 8982 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
.12
.025
.055
.025
.055
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 8876 Rt is planned cut-dredge and ds planned fill // Left in LA-19 an
.12
.025
.055
.025
.055
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 8708 Rt is ds (no change) planned cut-dredge // Left in LA-19 and rig
.12
.025
.055
.025
.055
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 8557 Rt is up (no change) planned fill // Left in LA-19 and right in
.12
.025
.055
.025
.055
.025
.04
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 8486 Rt is planned fill // Right in LA-17 demo area=high n-val
.12
.025
.055
.025
.04
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 8428 Rt is planned fill // Right in LA-17 demo area=high n-val
.12
.025
.055
.025
.04
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta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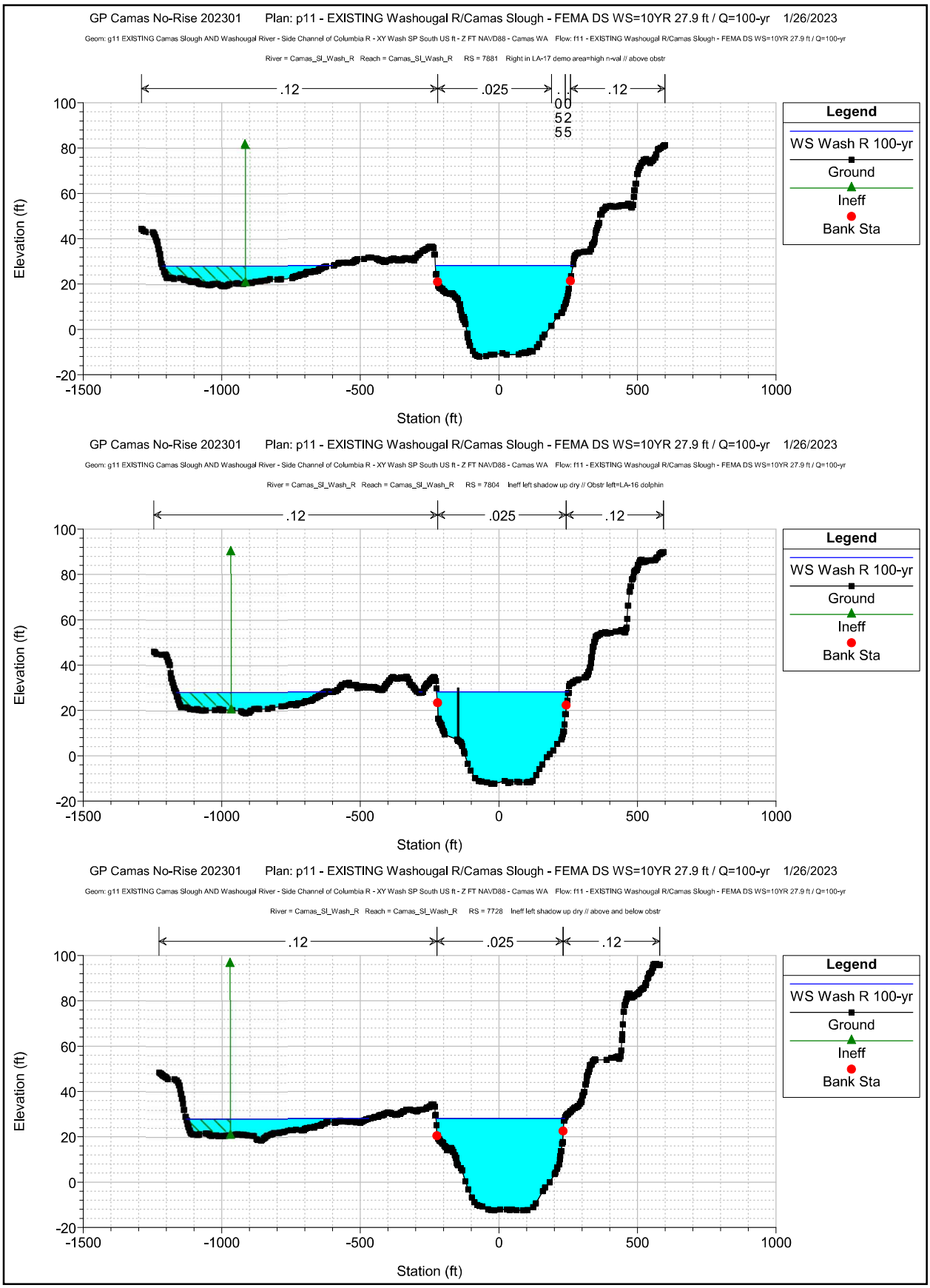
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 8363 Rt is planned fill // Right in LA-17 demo area=high n-val
.12
.025
.055
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 8279 Rt is ds (no change) planned fill // Right in LA-17 demo area=hi
.12
.025
.055
.025
.04
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 8060 Right in LA-17 demo area=high n-val
.12
.025
.055
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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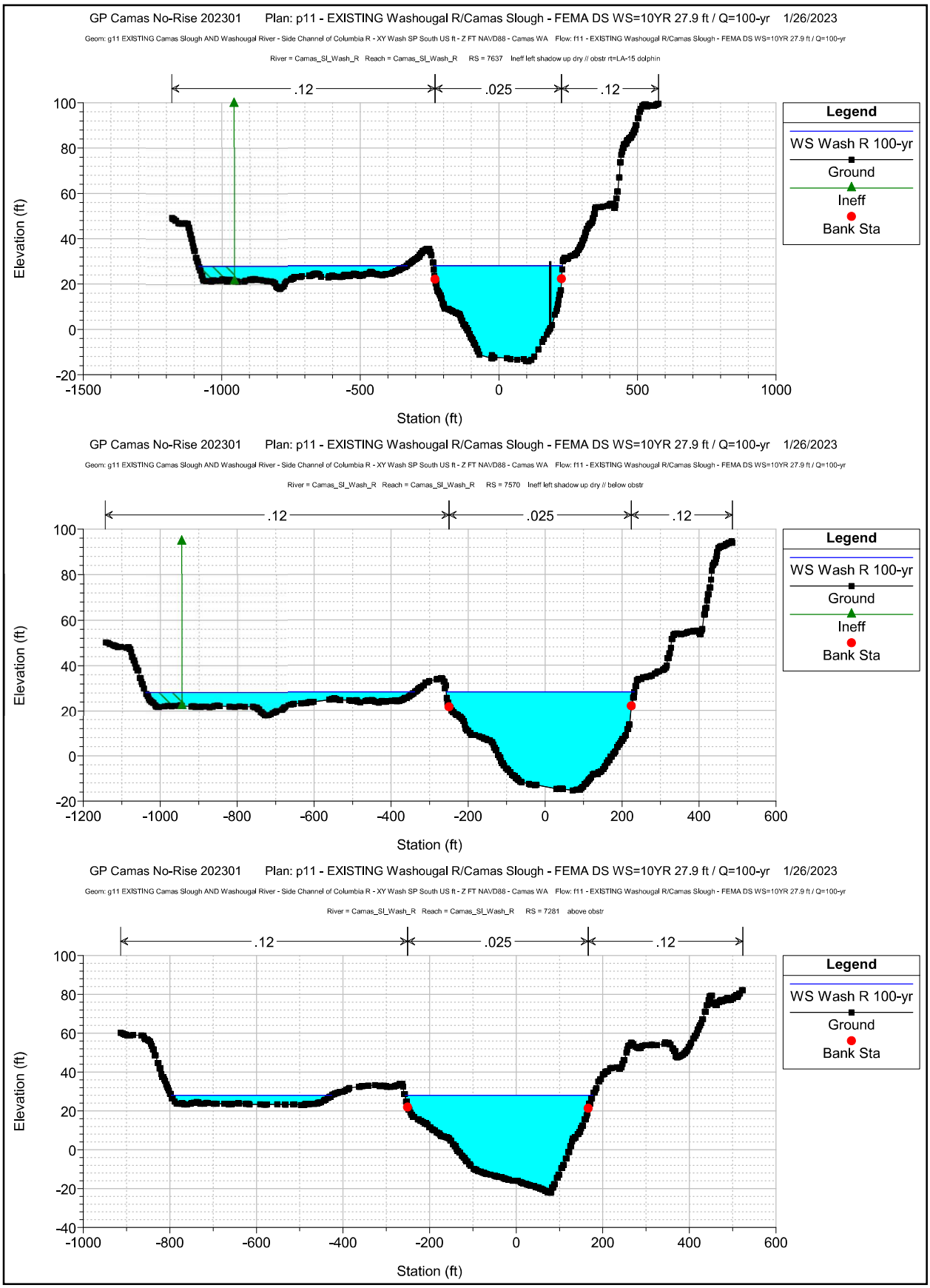
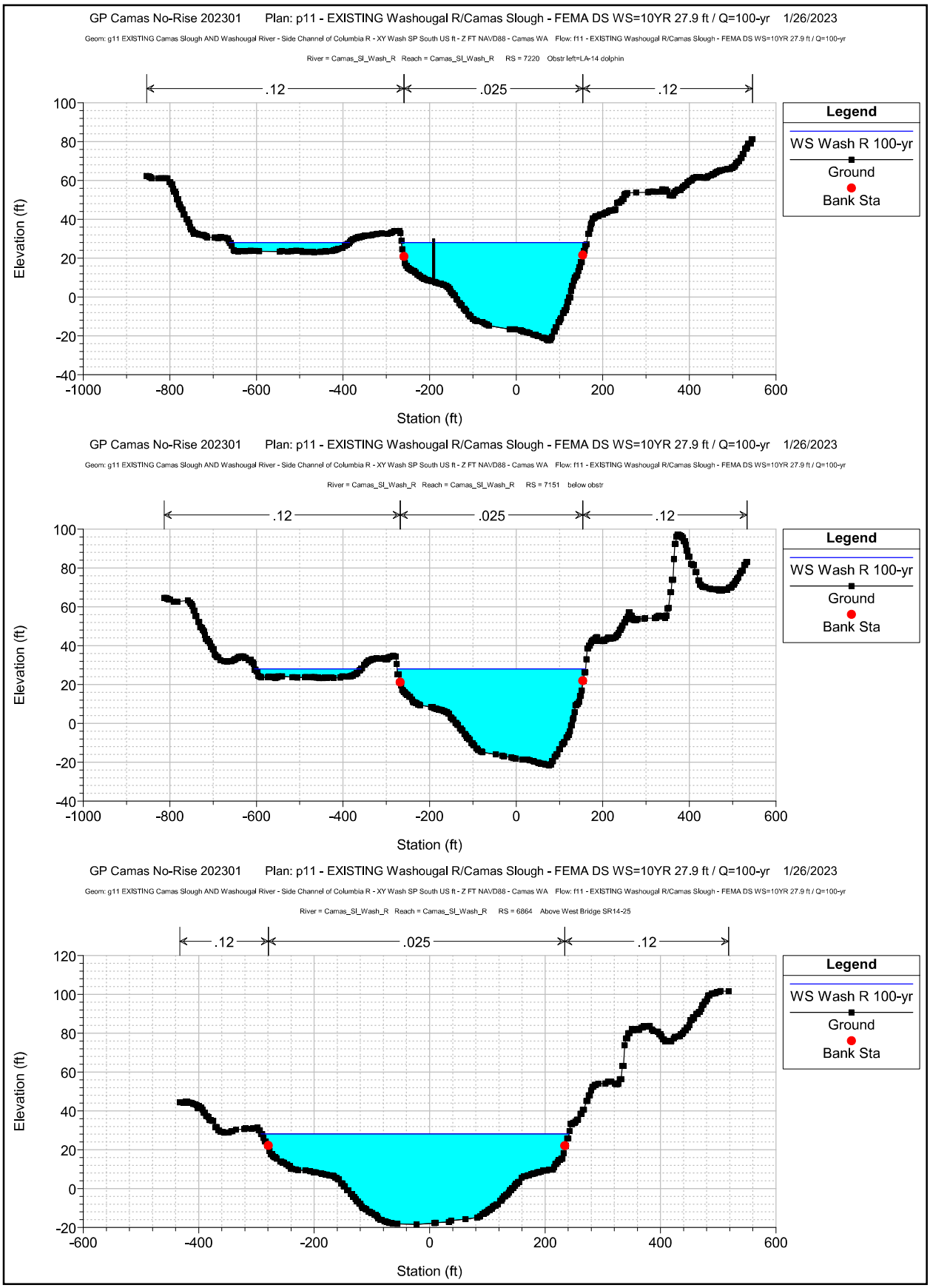
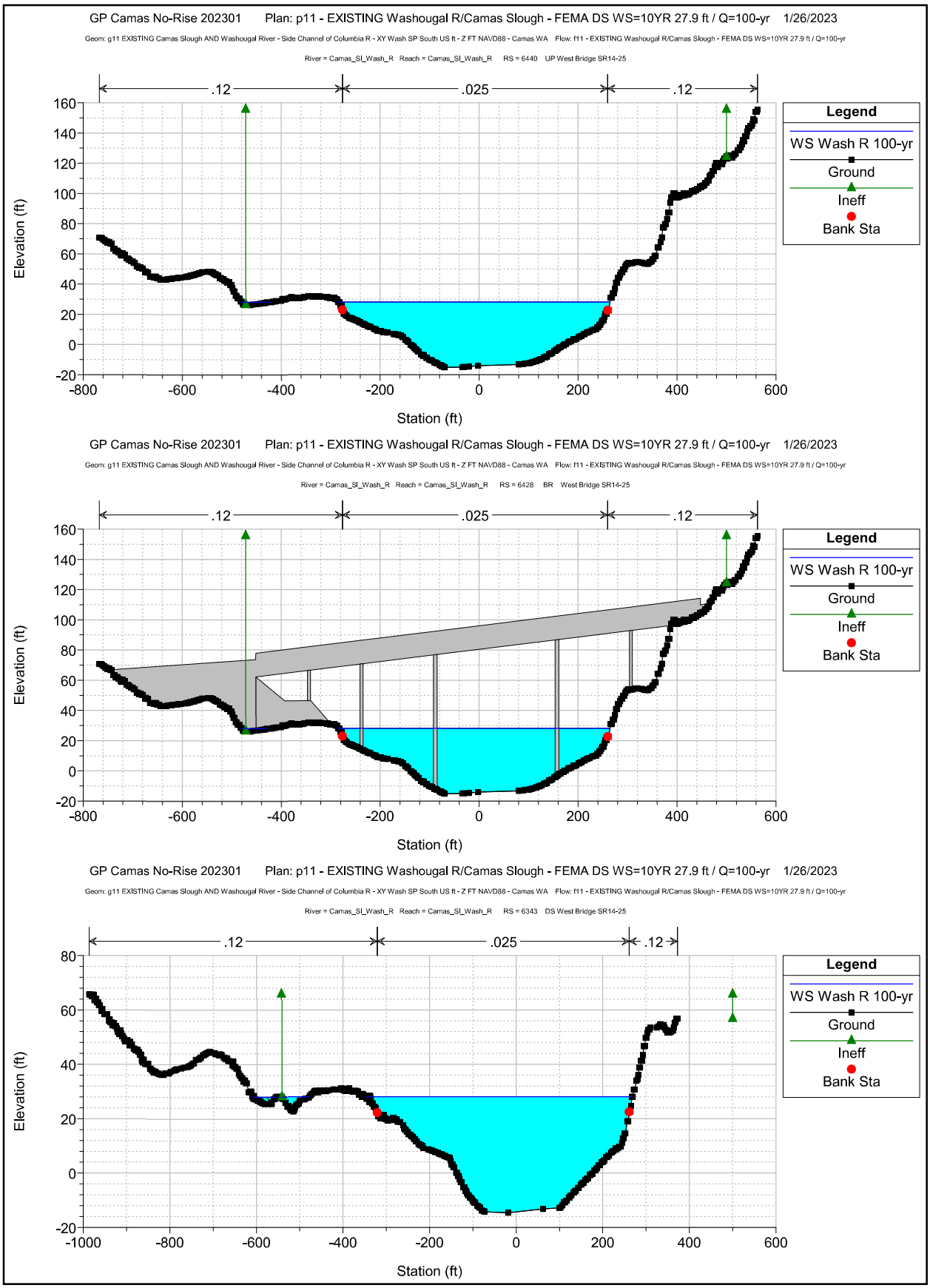
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 7881 Right in LA-17 demo area=high n-val // above obstr
.12
.025
.12
.00
.52
.55
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 7804 Ineff left shadow up dry // Obstr left=LA-16 dolphin
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 7728 Ineff left shadow up dry // above and below obstr
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

12


GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 7637 Ineff left shadow up dry // obstr rt=LA-15 dolphin
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 7570 Ineff left shadow up dry // below obstr
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 7281 above obstr
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Bank Sta

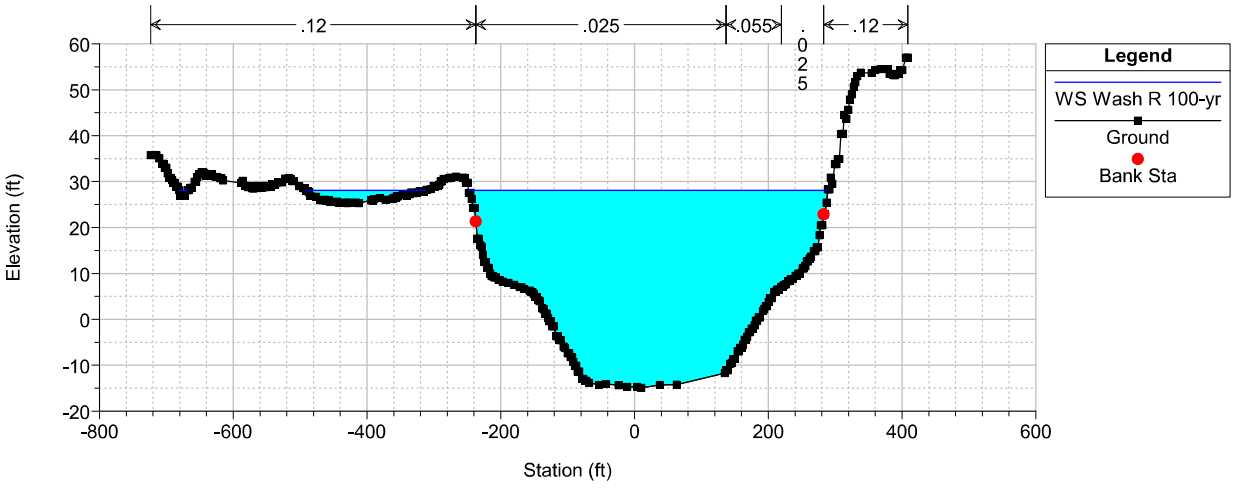

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 7220 Obstr left=LA-14 dolphin
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 7151 below obstr
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 6864 Above West Bridge SR14-25
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 6440 UP West Bridge SR14-25
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 6428 BR West Bridge SR14-25
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 6343 DS West Bridge SR14-25
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023

Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr

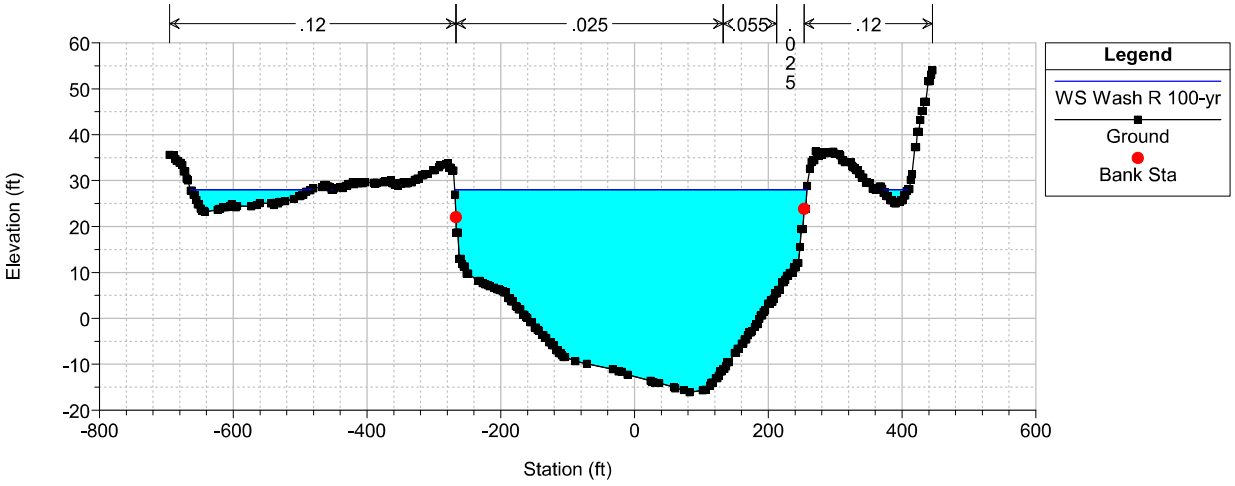
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 6148 Expanded West Bridge SR14-25



GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023

Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr

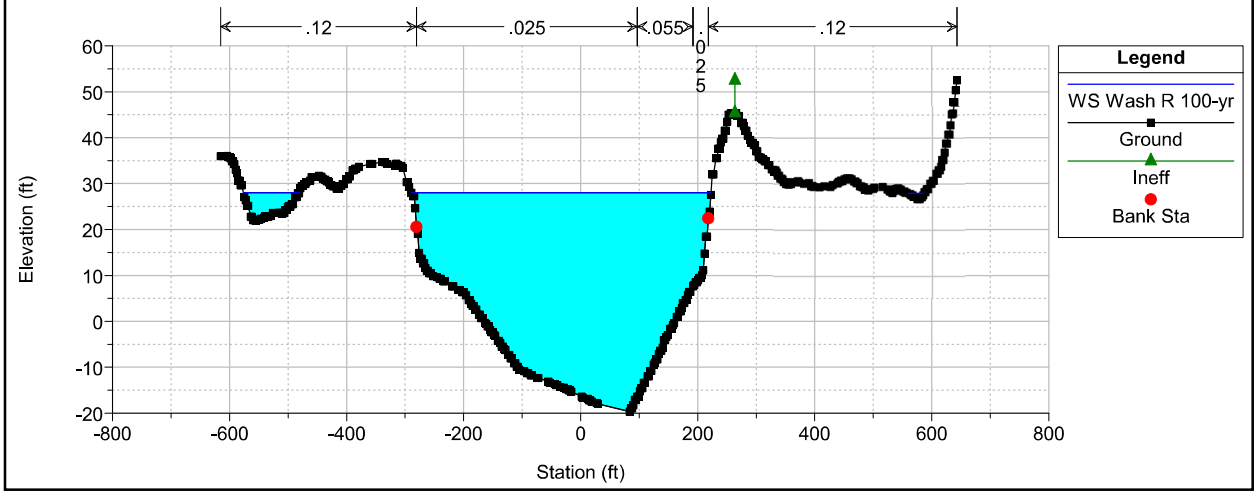
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 5580 Right in LA-12 demo area=high n-value existing

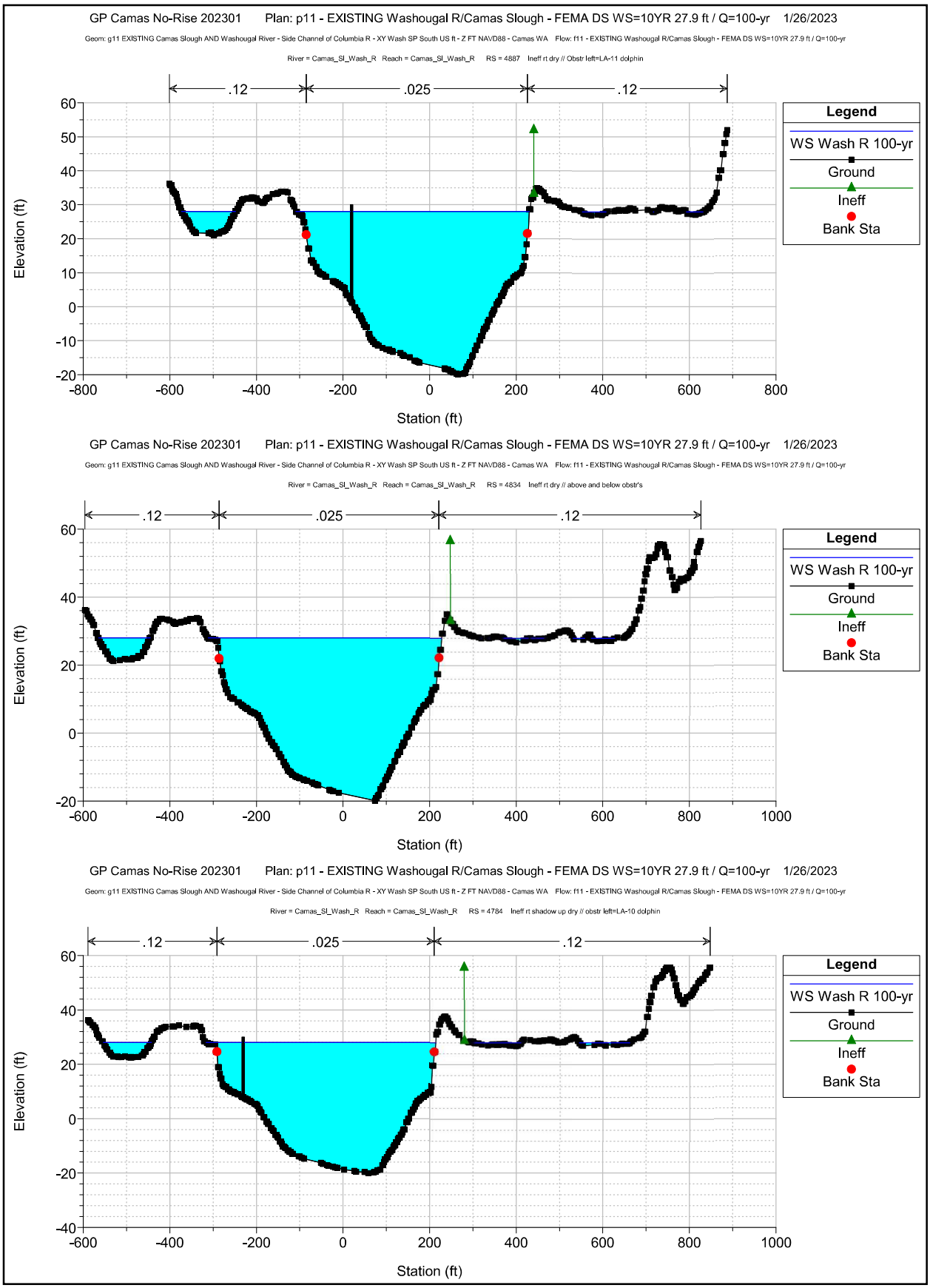


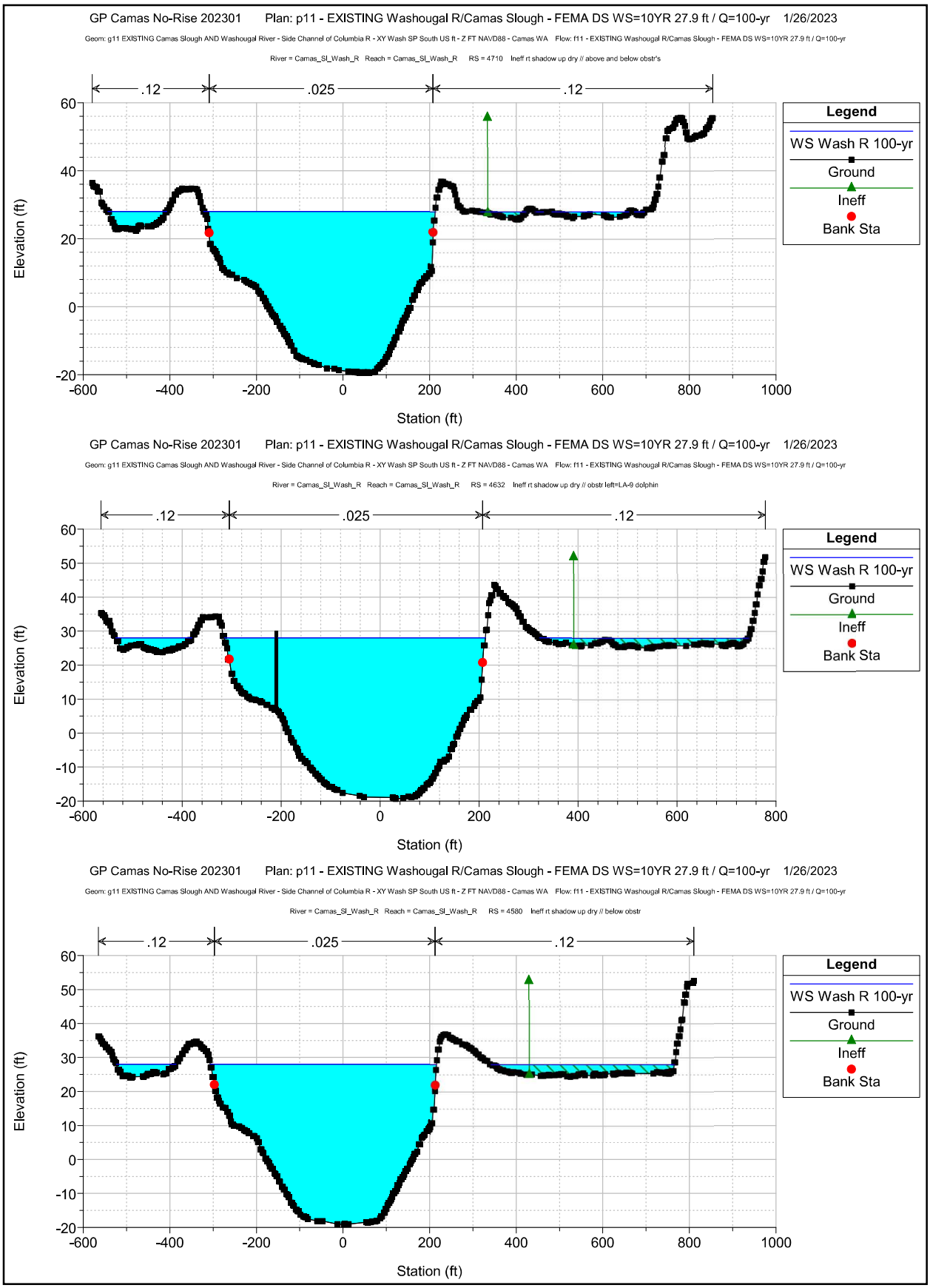
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023

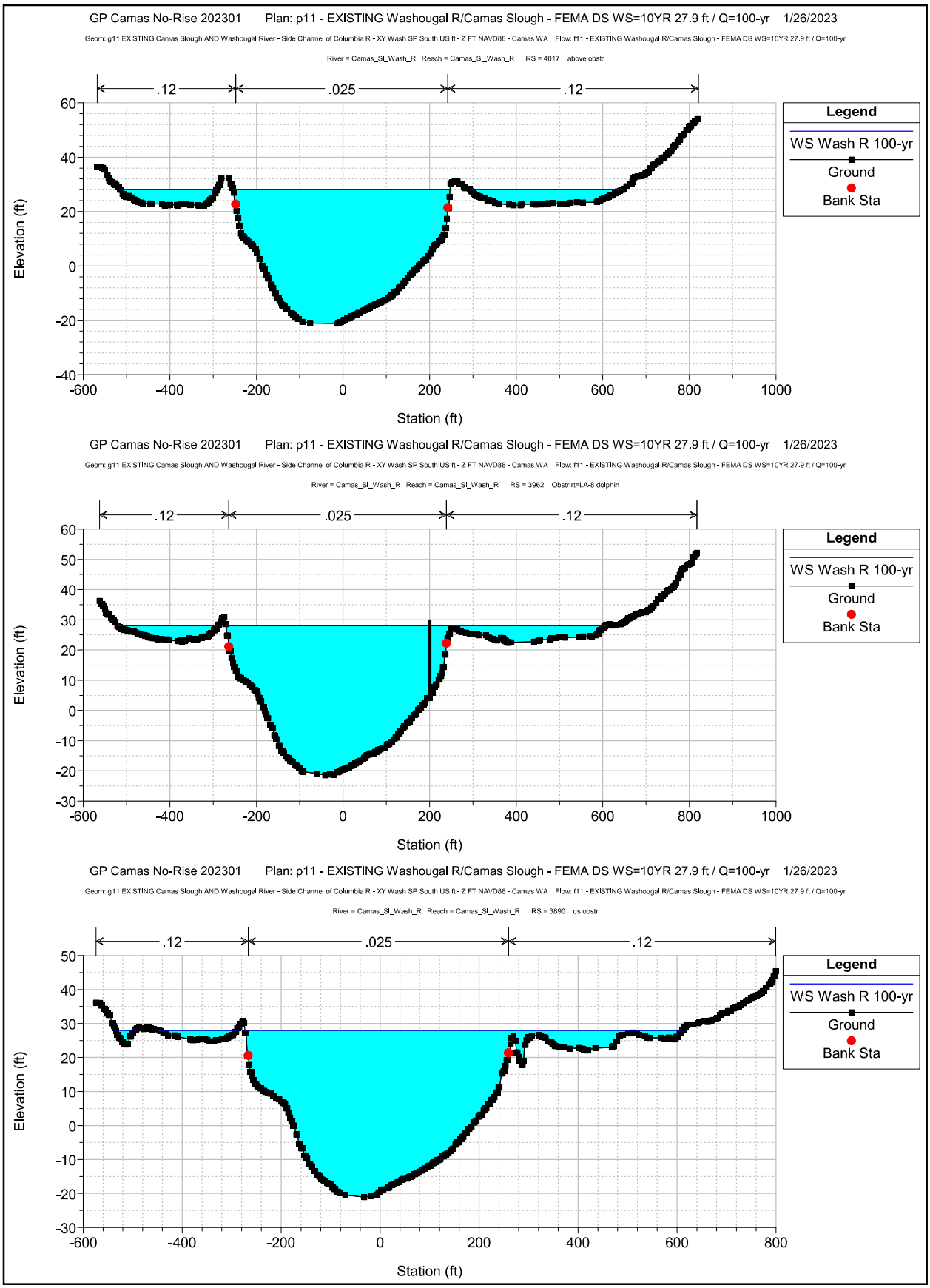
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr

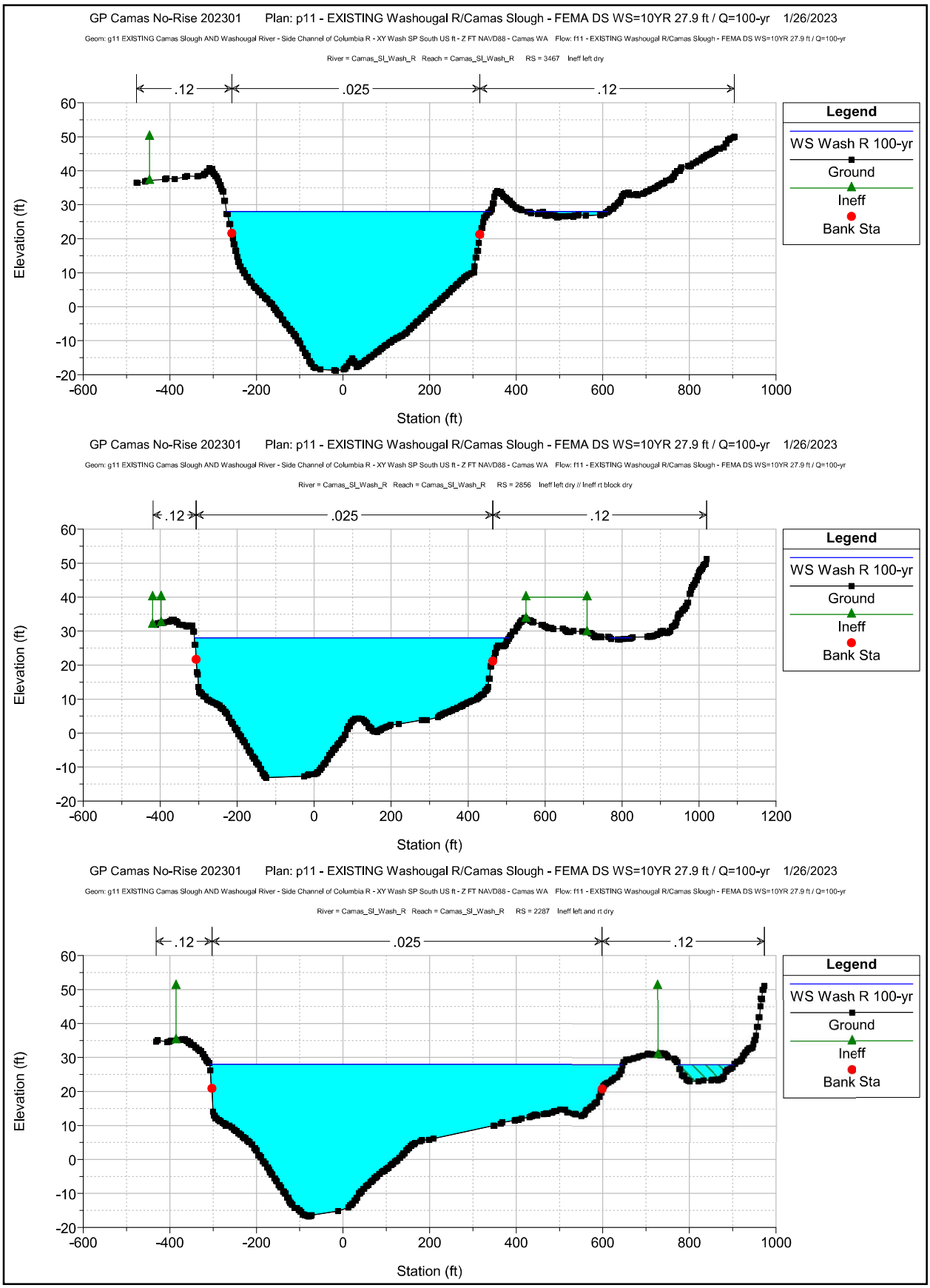
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 5008 Ineff rt dry // right side start LA-12 demo area=high n-value ex




GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 4887 Ineff rt dry // Obstr left=LA-11 dolphin
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 4834 Ineff rt dry // above and below obstr's
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 4784 Ineff rt shadow up dry // obstr left=LA-10 dolphin
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 4710 Ineff rt shadow up dry // above and below obstr's
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 4632 Ineff rt shadow up dry // obstr left=LA-9 dolphin
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 4580 Ineff rt shadow up dry // below obstr
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta

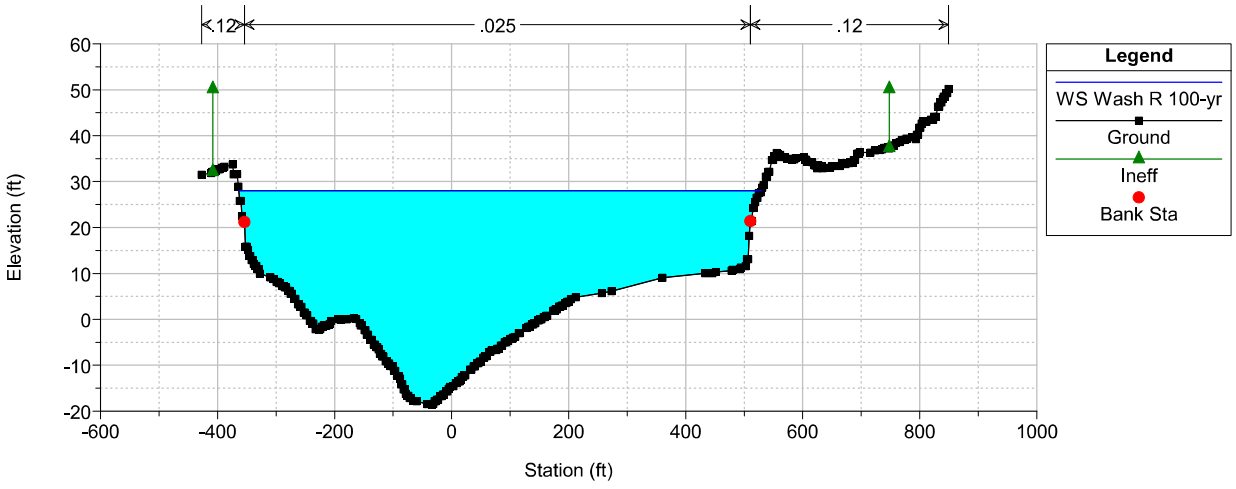

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 4017 above obstr
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 3962 Obstr rt=LA-8 dolphin
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 3890 ds obstr
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 3467 Ineff left dry
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 2856 Ineff left dry // Ineff rt block dry
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 2287 Ineff left and rt dry
.12
.025
.12
Elevation (ft)
Station (ft)
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023

Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr

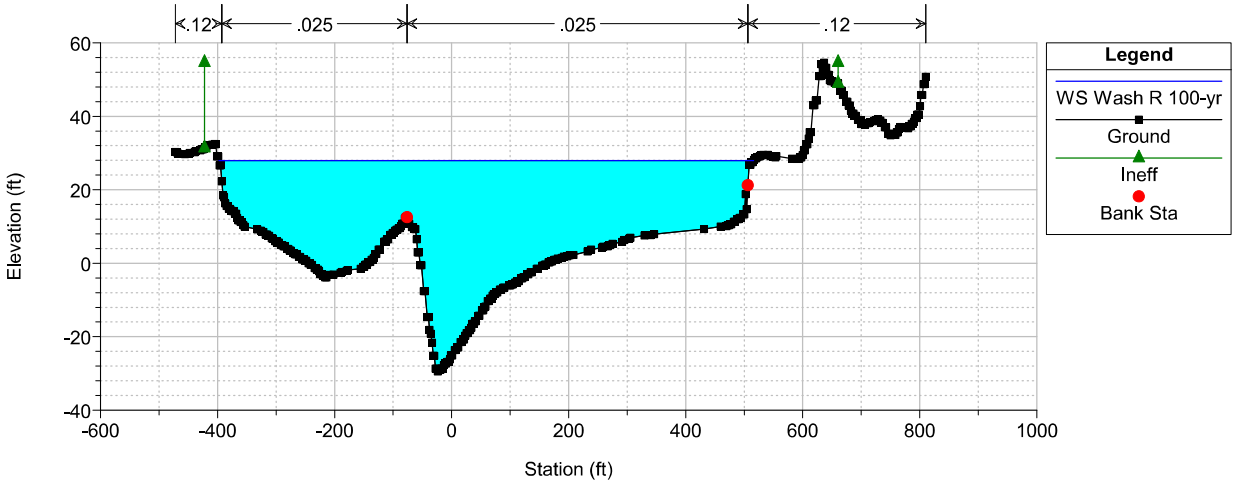
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 1911 Ineff left and rt dry



GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023

Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr

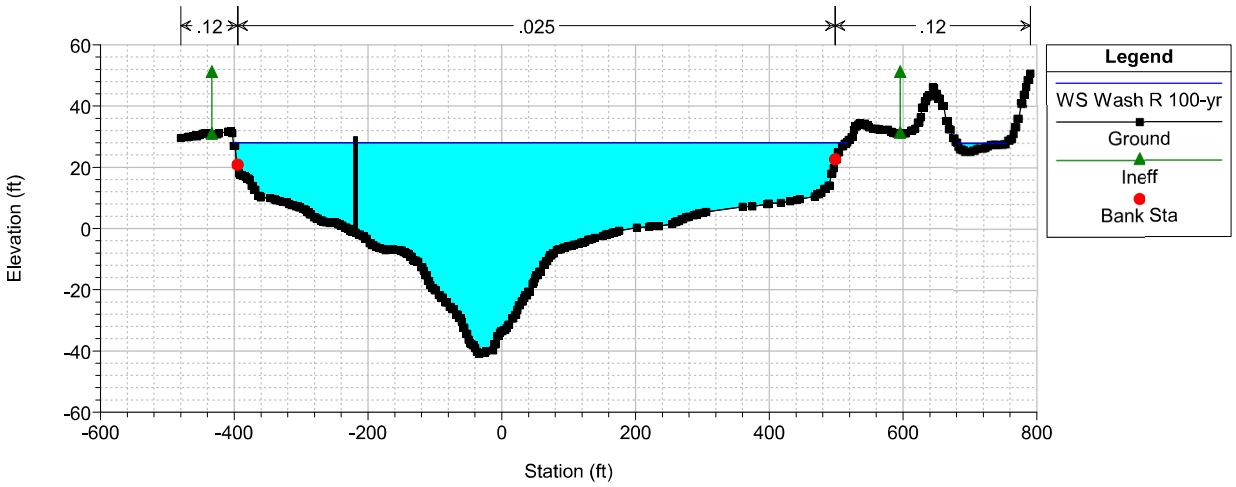
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 1782 Ineff rt dry // ineff left ds-up dry and jct columbia river // a

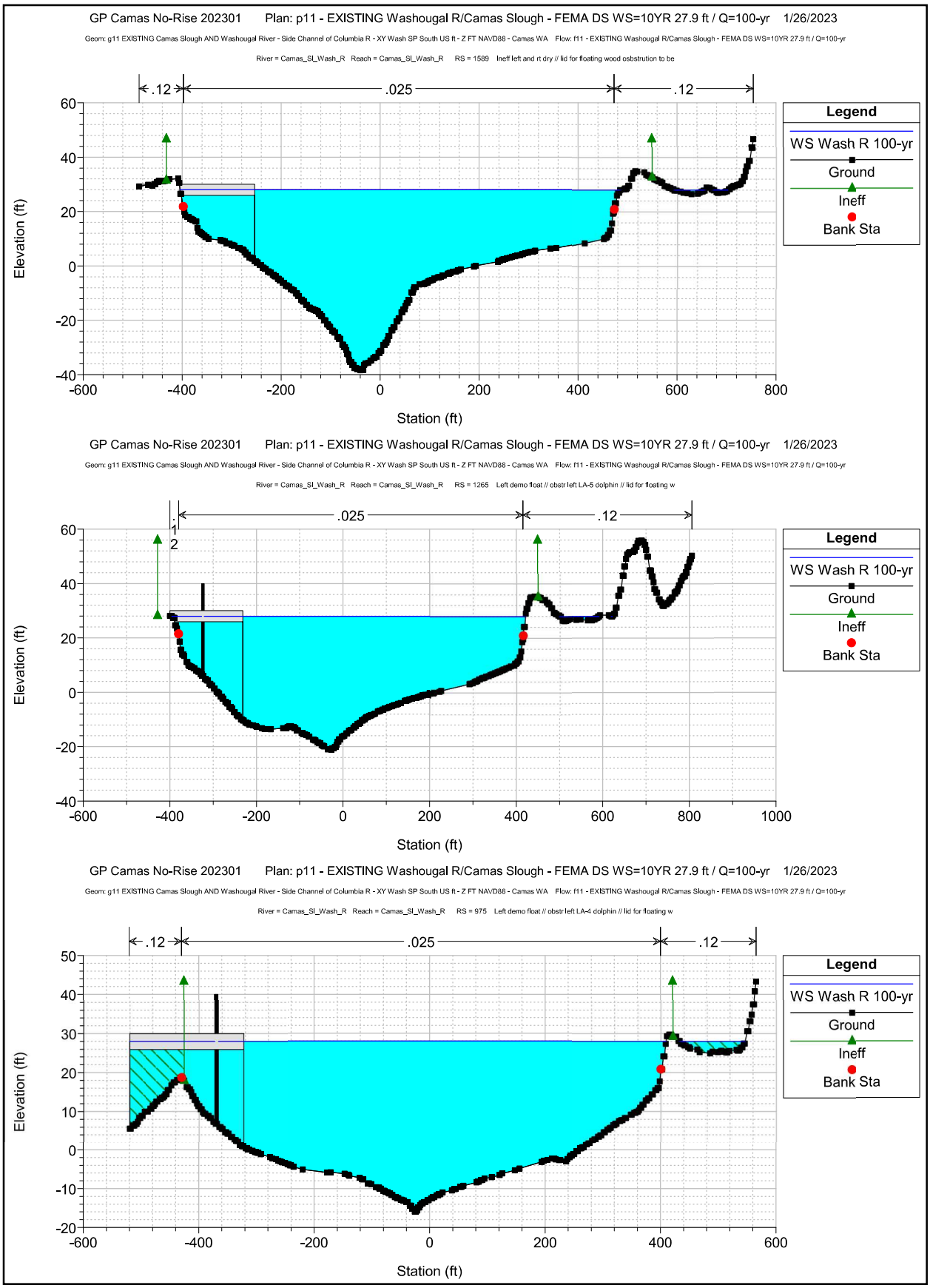


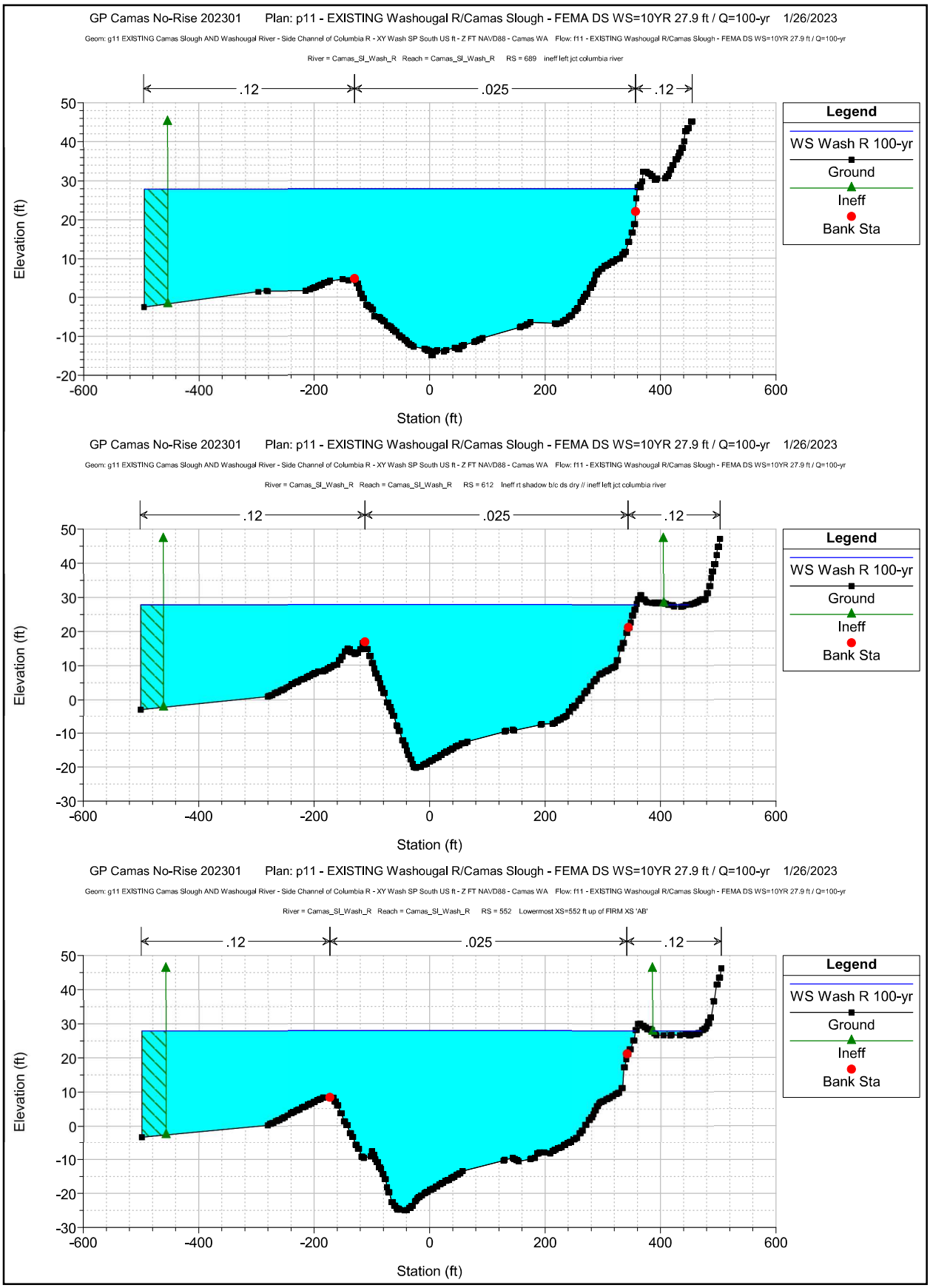
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023

Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr

River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 1670 Ineff rt dry // ineff left ds-up dry and jct columbia river // o




GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 1589 Ineff left and rt dry // lid for floating wood osbstrution to be
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 1265 Left demo float // obstr left LA-5 dolphin // lid for floating w
1
2
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 975 Left demo float // obstr left LA-4 dolphin // lid for floating w
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

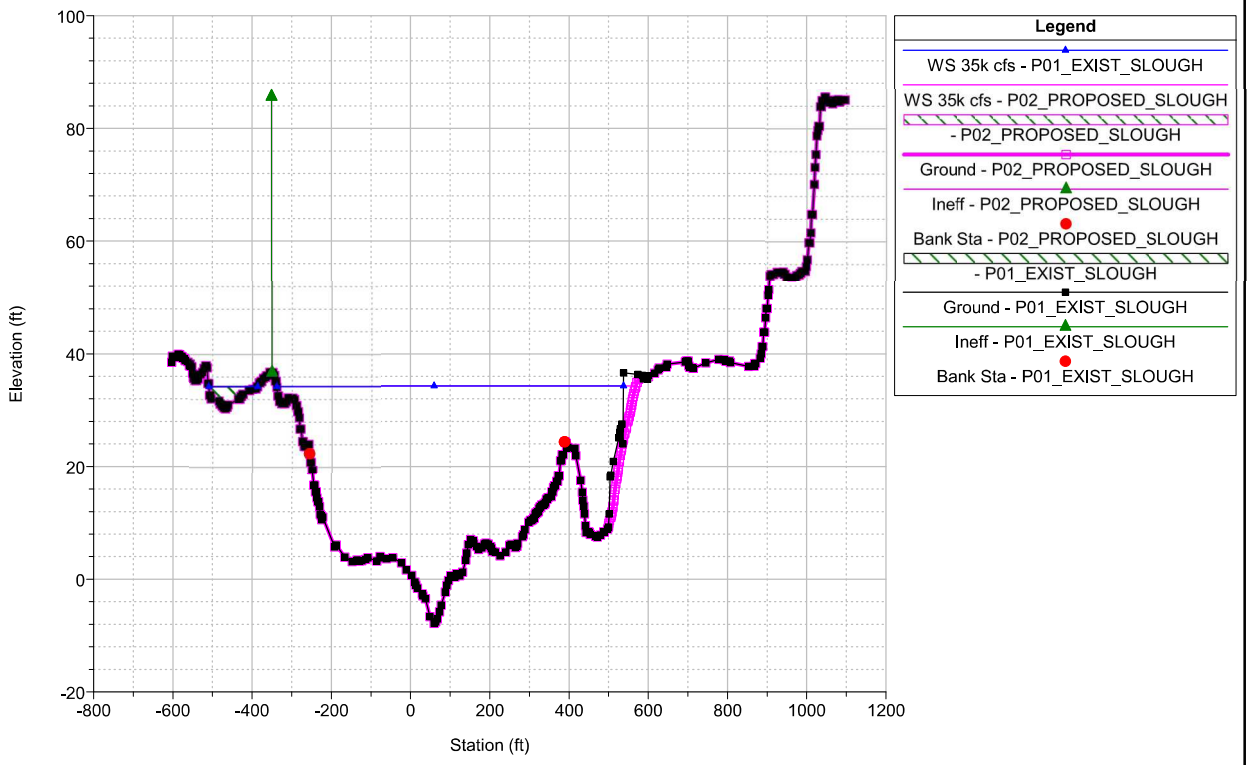

GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 689 ineff left jct columbia river
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 612 Ineff rt shadow b/c ds dry // ineff left jct columbia river
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr 1/26/2023
Geom: g11 EXISTING Camas Slough AND Washougal River - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f11 - EXISTING Washougal R/Camas Slough - FEMA DS WS=10YR 27.9 ft / Q=100-yr
River = Camas_SI_Wash_R Reach = Camas_SI_Wash_R RS = 552 Lowermost XS=552 ft up of FIRM XS 'AB'
.12
.025
.12
Legend
WS Wash R 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

APPENDIX F:
PROPOSED-CONDITION CROSS-SECTION DATA FOR BOTH MODELS

GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

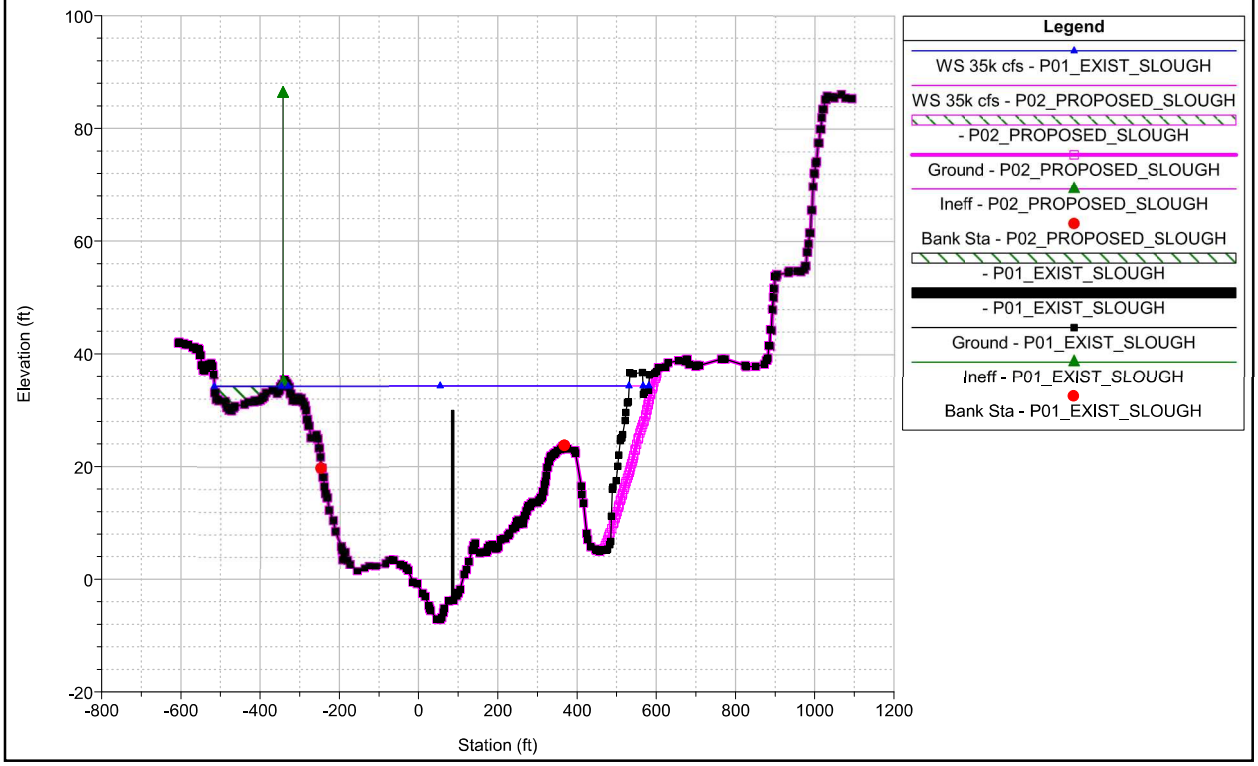
River = Camas_Slough Reach = Camas_Slough RS = 9798 Rt is planned cut and fill // Left is LA-19 demo area=high n-val



GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

River = Camas_Slough Reach = Camas_Slough RS = 9760 Rt is planned cut and fill // Obstr rt=LA-18 dolphin // Left in

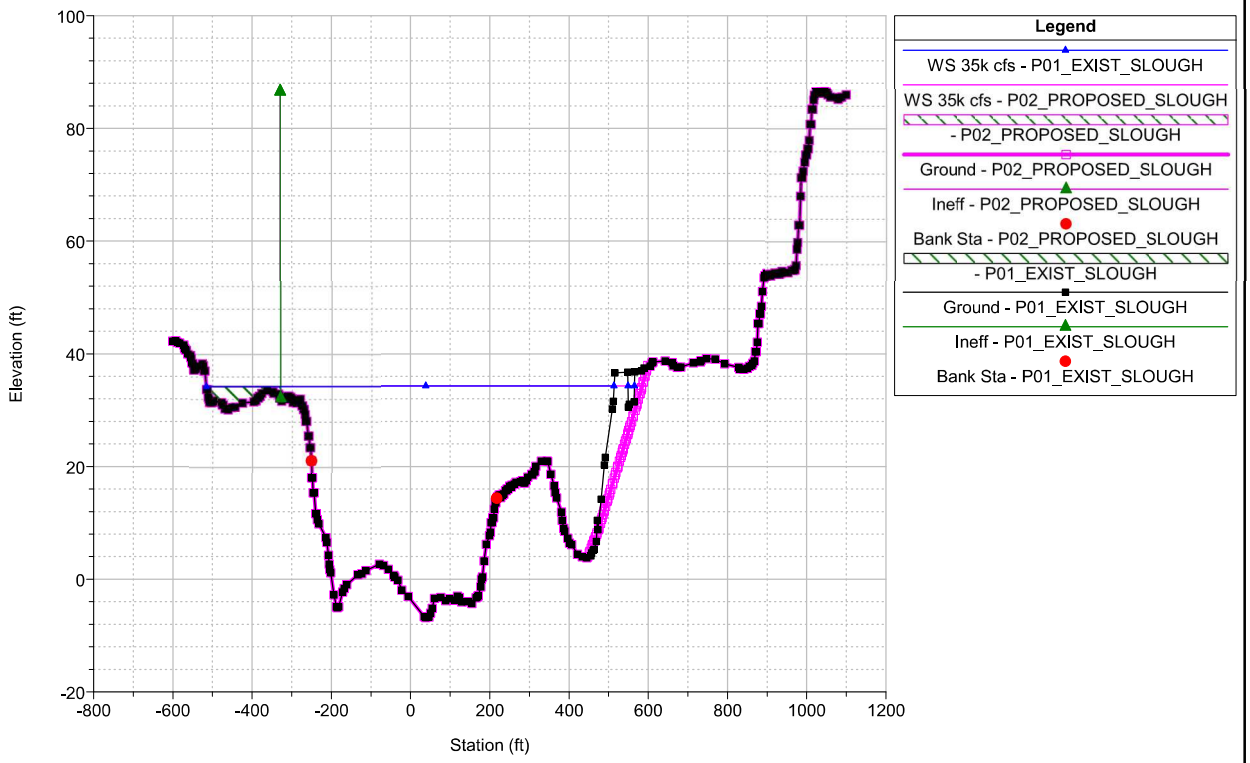


1

GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

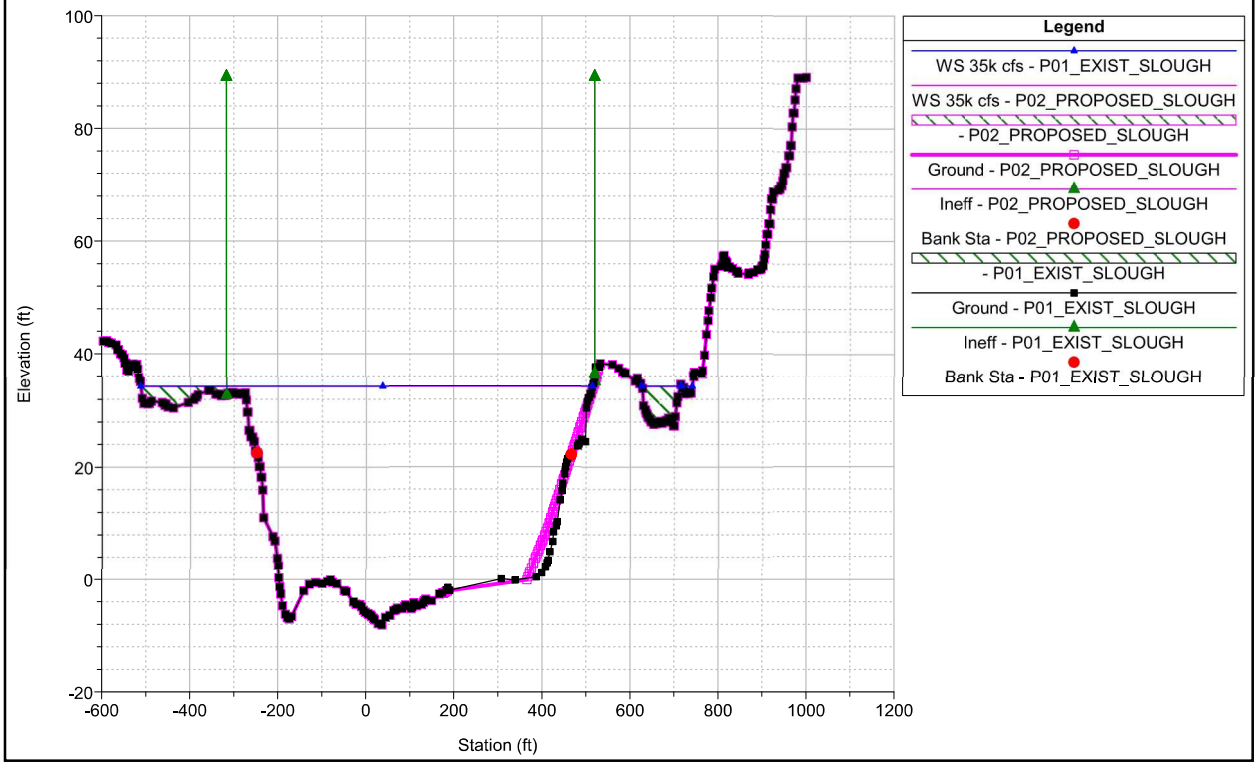
River = Camas_Slough Reach = Camas_Slough RS = 9716 Rt is planned cut and fill // below obstr // Left in LA-19 demo

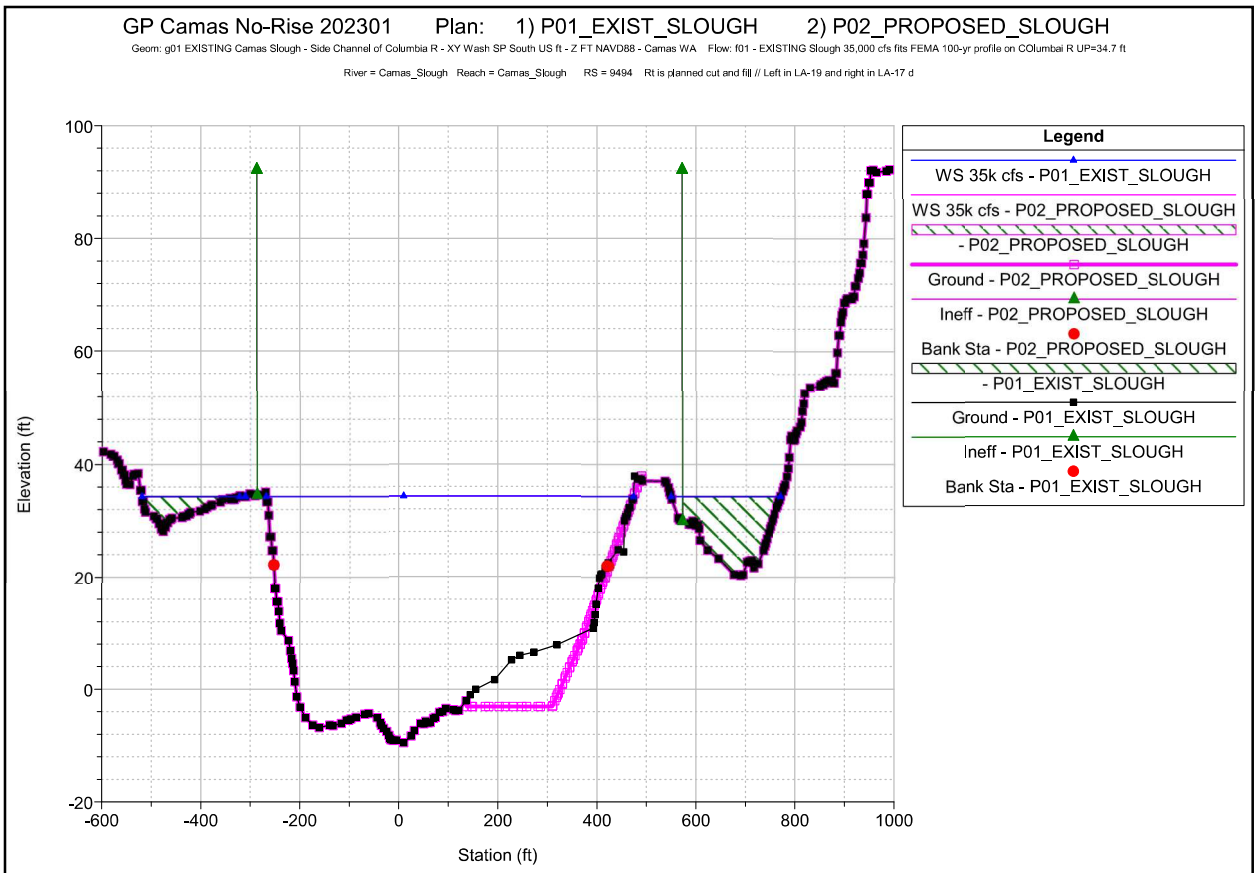


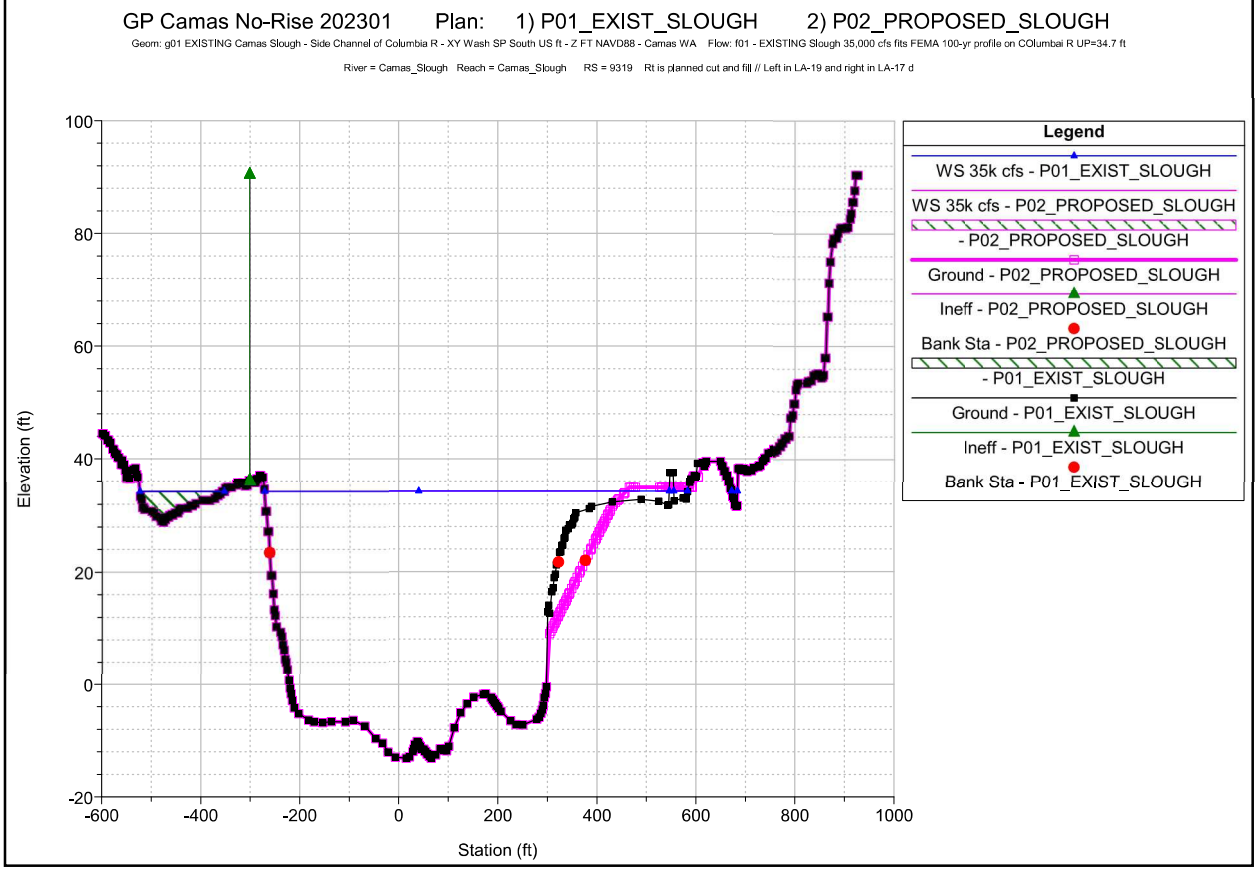
GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

River = Camas_Slough Reach = Camas_Slough RS = 9622 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d



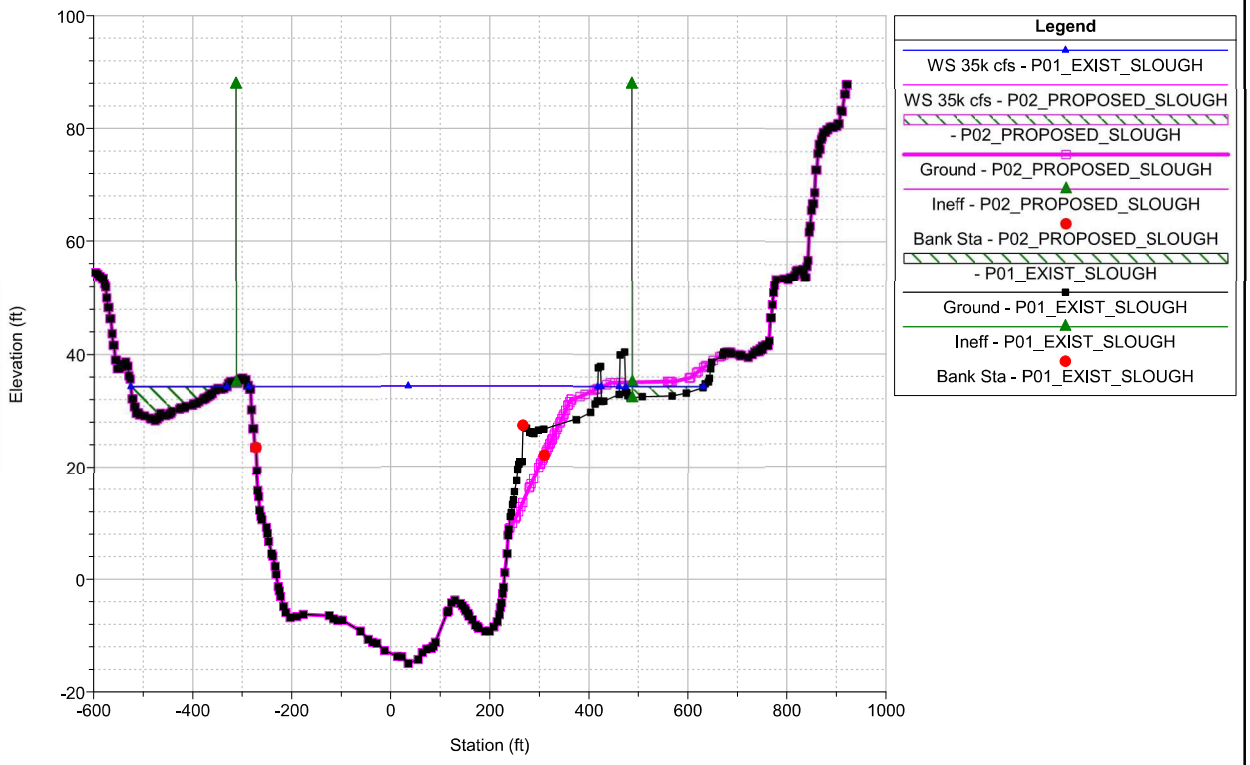

GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9494 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
Legend
WS 35k cfs - P01_EXIST_SLOUGH
WS 35k cfs - P02_PROPOSED_SLOUGH
- P02_PROPOSED_SLOUGH
Ground - P02_PROPOSED_SLOUGH
Ineff - P02_PROPOSED_SLOUGH
Bank Sta - P02_PROPOSED_SLOUGH
- P01_EXIST_SLOUGH
Ground - P01_EXIST_SLOUGH
Ineff - P01_EXIST_SLOUGH
Bank Sta - P01_EXIST_SLOUGH
Elevation (ft)
Station (ft)
100
80
60
40
20
0
-20
-600
-400
-200
0
200
400
600
800
1000


GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9319 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d
Legend
WS 35k cfs - P01_EXIST_SLOUGH
WS 35k cfs - P02_PROPOSED_SLOUGH
- P02_PROPOSED_SLOUGH
Ground - P02_PROPOSED_SLOUGH
Ineff - P02_PROPOSED_SLOUGH
Bank Sta - P02_PROPOSED_SLOUGH
- P01_EXIST_SLOUGH
Ground - P01_EXIST_SLOUGH
Ineff - P01_EXIST_SLOUGH
Bank Sta - P01_EXIST_SLOUGH
Elevation (ft)
Station (ft)
100
80
60
40
20
0
-20
-600
-400
-200
0
200
400
600
800
1000

GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

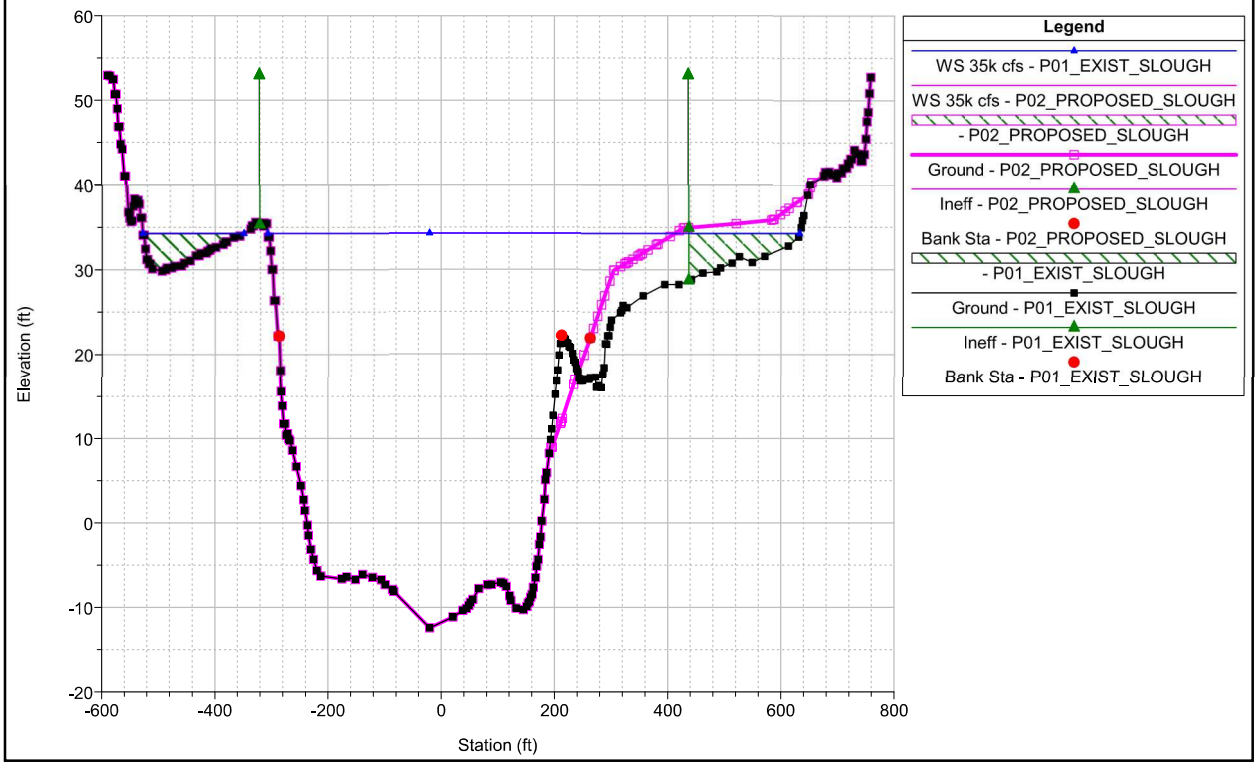
River = Camas_Slough Reach = Camas_Slough RS = 9198 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d



GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

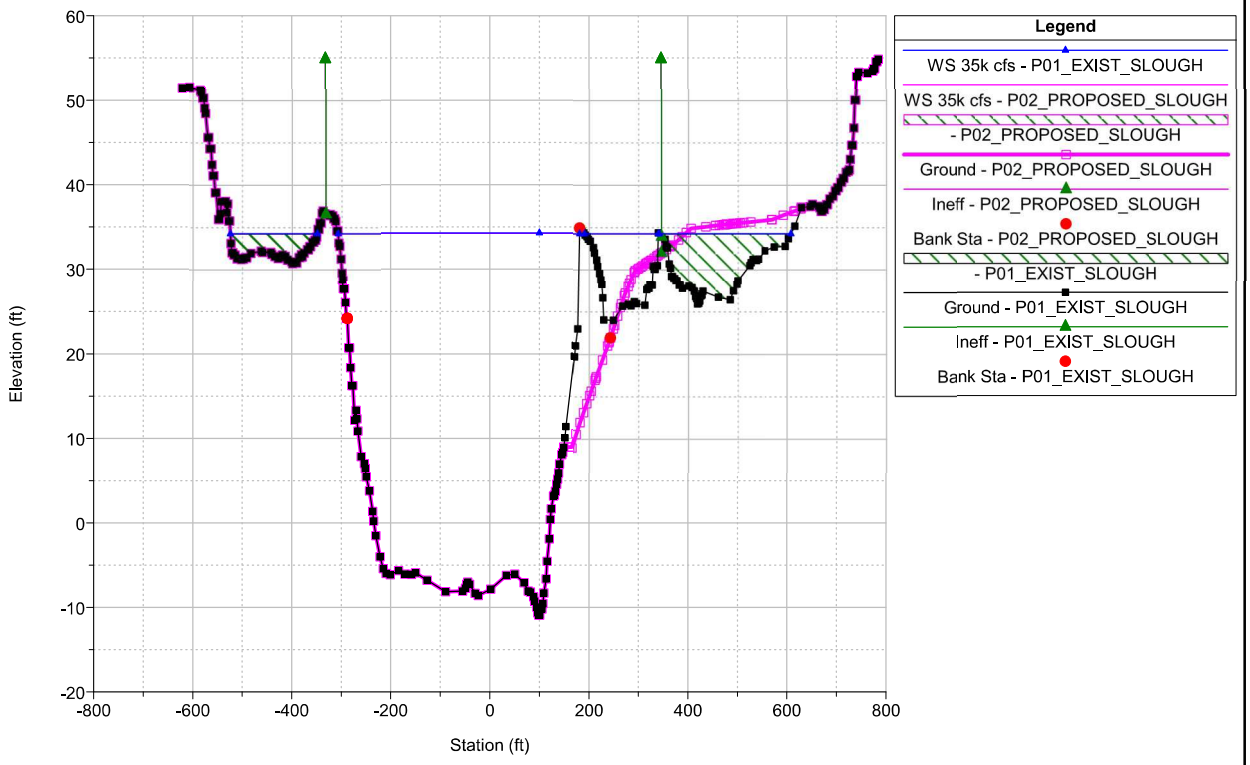
River = Camas_Slough Reach = Camas_Slough RS = 9099 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d



GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

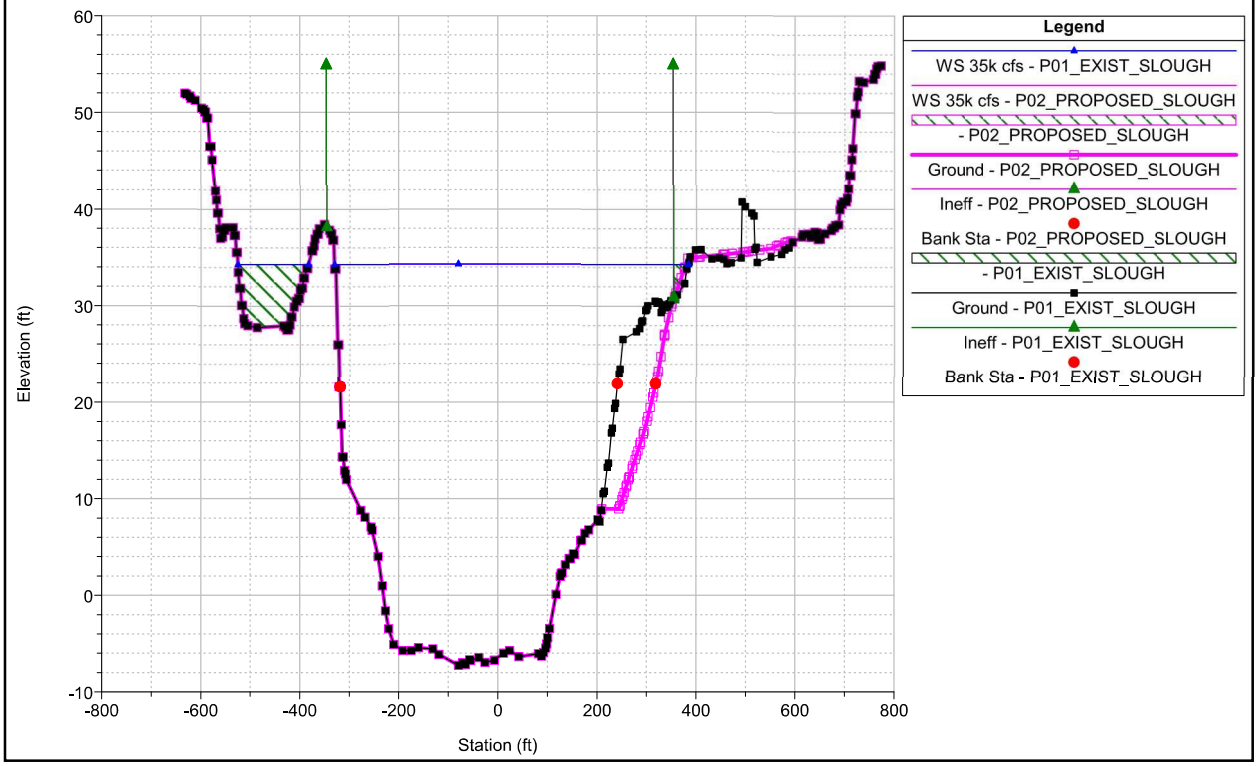
River = Camas_Slough Reach = Camas_Slough RS = 8982 Rt is planned cut and fill // Left in LA-19 and right in LA-17 d



GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

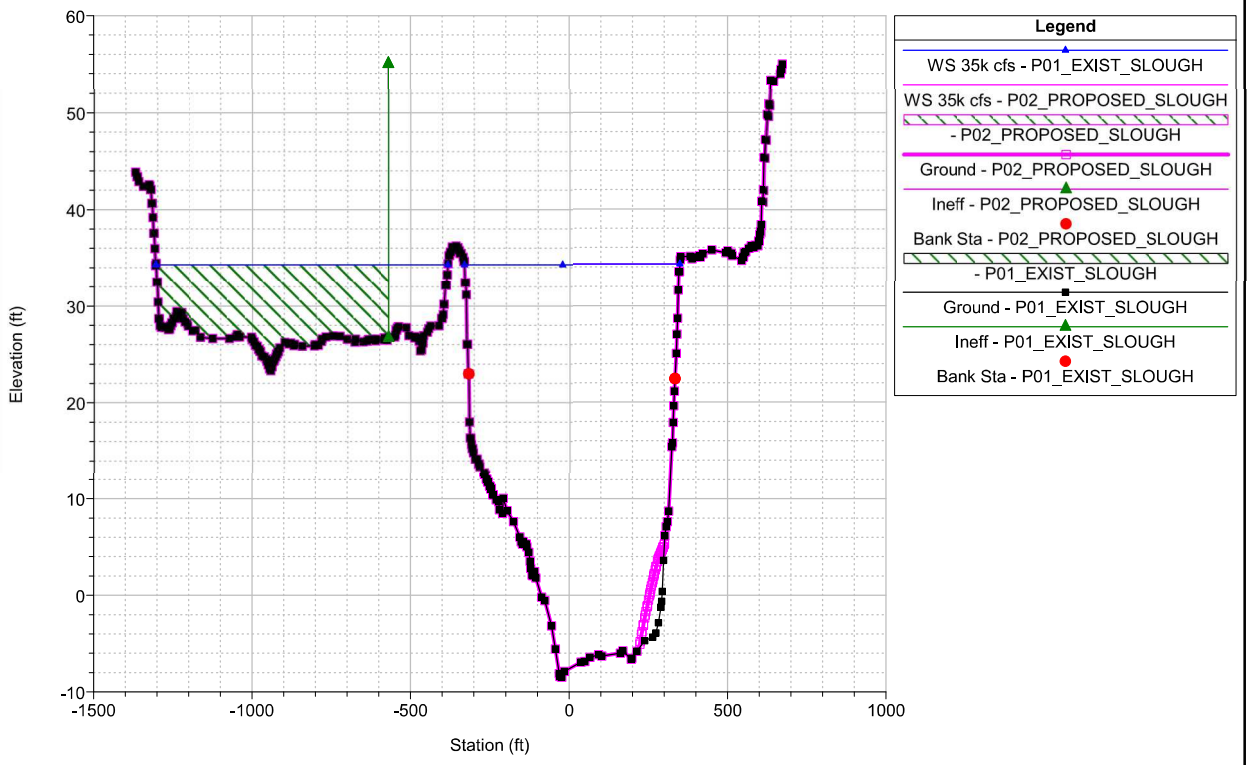
River = Camas_Slough Reach = Camas_Slough RS = 8876 Rt is planned cut-dredge and ds planned fill // Left in LA-19 an



GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

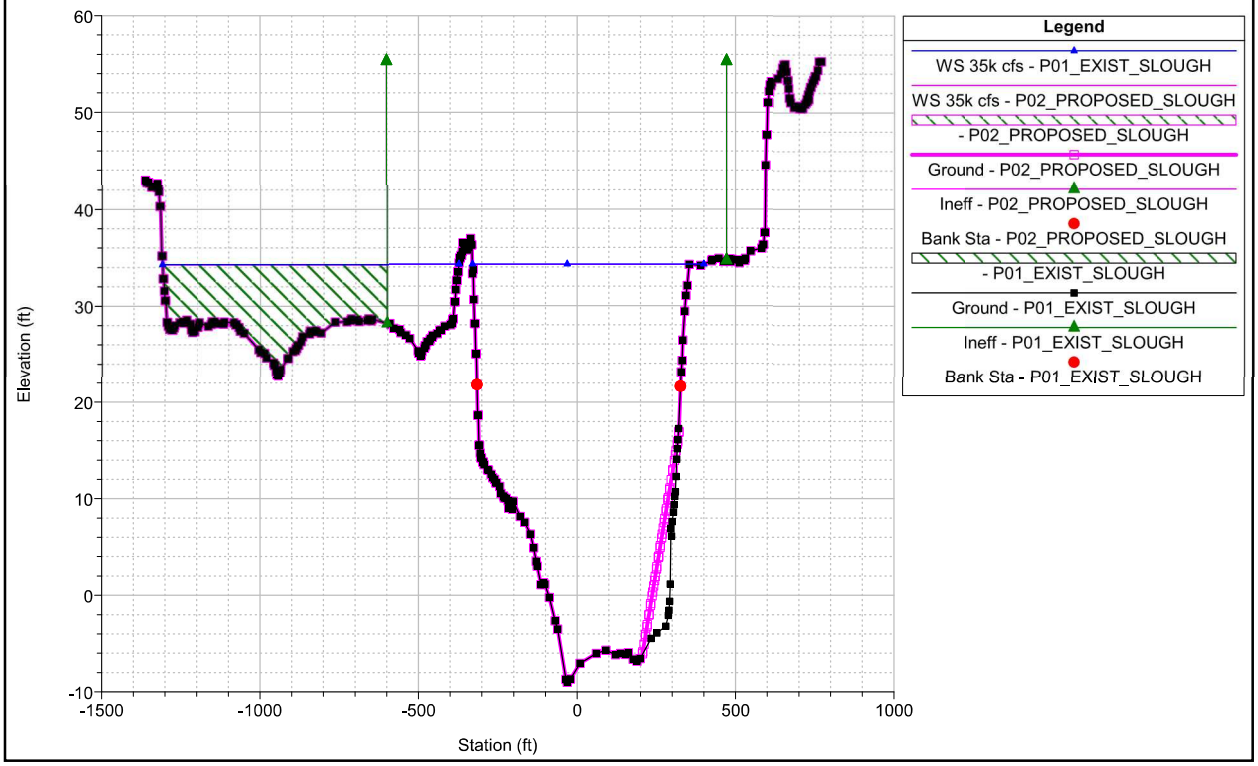
River = Camas_Slough Reach = Camas_Slough RS = 8486 Rt is planned fill // Right in LA-17 demo area=high n-val

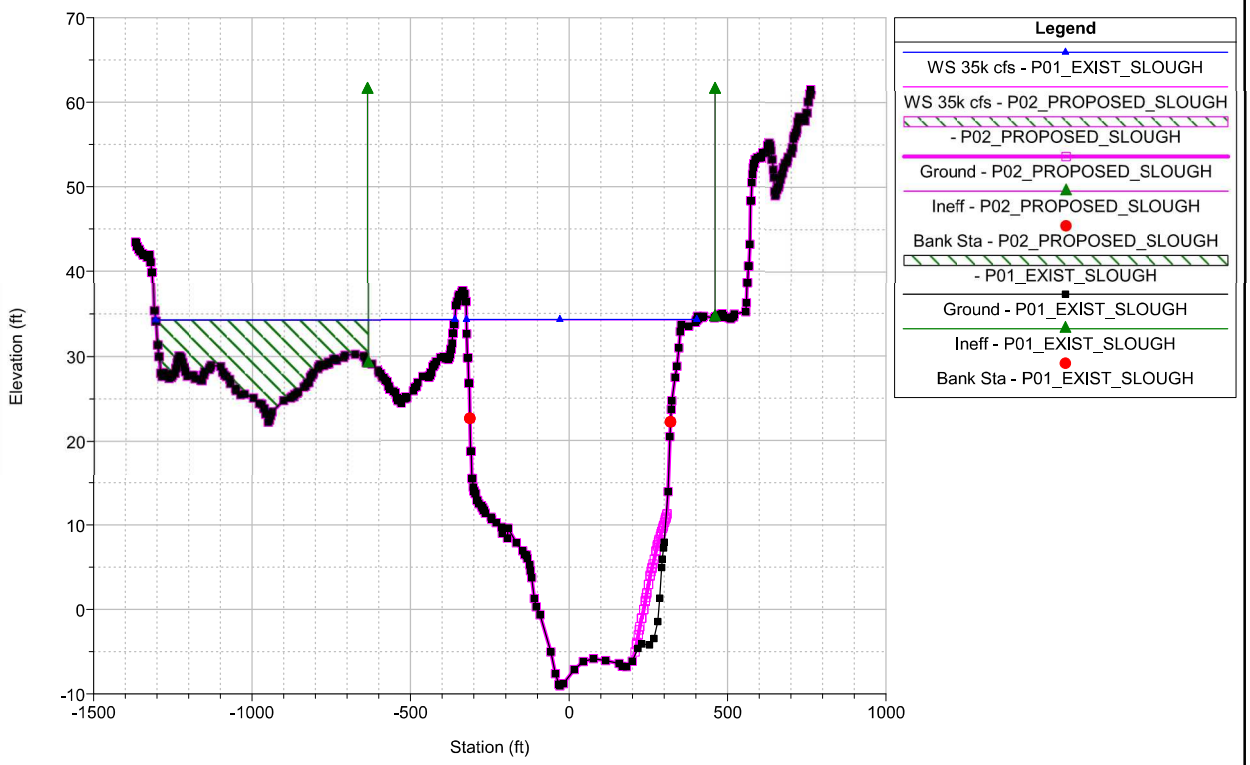


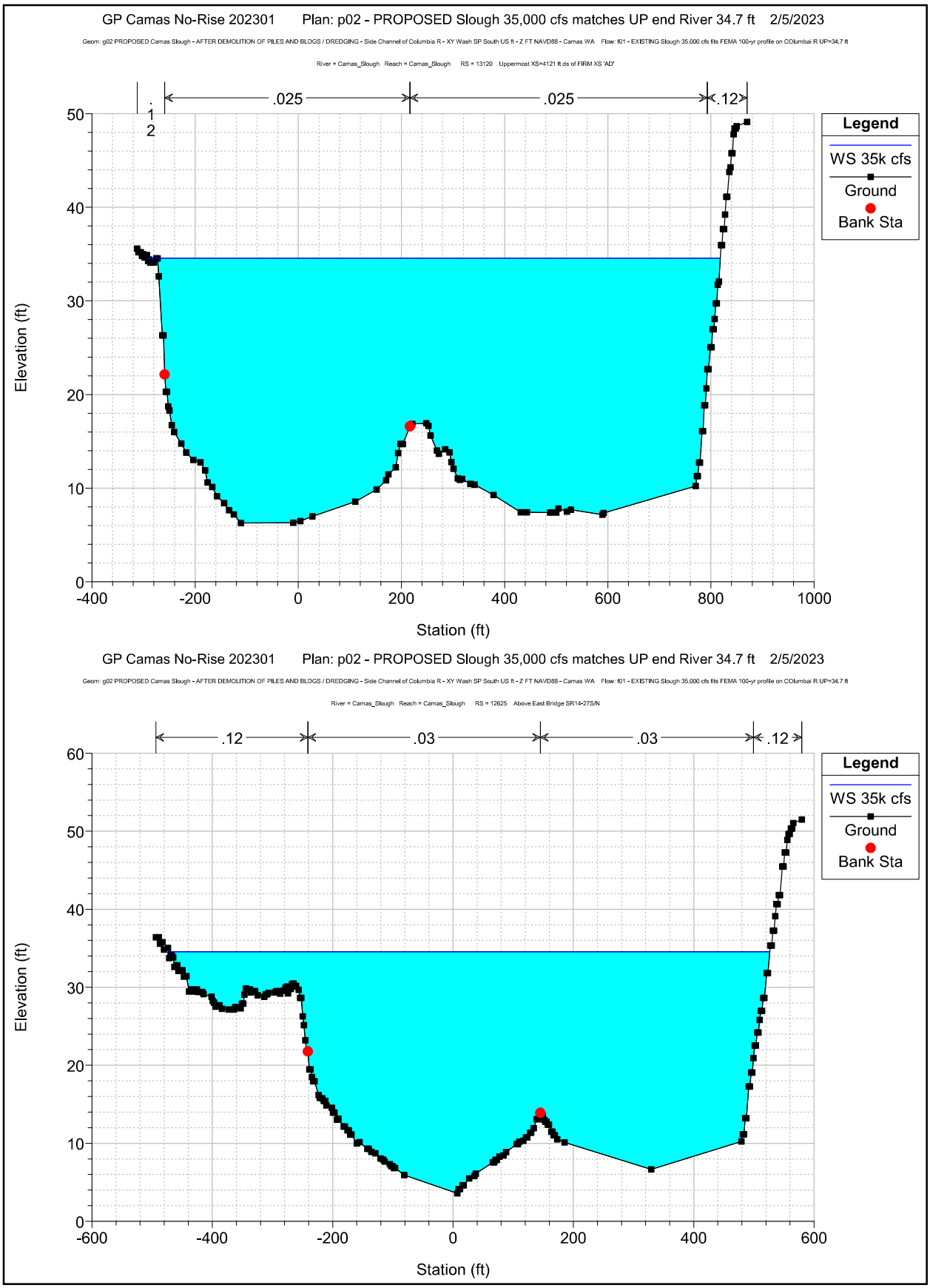
GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH

Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

River = Camas_Slough Reach = Camas_Slough RS = 8428 Rt is planned fill // Right in LA-17 demo area=high n-val



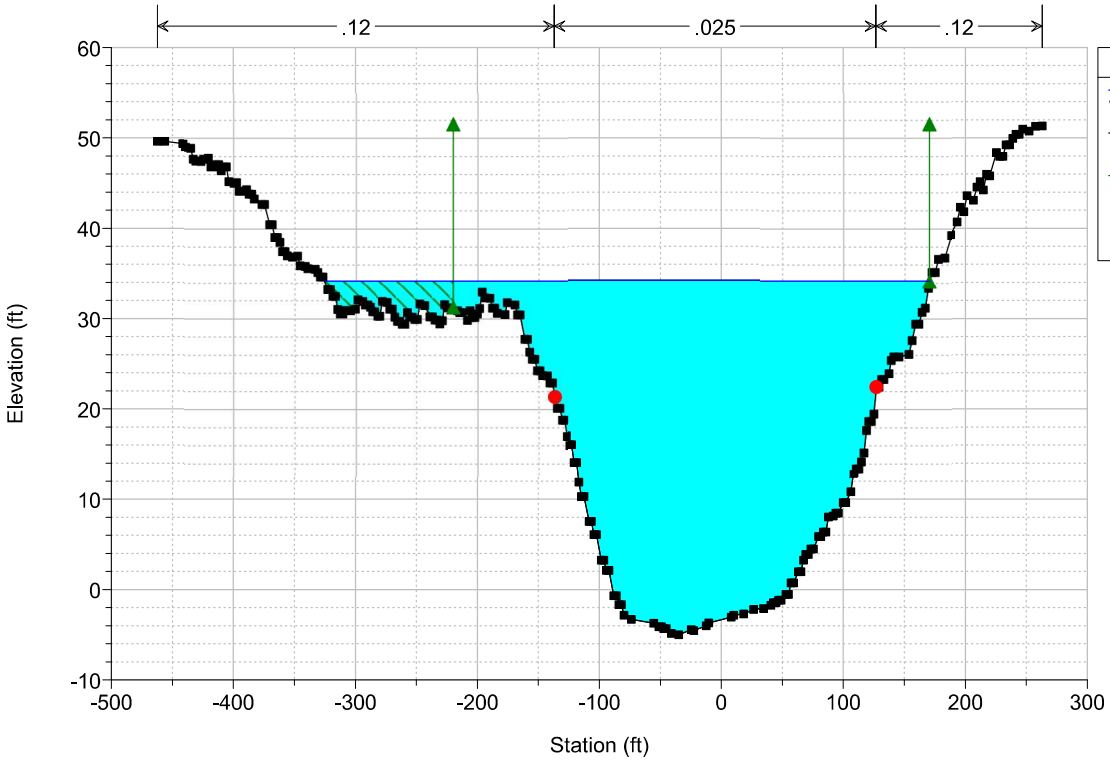

GP Camas No-Rise 202301 Plan: 1) P01_EXIST_SLOUGH 2) P02_PROPOSED_SLOUGH
Geom: g01 EXISTING Camas Slough - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8363 Rt is planned fill // Right in LA-17 demo area=high n-val
Elevation (ft)
70
60
50
40
30
20
10
0
-10
-1500
-1000
-500
0
500
1000
Station (ft)
Legend
WS 35k cfs - P01_EXIST_SLOUGH
WS 35k cfs - P02_PROPOSED_SLOUGH
- P02_PROPOSED_SLOUGH
Ground - P02_PROPOSED_SLOUGH
Ineff - P02_PROPOSED_SLOUGH
Bank Sta - P02_PROPOSED_SLOUGH
- P01_EXIST_SLOUGH
Ground - P01_EXIST_SLOUGH
Ineff - P01_EXIST_SLOUGH
Bank Sta - P01_EXIST_SLOUGH


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 13120 Uppermost XS=4121 ft dis of FIRM XS 'AD'
.1
.2
.025
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 12625 Above East Bridge SR14-27S/N
.12
.03
.03
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
1

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023

Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

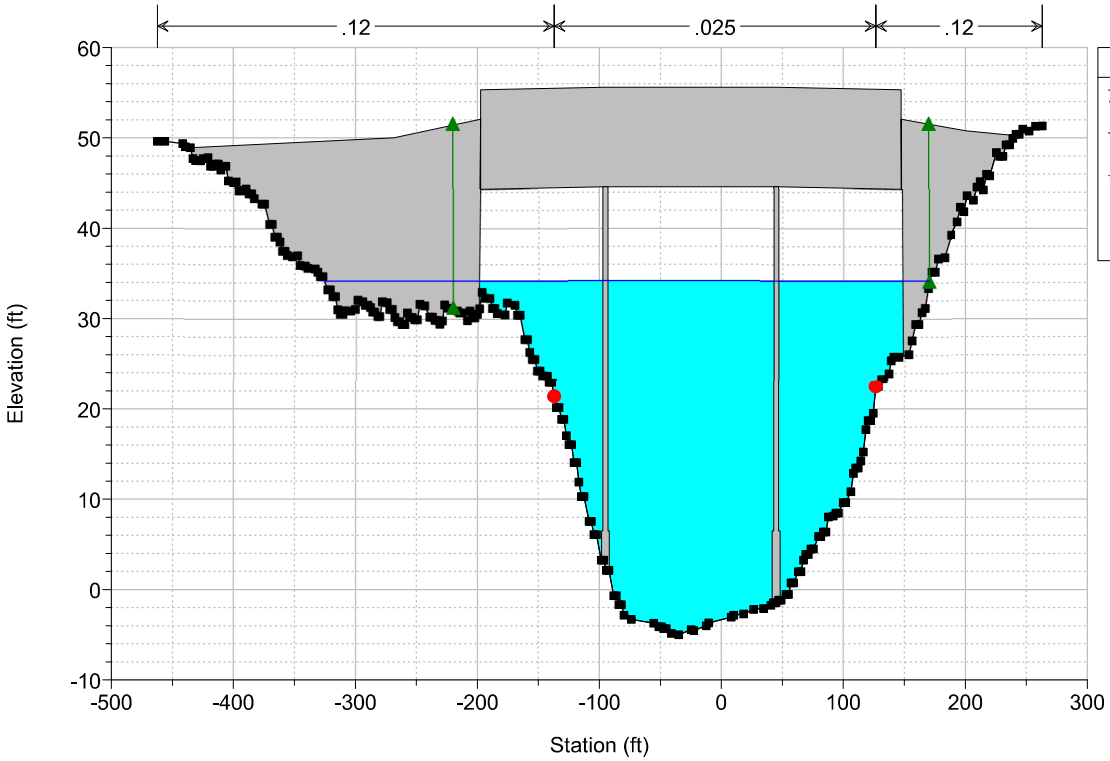
River = Camas_Slough Reach = Camas_Slough RS = 12222 UP East Bridge SR14-27S/N



GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023

Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

River = Camas_Slough Reach = Camas_Slough RS = 12168 BR East Bridge SR14-27S/N



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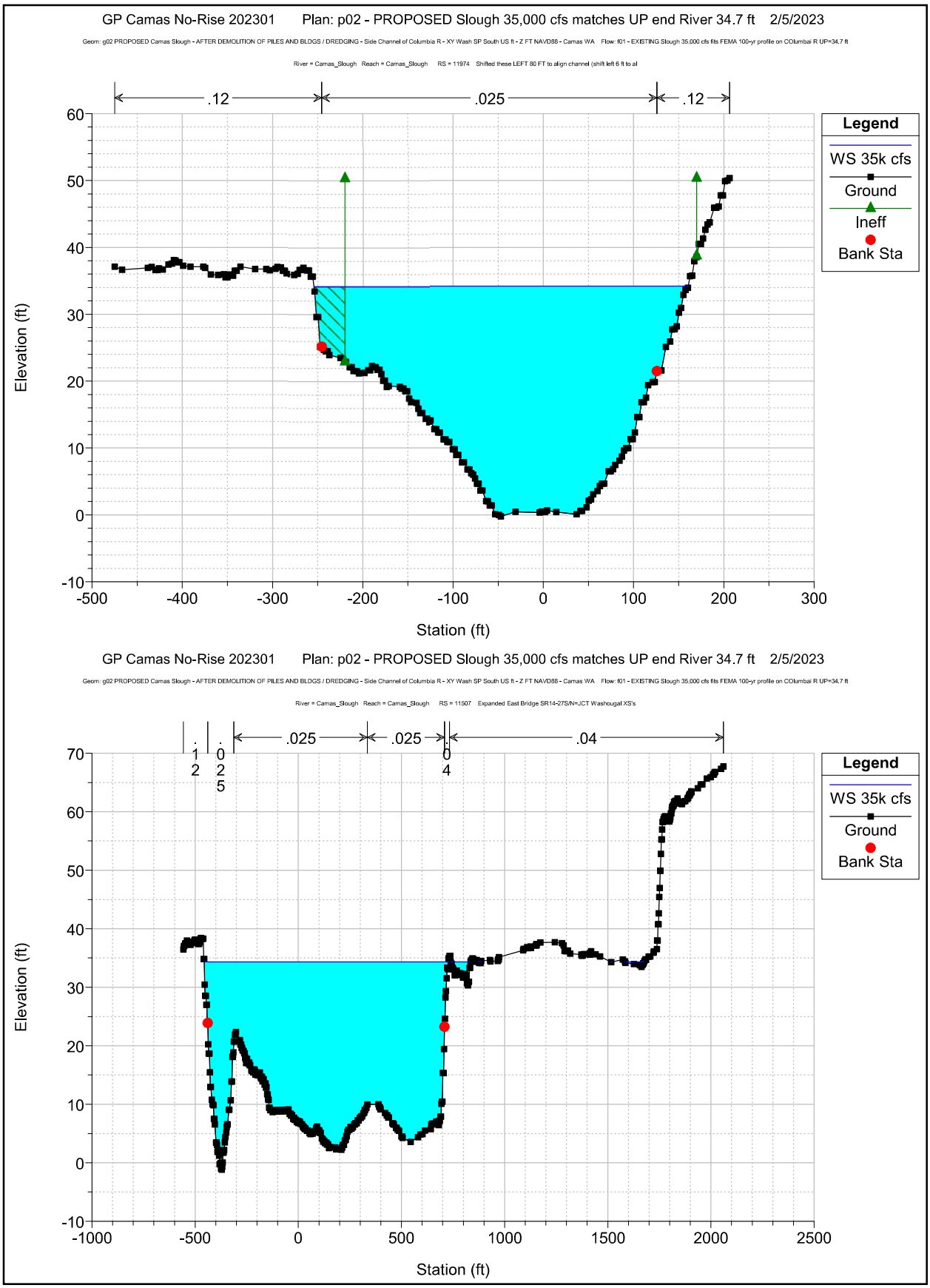
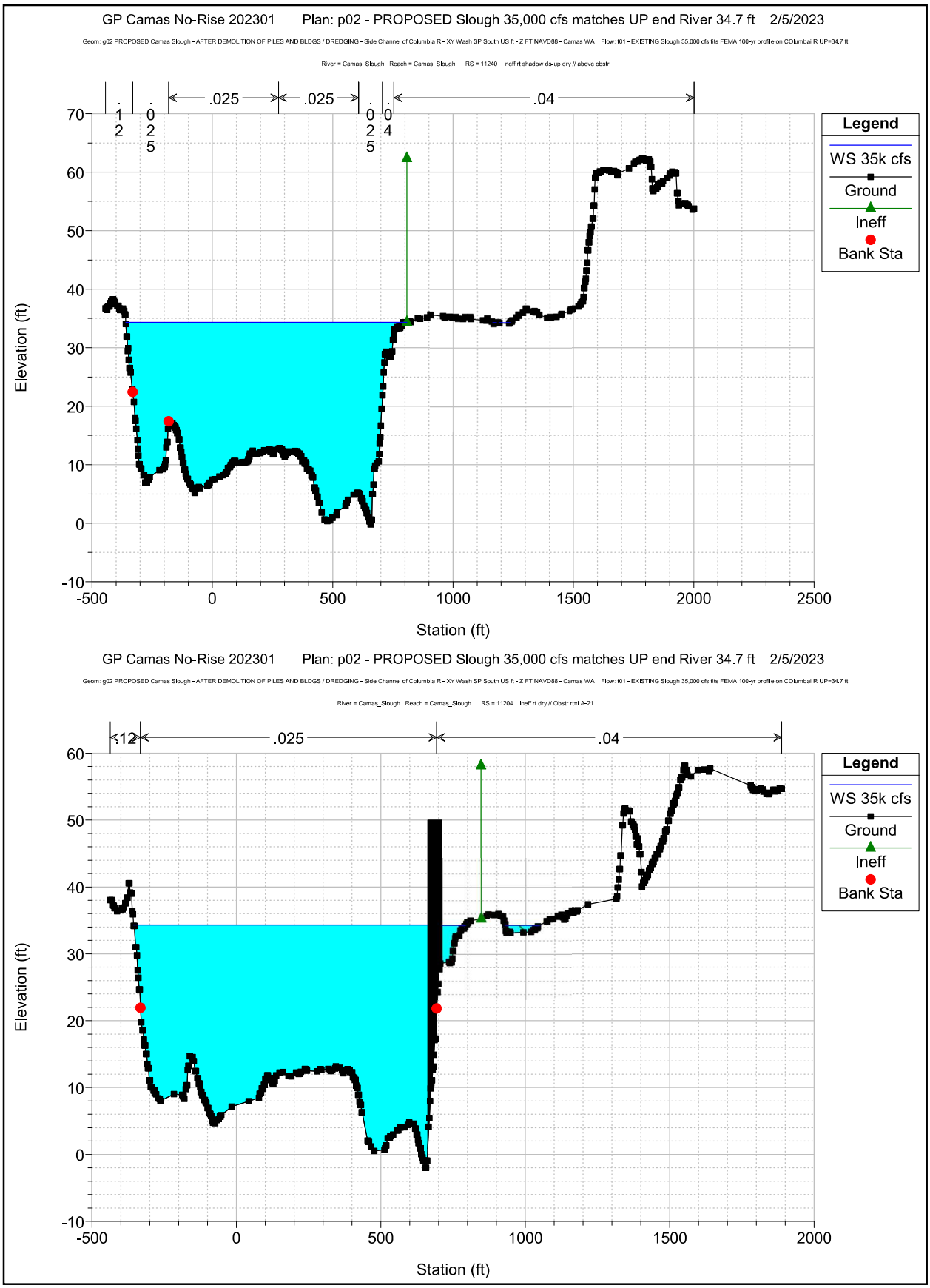
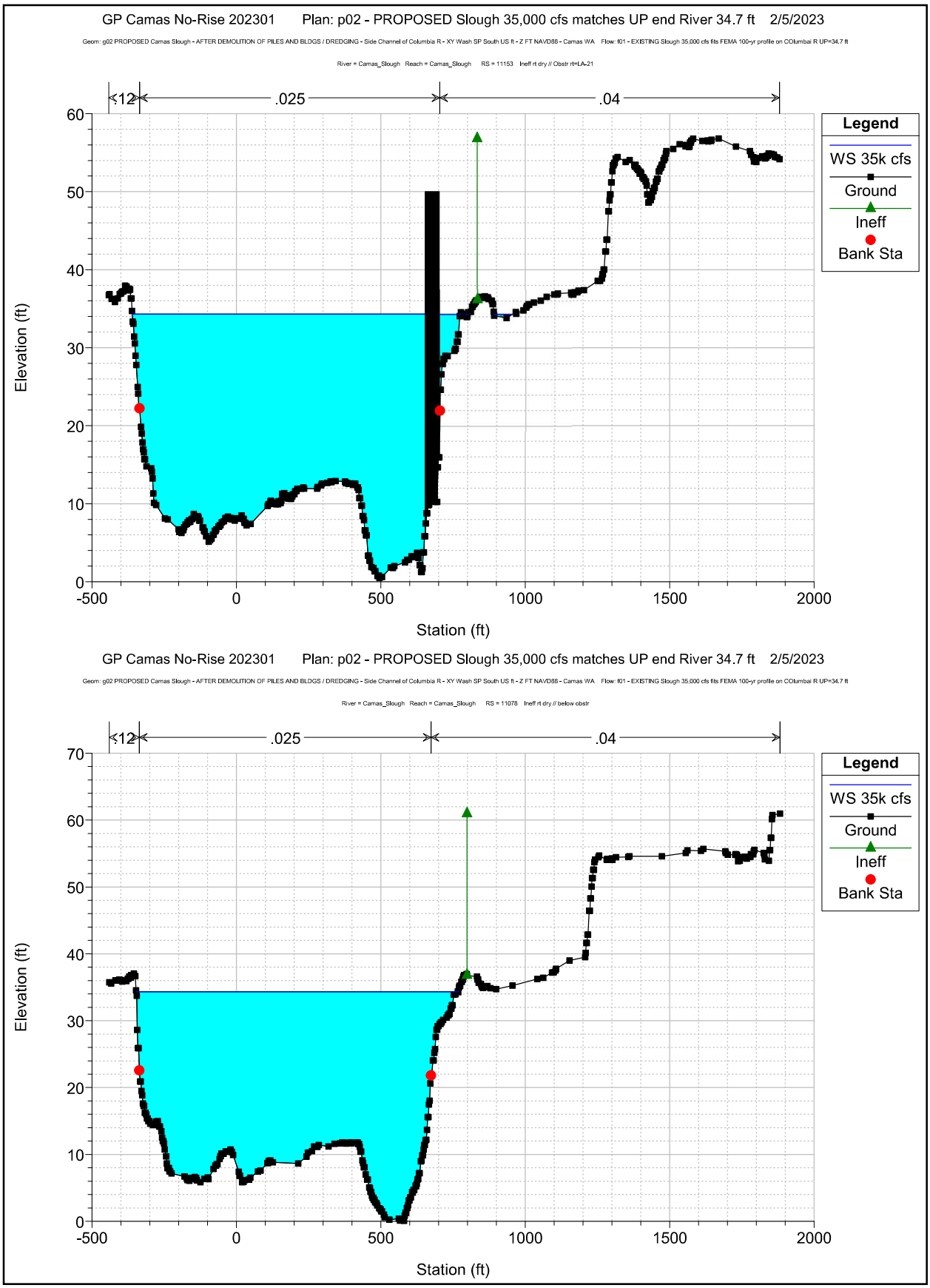
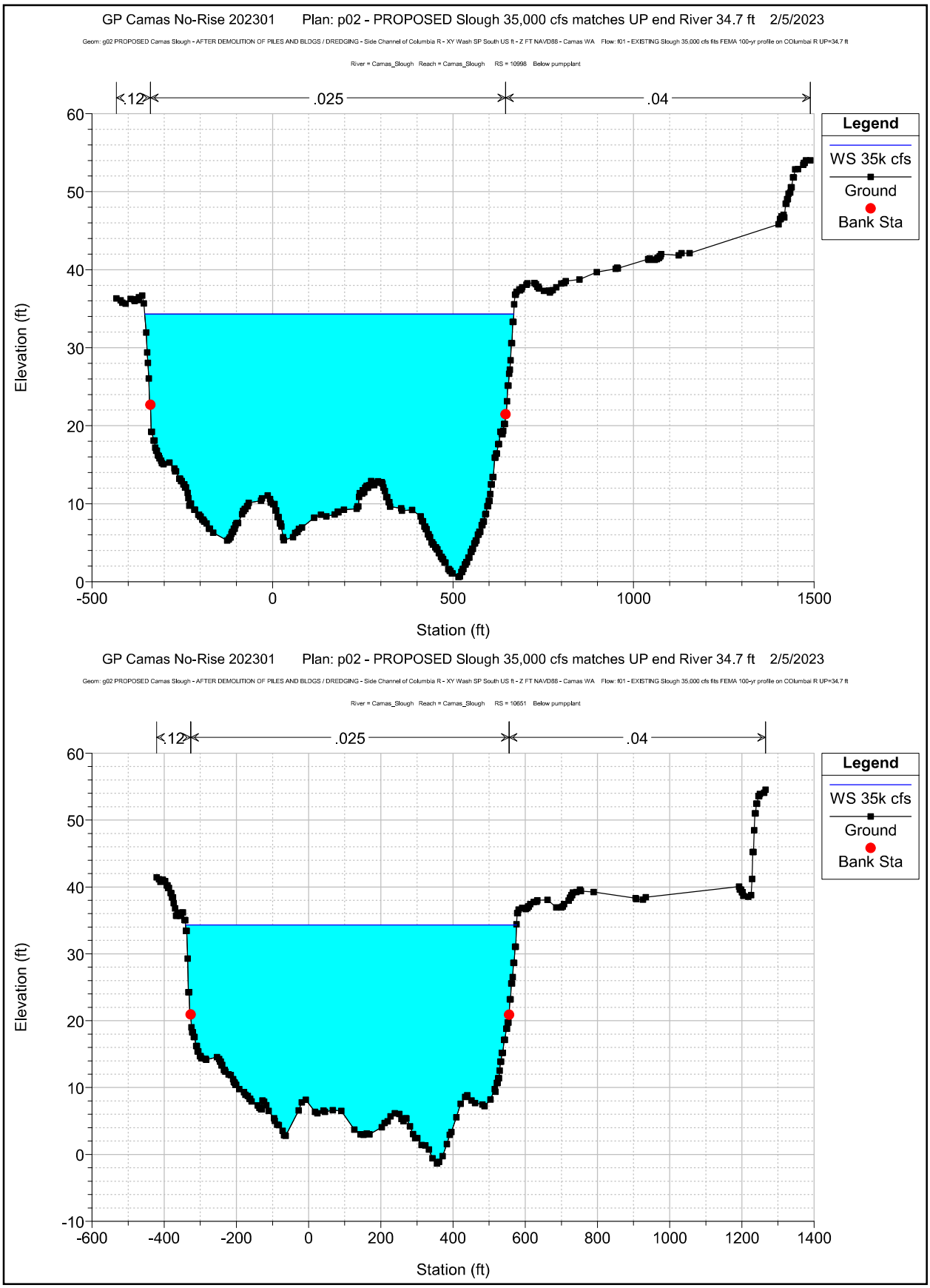

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11974 Shifted these LEFT 80 FT to align channel (shift left 6 ft to al
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11507 Expanded East Bridge SR14-27S/N=JCT Washougal XS's
.12
.025
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11240 Ineff rt shadow ds-up dry // above obstr
.12
.025
.025
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11204 Ineff rt dry // Obstr rt=LA-21
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11153 Ineff rt dry // Obstr rt=LA-21
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 11078 Ineff rt dry // below obstr
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
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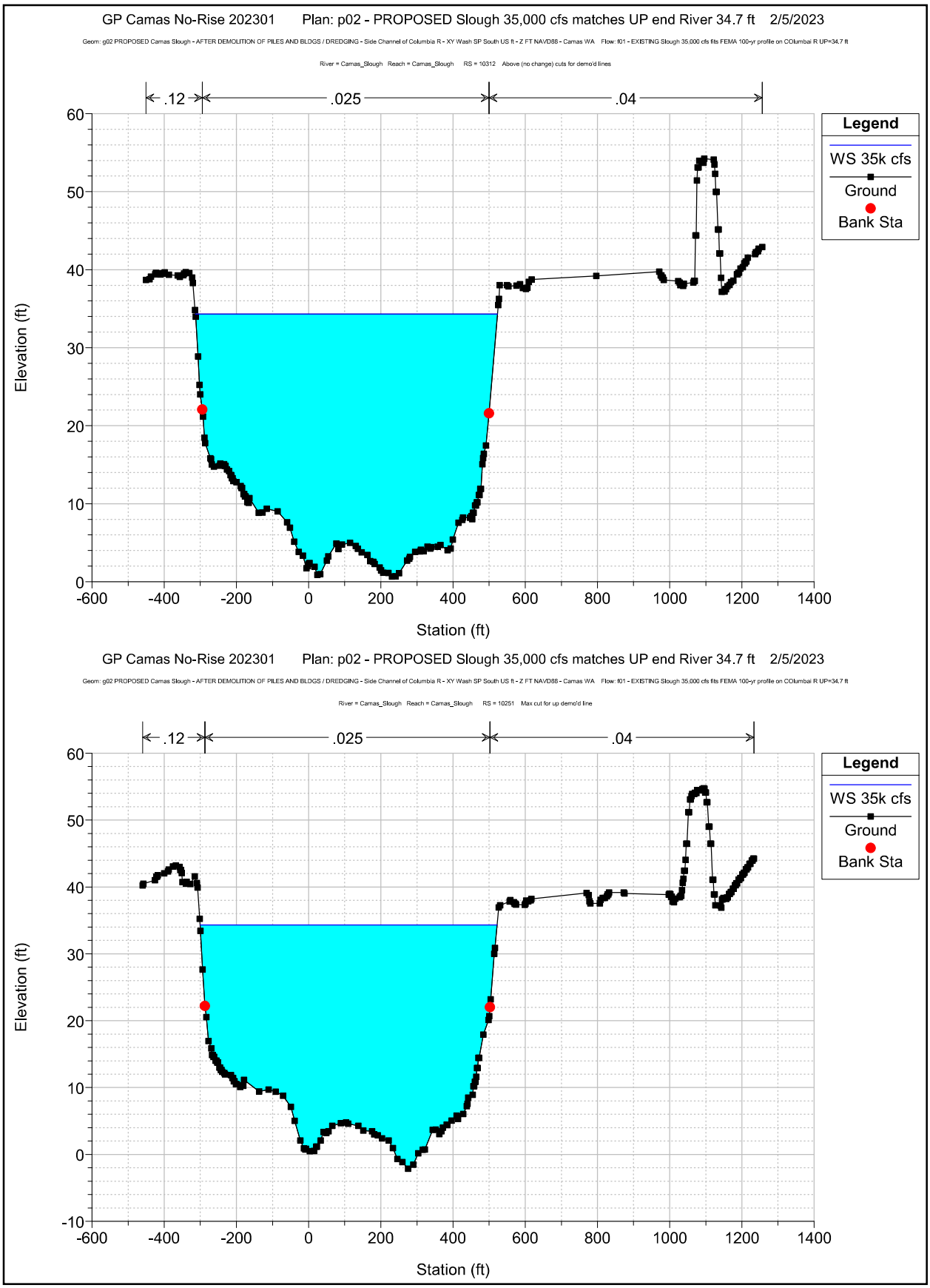
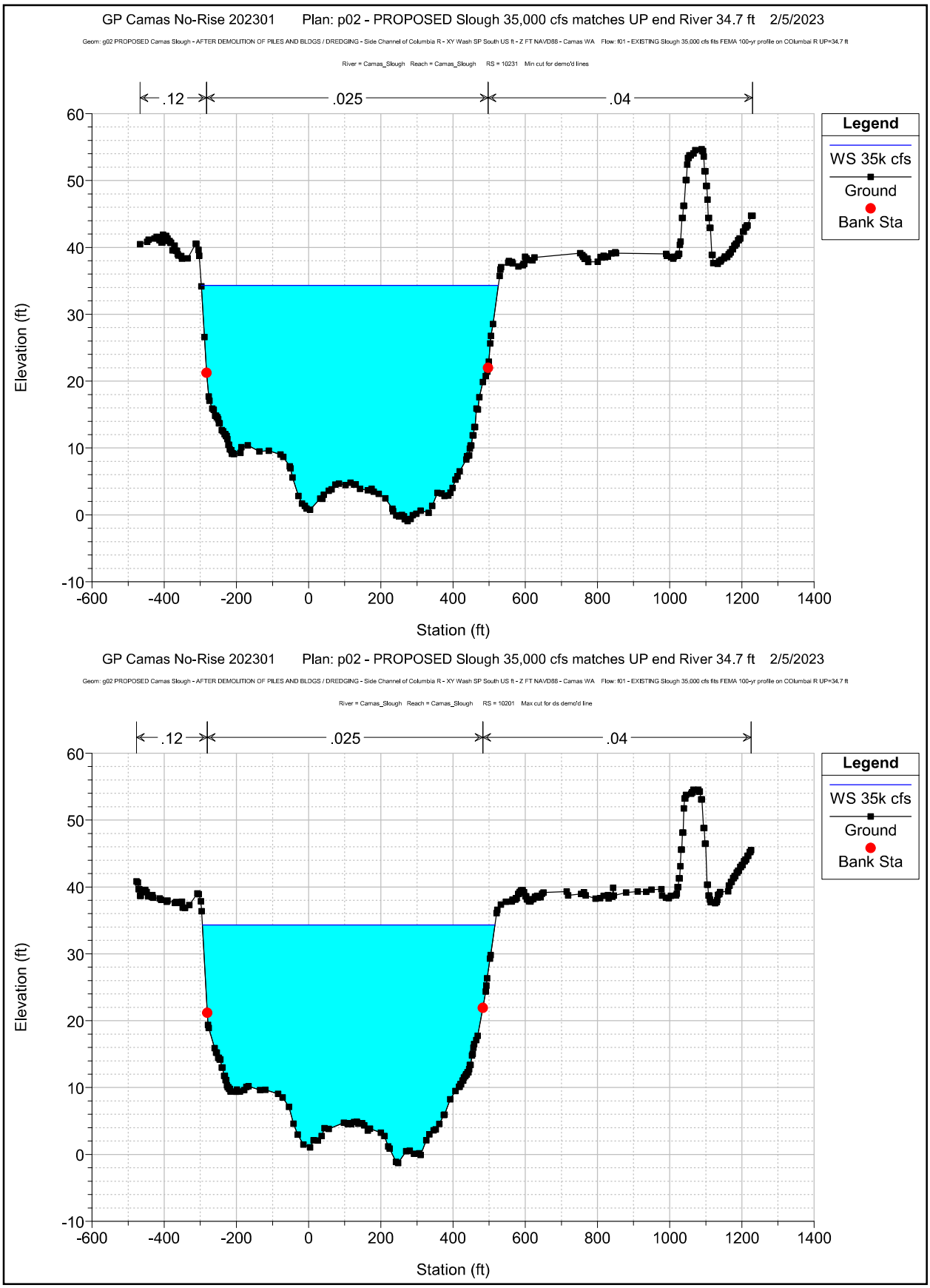
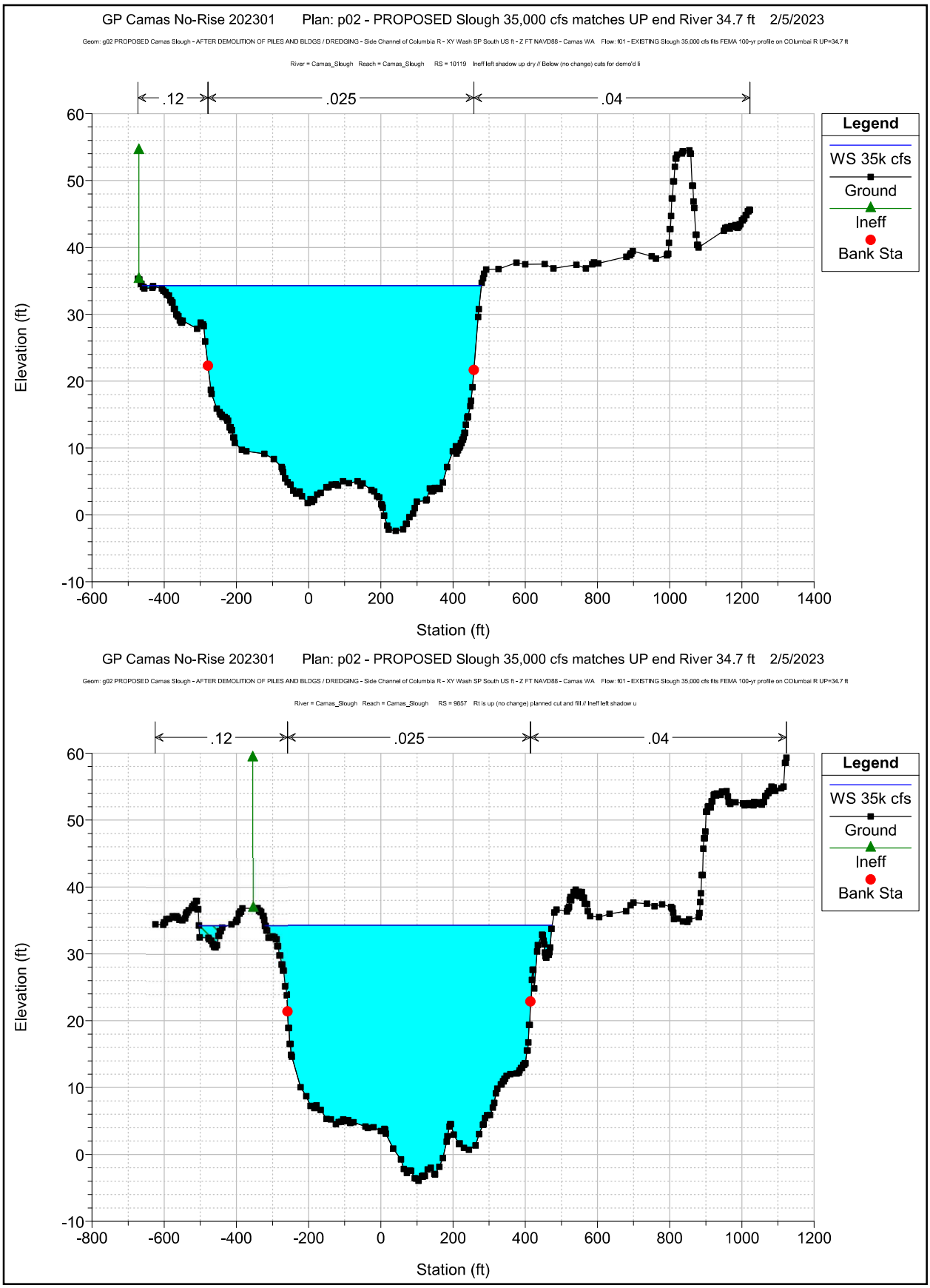
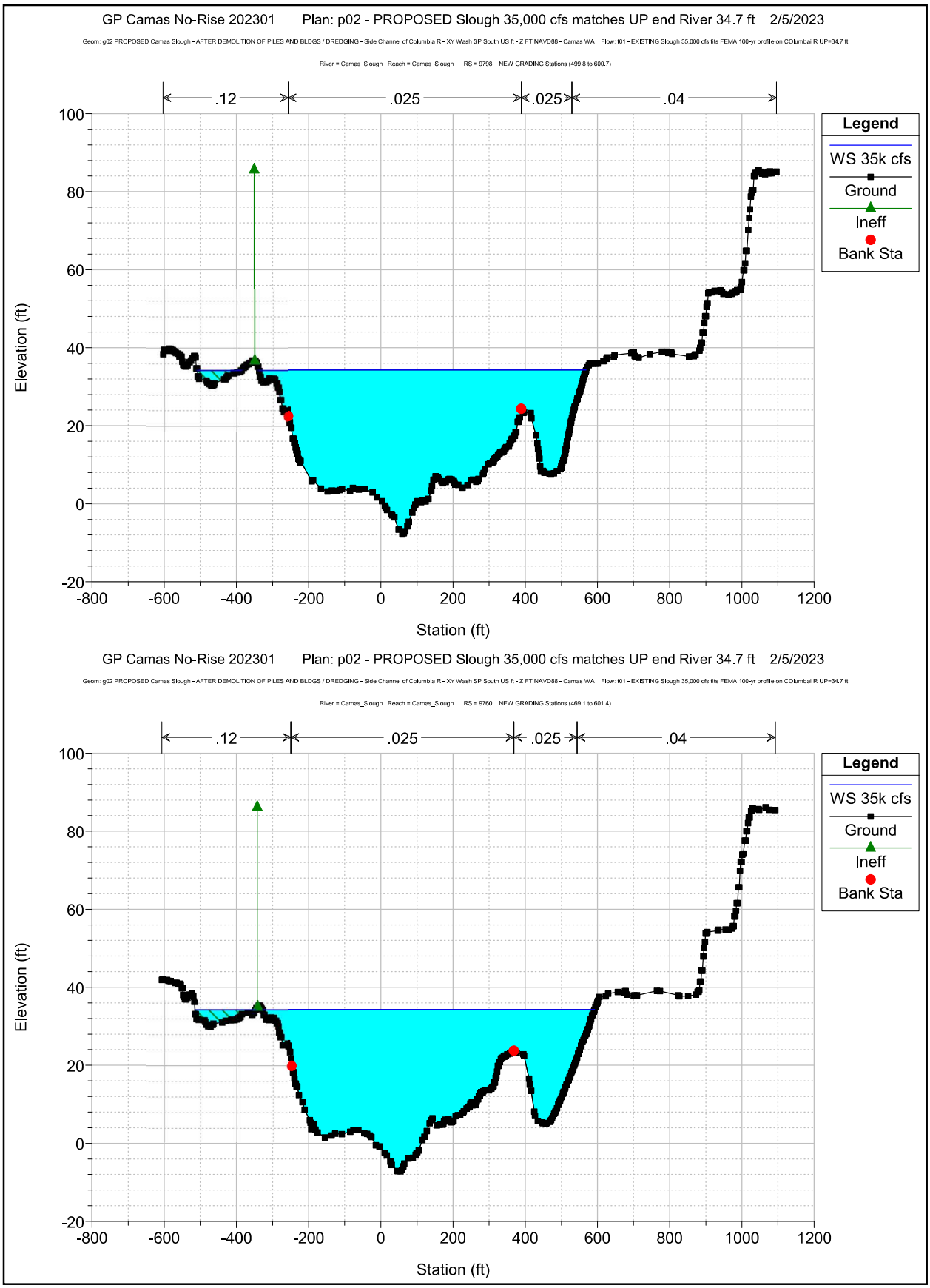
River = Camas_Slough Reach = Camas_Slough RS = 10998 Below pumpplant
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10651 Below pumpplant
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10312 Above (no change) cuts for demo'd lines
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10251 Max cut for up demo'd line
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10231 Min cut for demo'd lines
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10201 Max cut for ds demo'd line
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 10119 Ineff left shadow up dry // Below (no change) cuts for demo'd li
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9657 Rt is up (no change) planned cut and fill // Ineff left shadow u
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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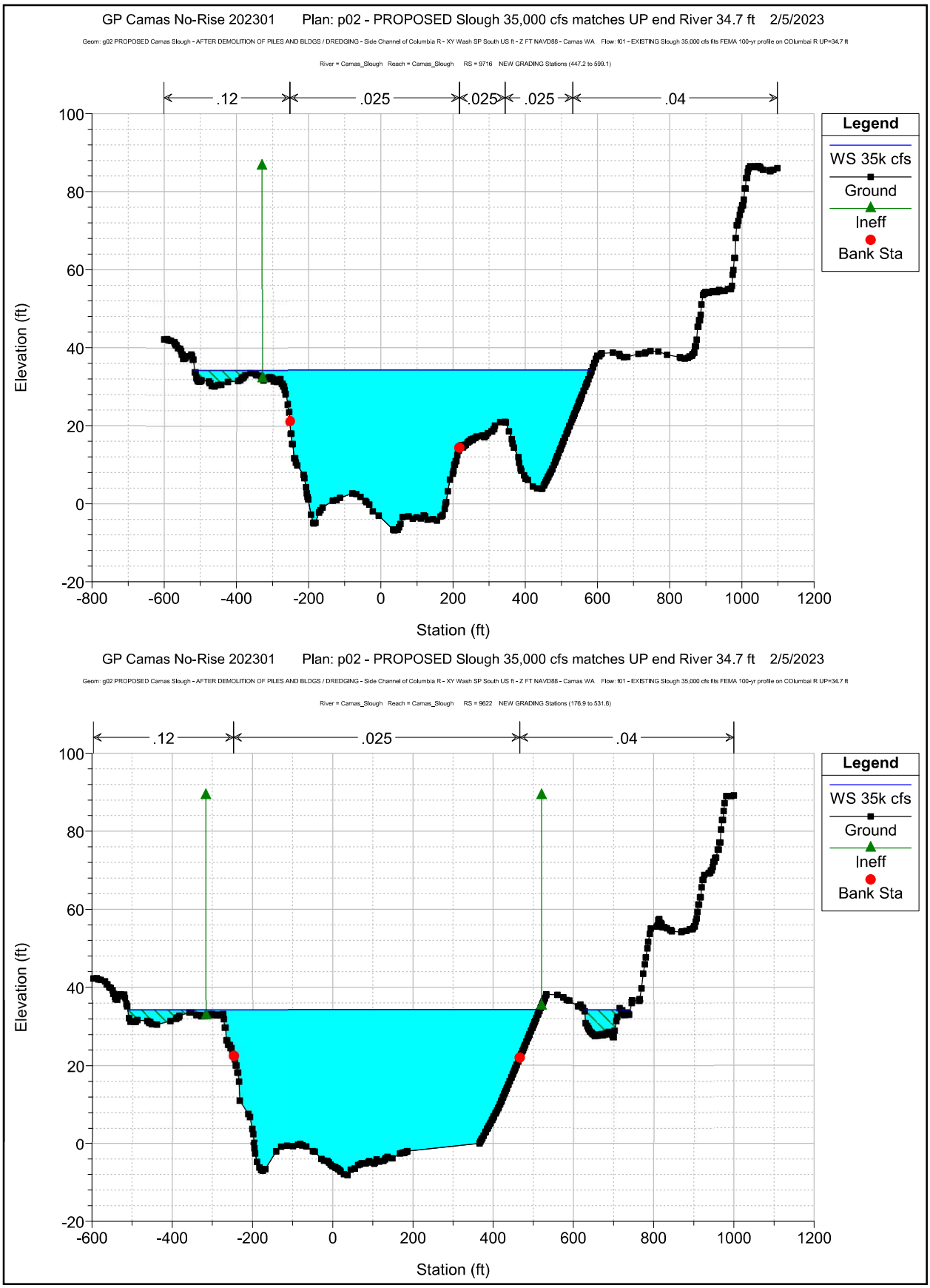
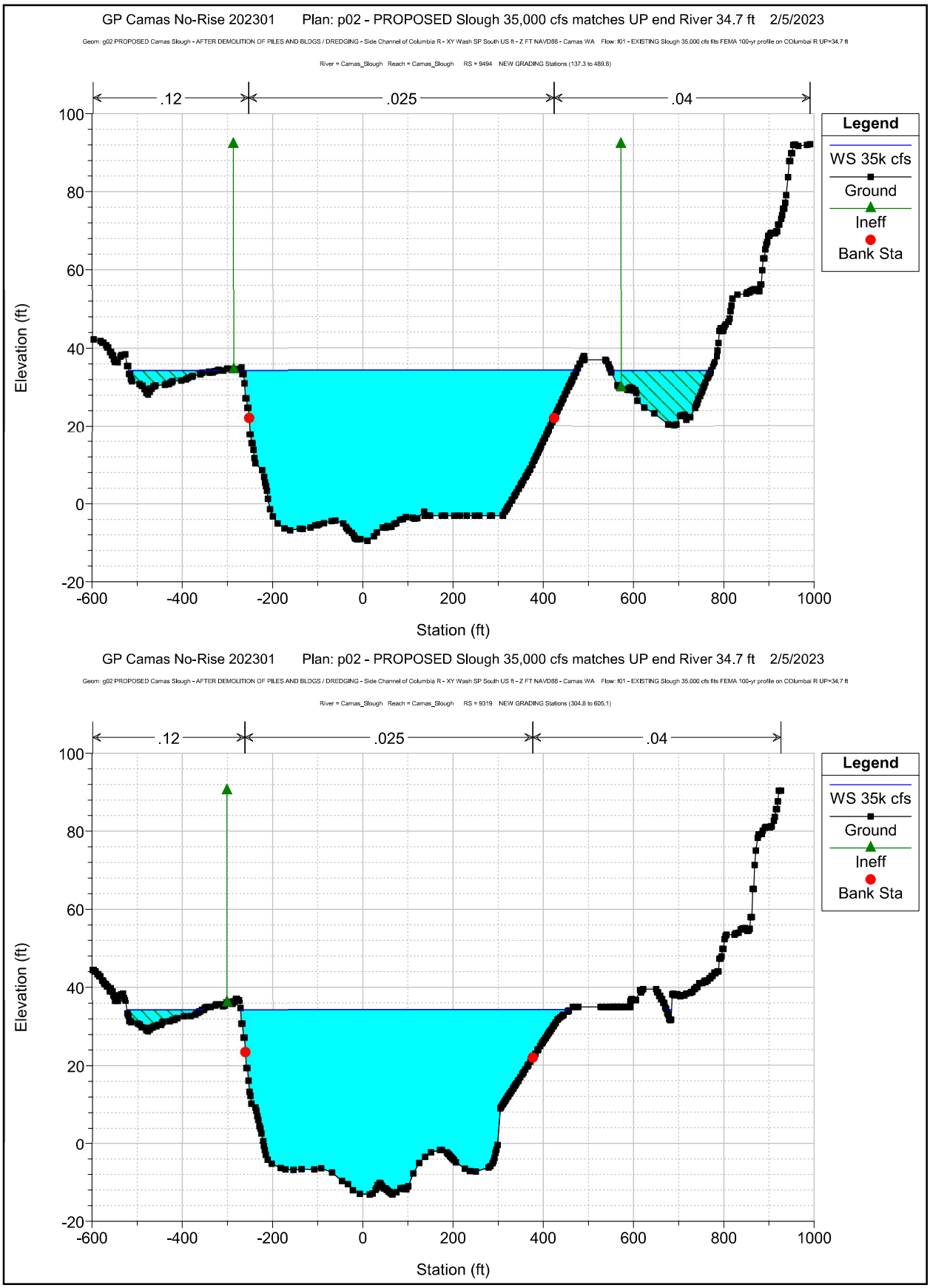
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9796 NEW GRADING Stations (499.8 to 600.7)
.12
.025
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9760 NEW GRADING Stations (469.1 to 601.4)
.12
.025
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

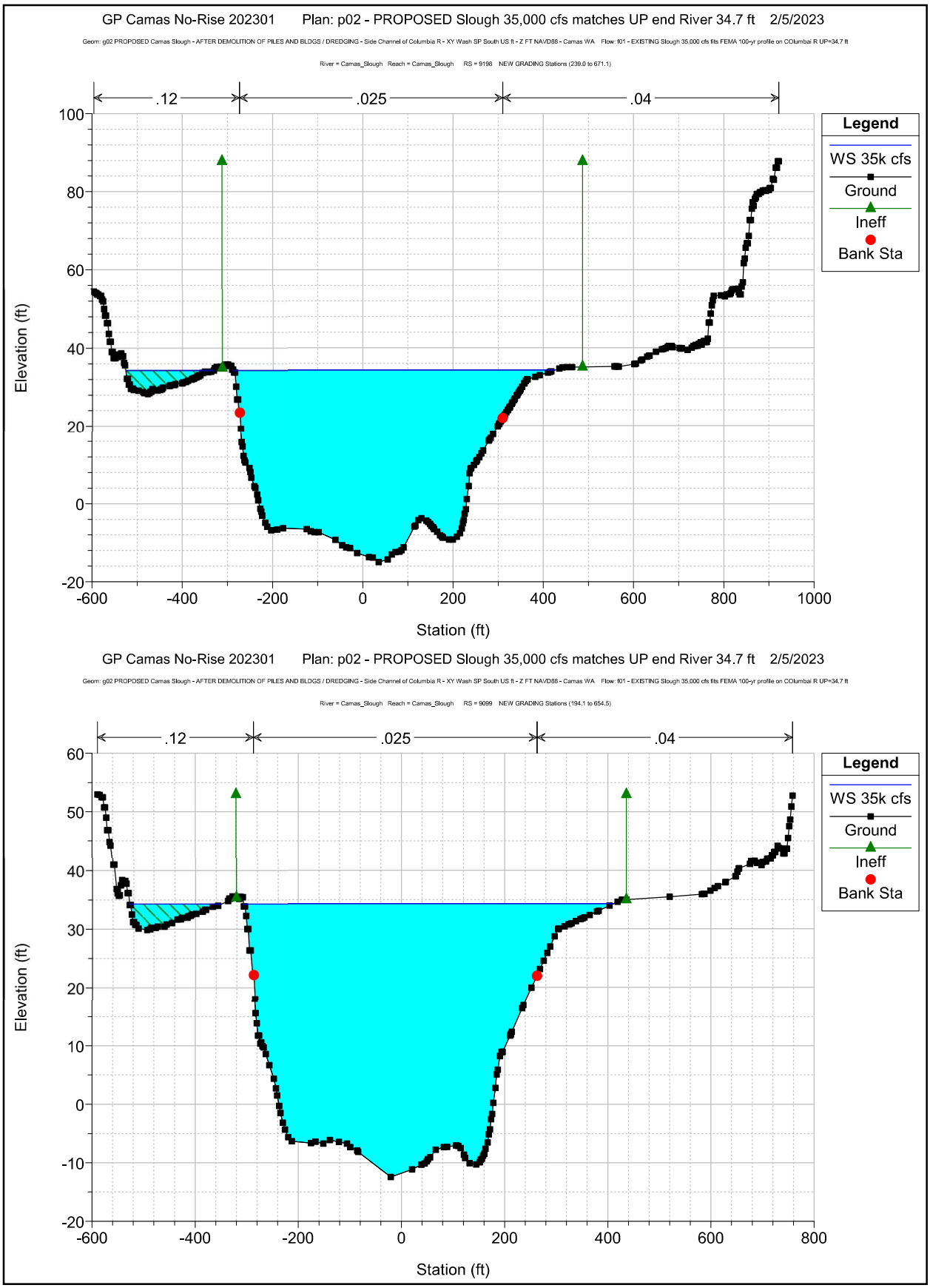
10


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9716 NEW GRADING Stations (447.2 to 599.1)
.12
.025
.025
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9622 NEW GRADING Stations (176.9 to 531.6)
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

11


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9494 NEW GRADING Stations (137.3 to 489.6)
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9319 NEW GRADING Stations (304.8 to 605.1)
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

12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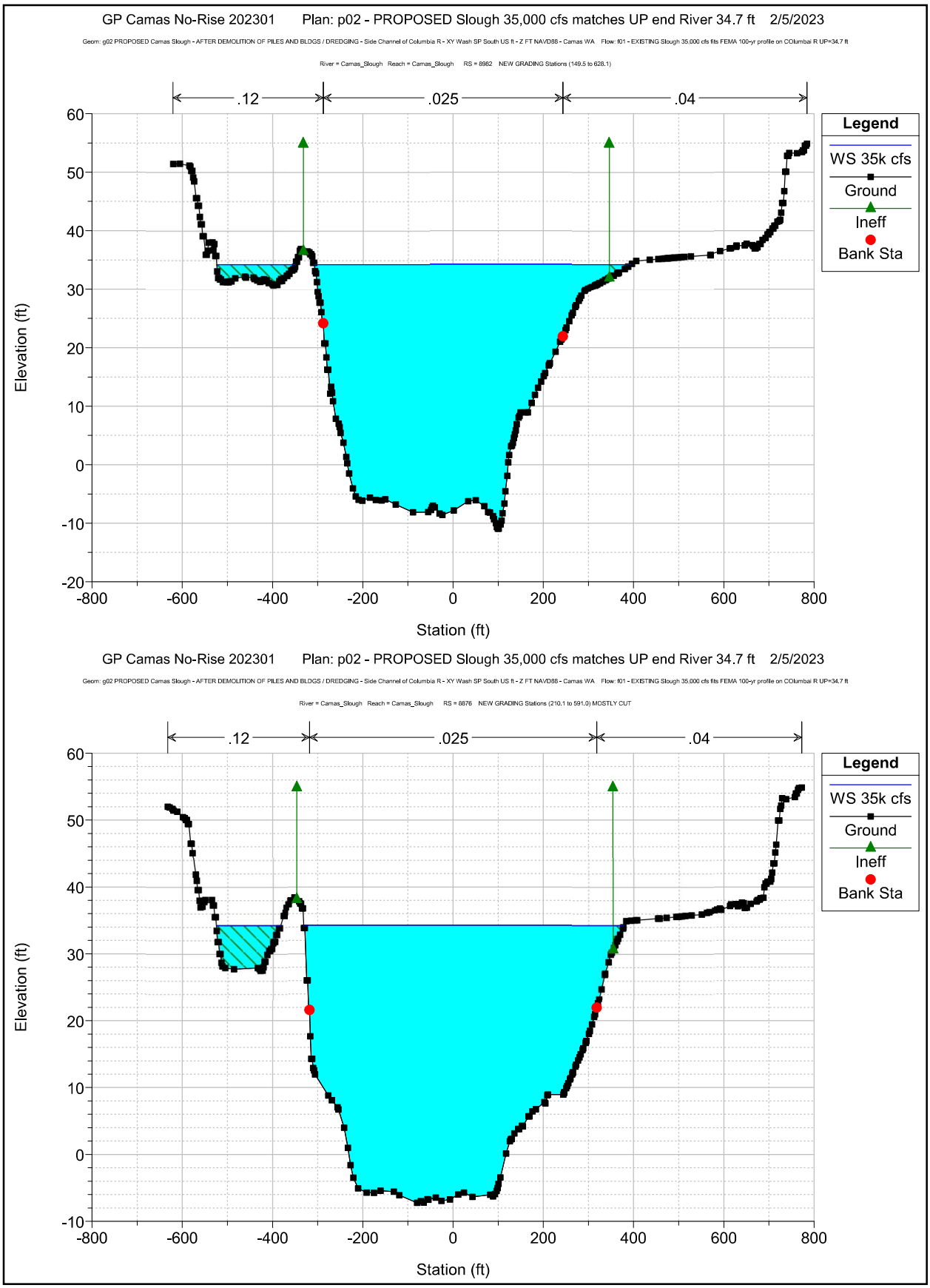
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9196 NEW GRADING Stations (239.0 to 671.1)
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 9099 NEW GRADING Stations (194.1 to 654.5)
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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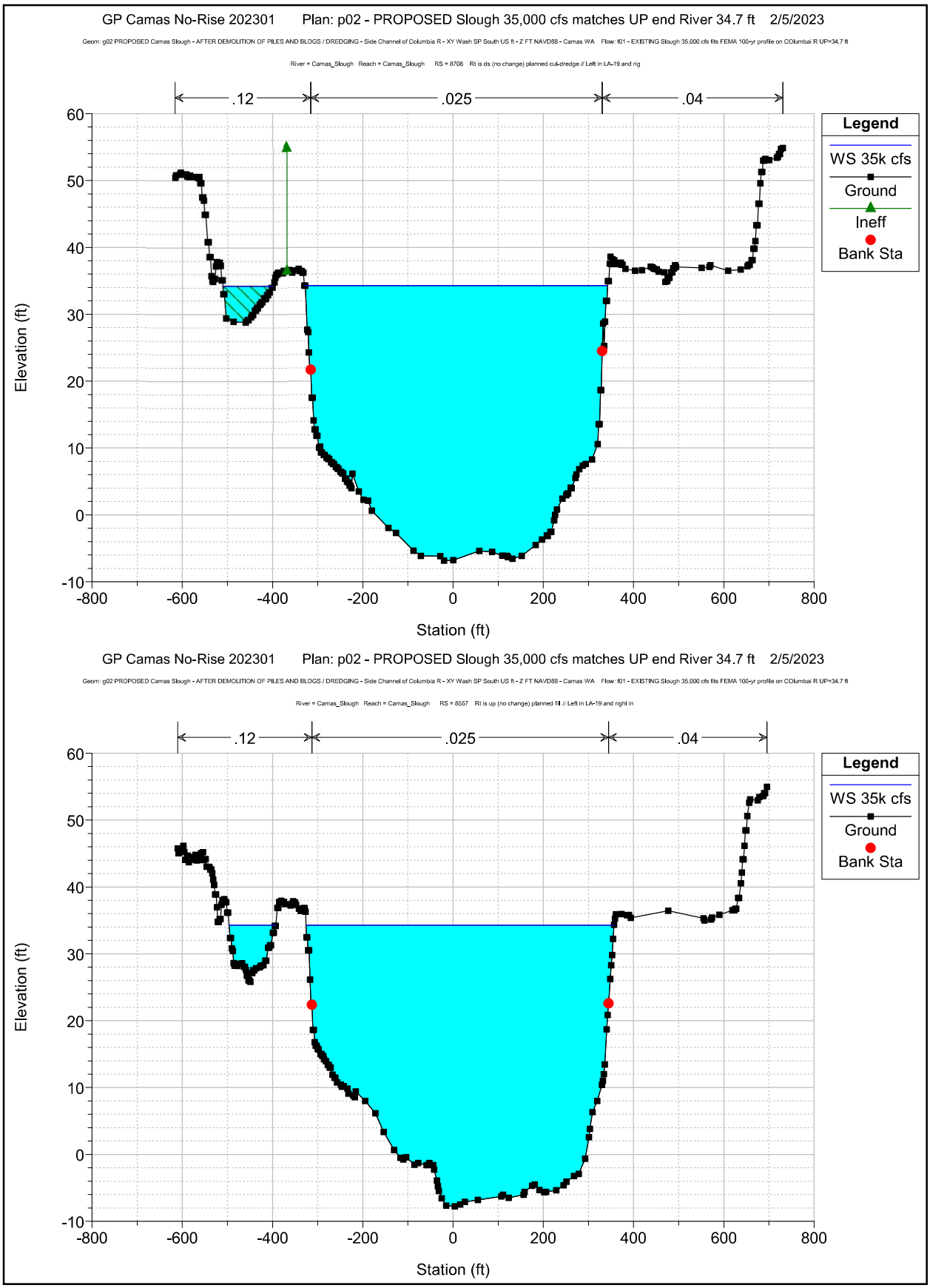
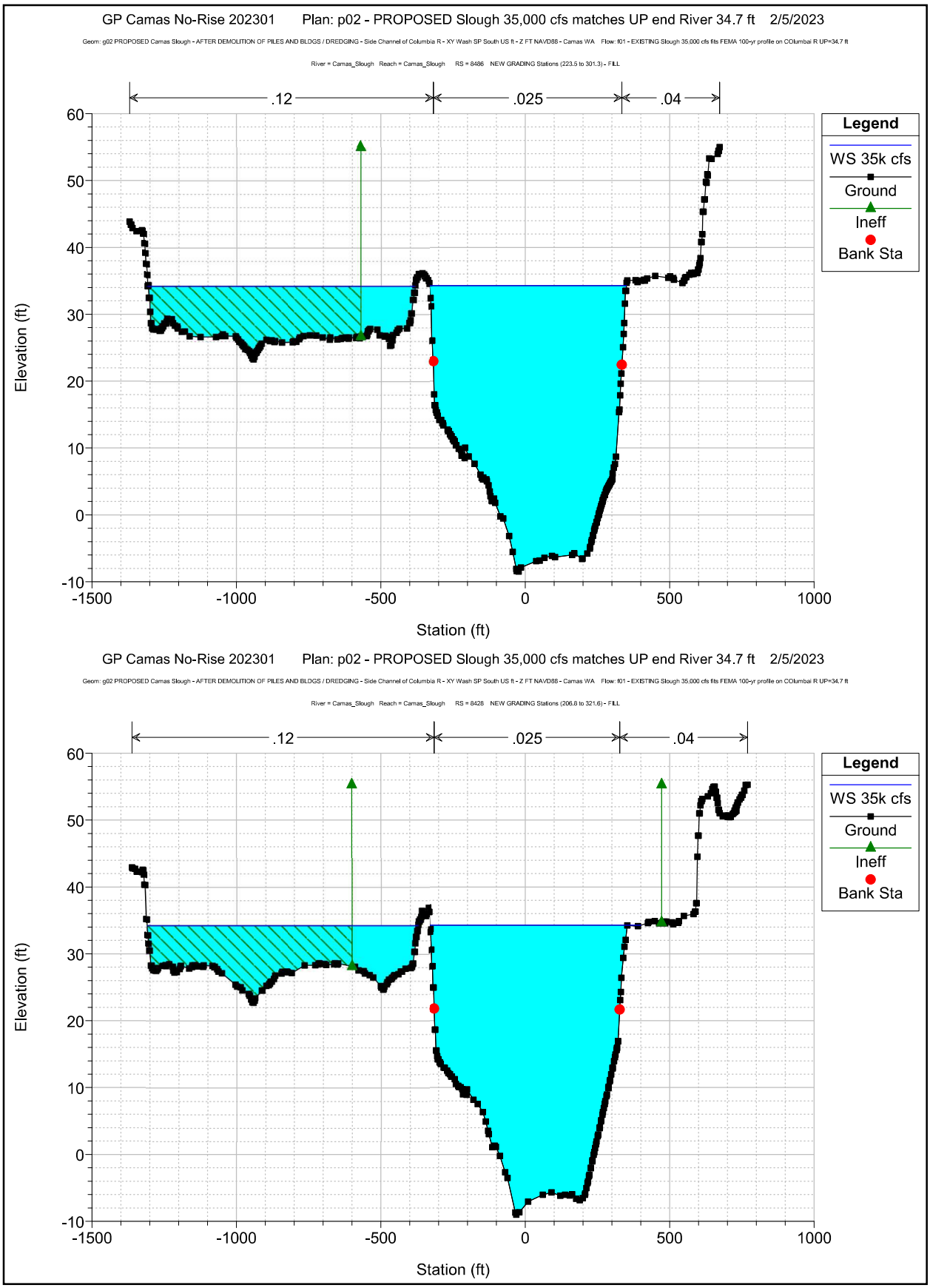
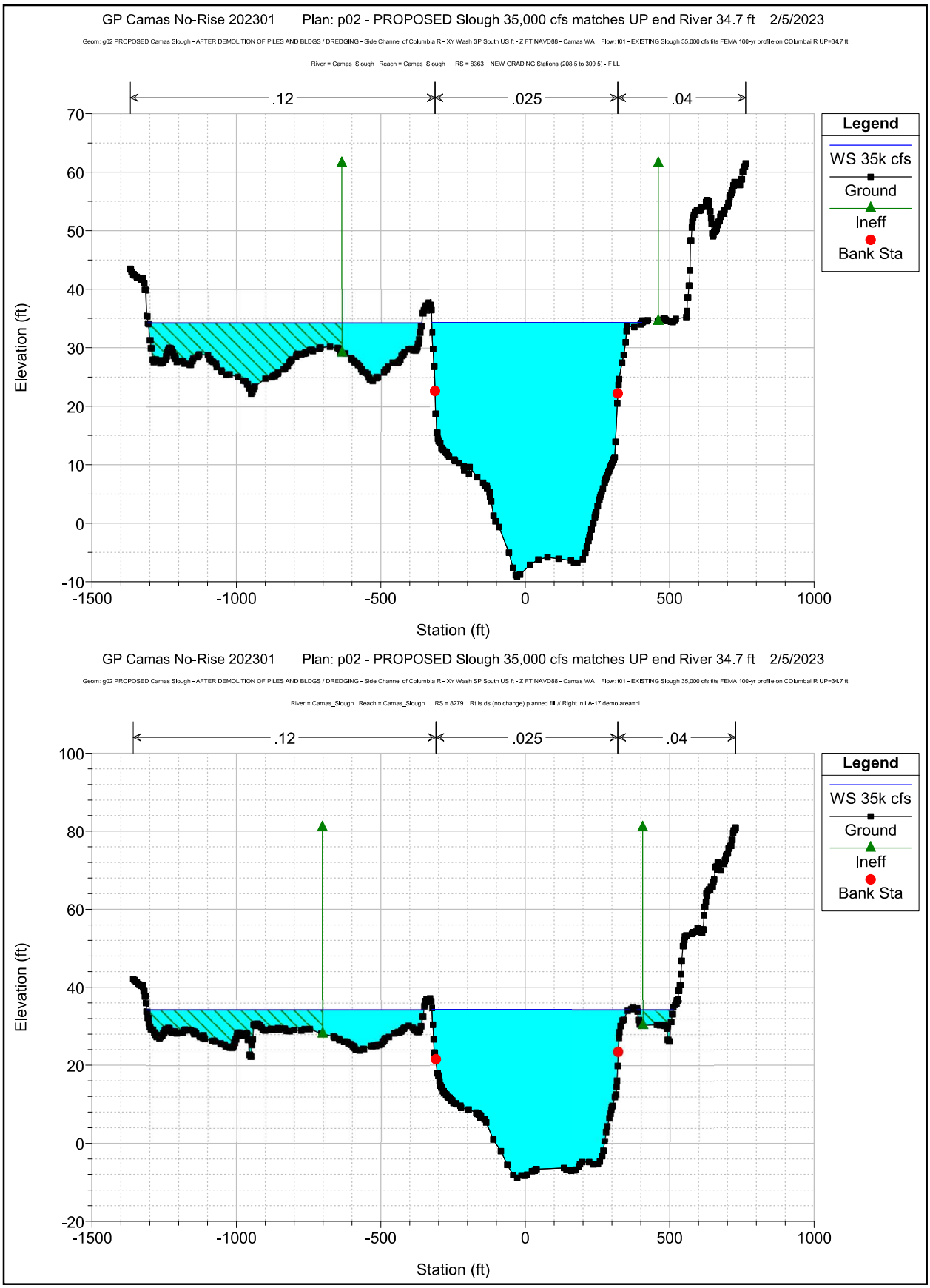
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8982 NEW GRADING Stations (149.5 to 628.1)
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8876 NEW GRADING Stations (210.1 to 591.0) MOSTLY CUT
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

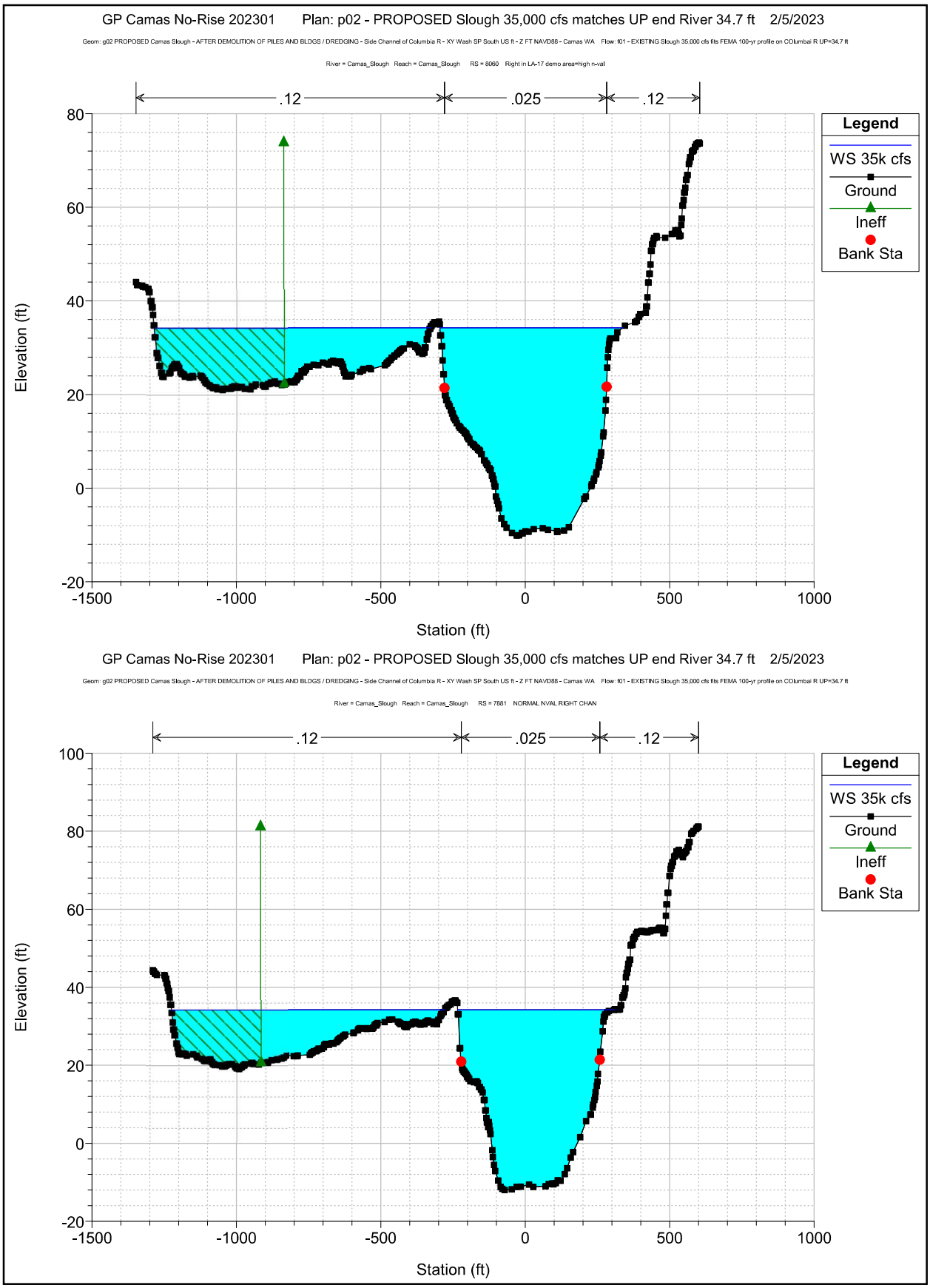

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8708 Rt is ds (no change) planned cut-dredge // Left in LA-19 and rig
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8557 Rt is up (no change) planned fill // Left in LA-19 and right in
.12
.025
.04
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

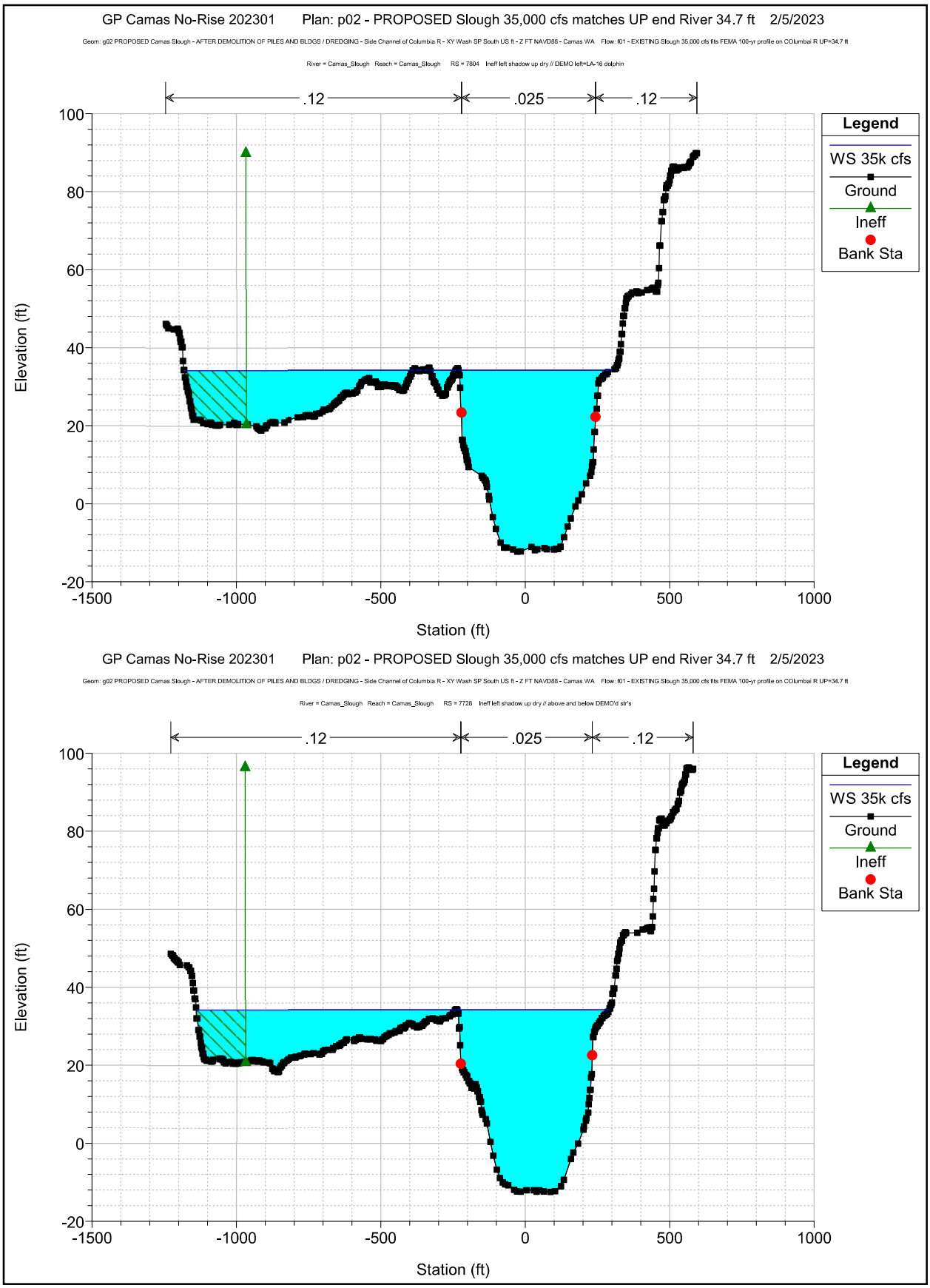
15


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8486 NEW GRADING Stations (223.5 to 301.3) - FILL
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8428 NEW GRADING Stations (206.8 to 321.6) - FILL
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8363 NEW GRADING Stations (208.5 to 309.5) - FILL
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8279 Rt is ds (no change) planned fill // Right in LA-17 demo area+hi
.12
.025
.04
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

17

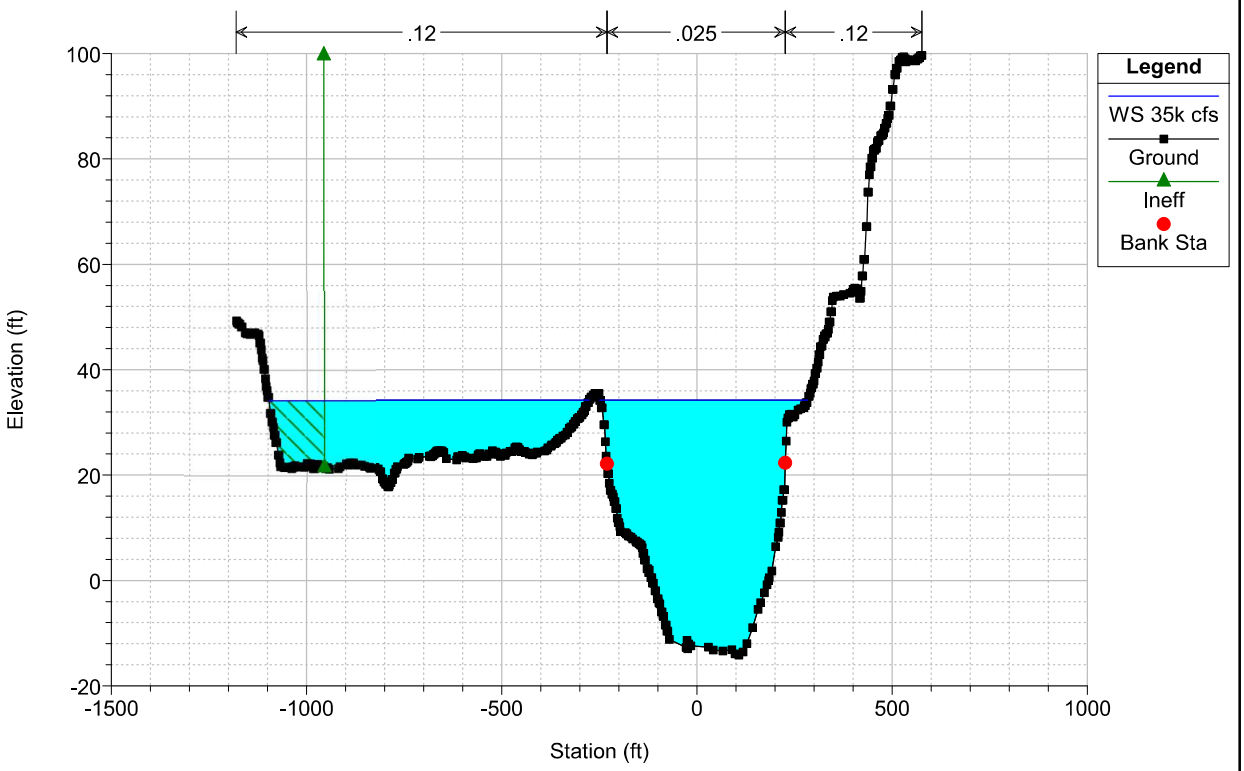

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 8060 Right in LA-17 demo area=high n-val
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7881 NORMAL NVAL RIGHT CHAN
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7804 Ineff left shadow up dry // DEMO left=LA-16 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
100
80
60
40
20
0
-20
-1500
-1000
-500
0
500
1000
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7726 Ineff left shadow up dry // above and below DEMO'd str's
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
100
80
60
40
20
0
-20
-1500
-1000
-500
0
500
1000
Station (ft)

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023

Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

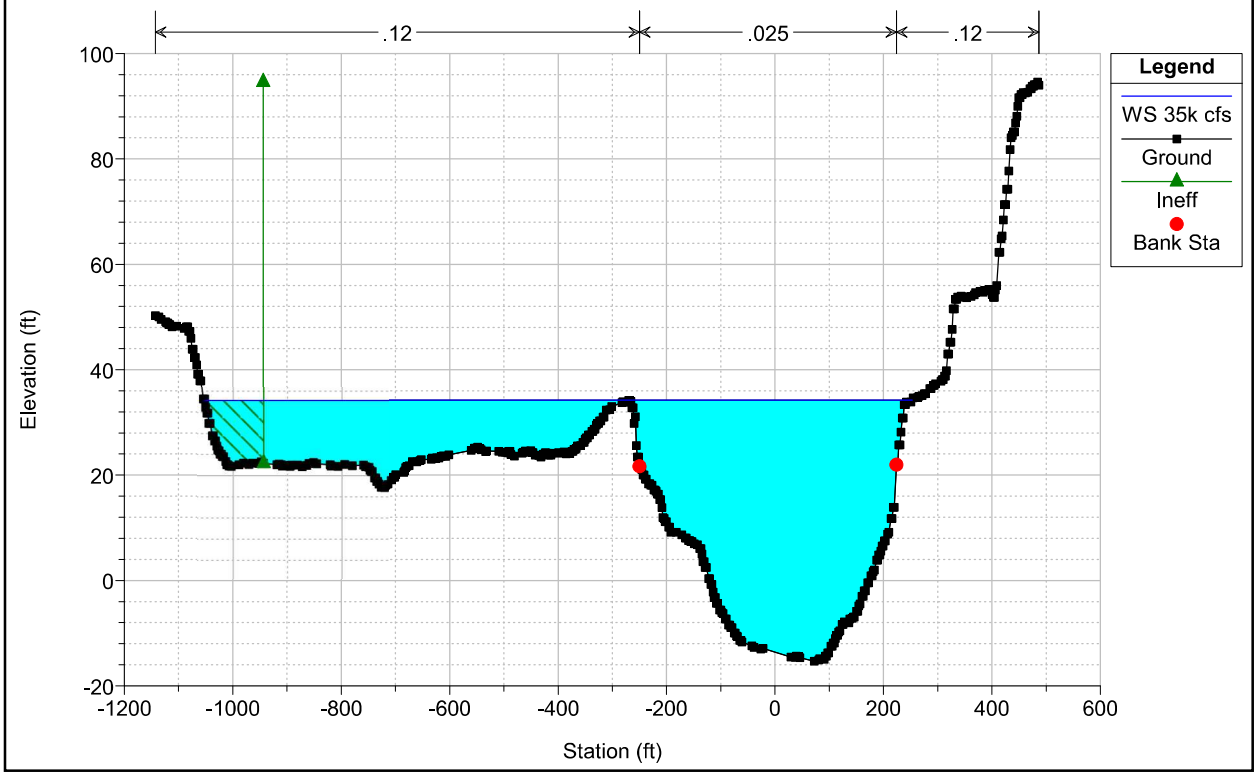
River = Camas_Slough Reach = Camas_Slough RS = 7637 Ineff left shadow up dry // DEMO rt LA-15 dolphin



GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023

Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

River = Camas_Slough Reach = Camas_Slough RS = 7570 Ineff left shadow up dry // below DEMO'd str



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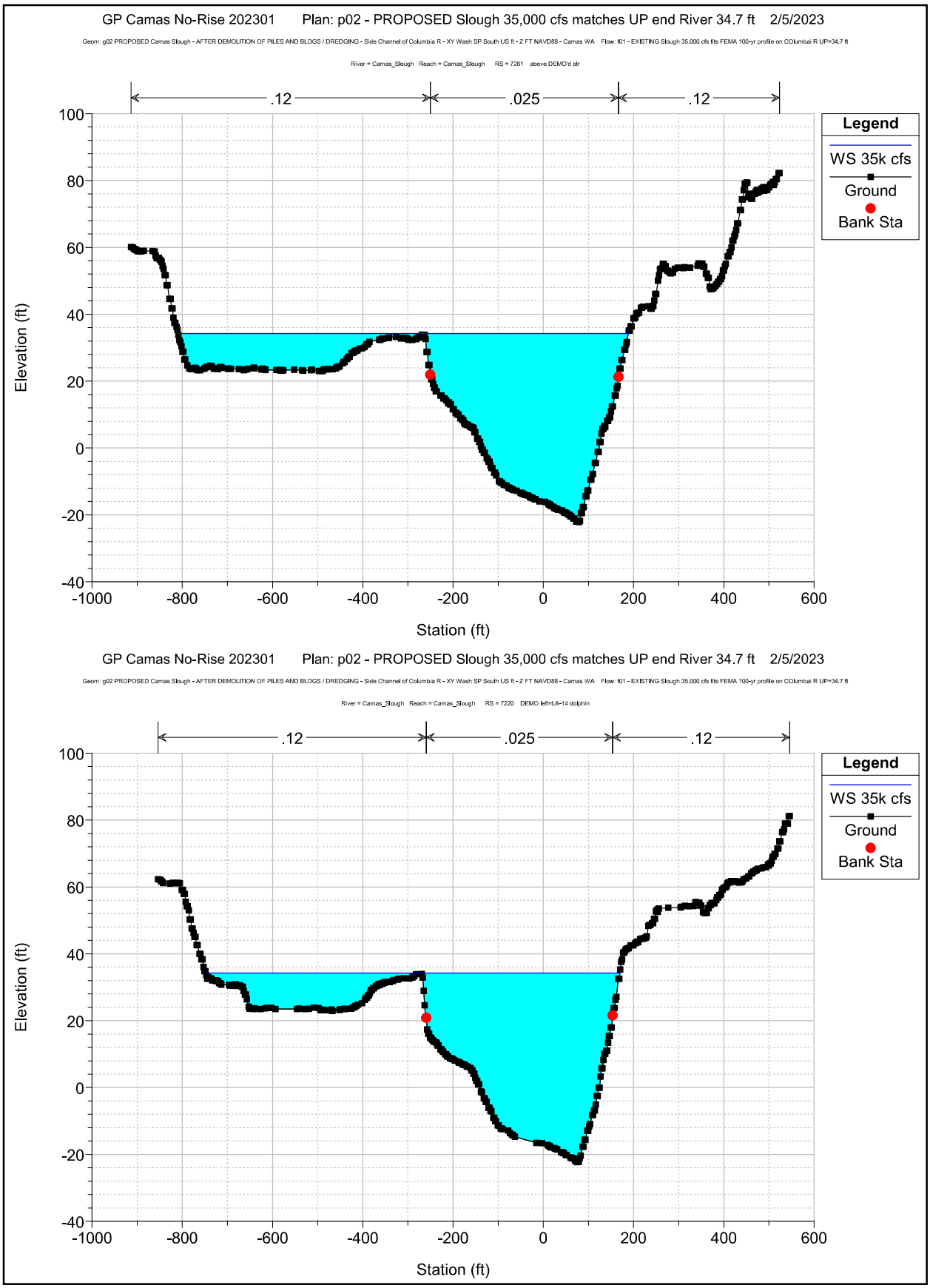
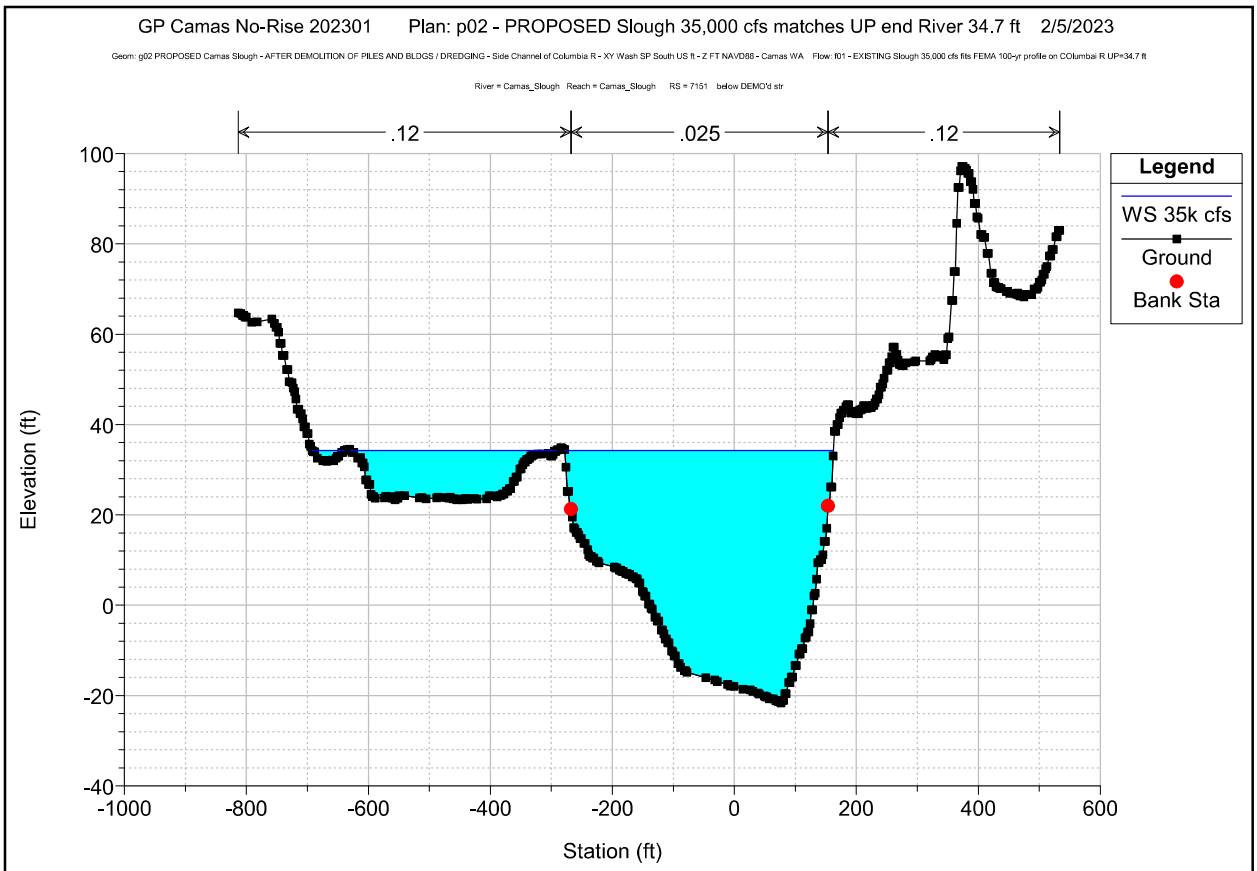
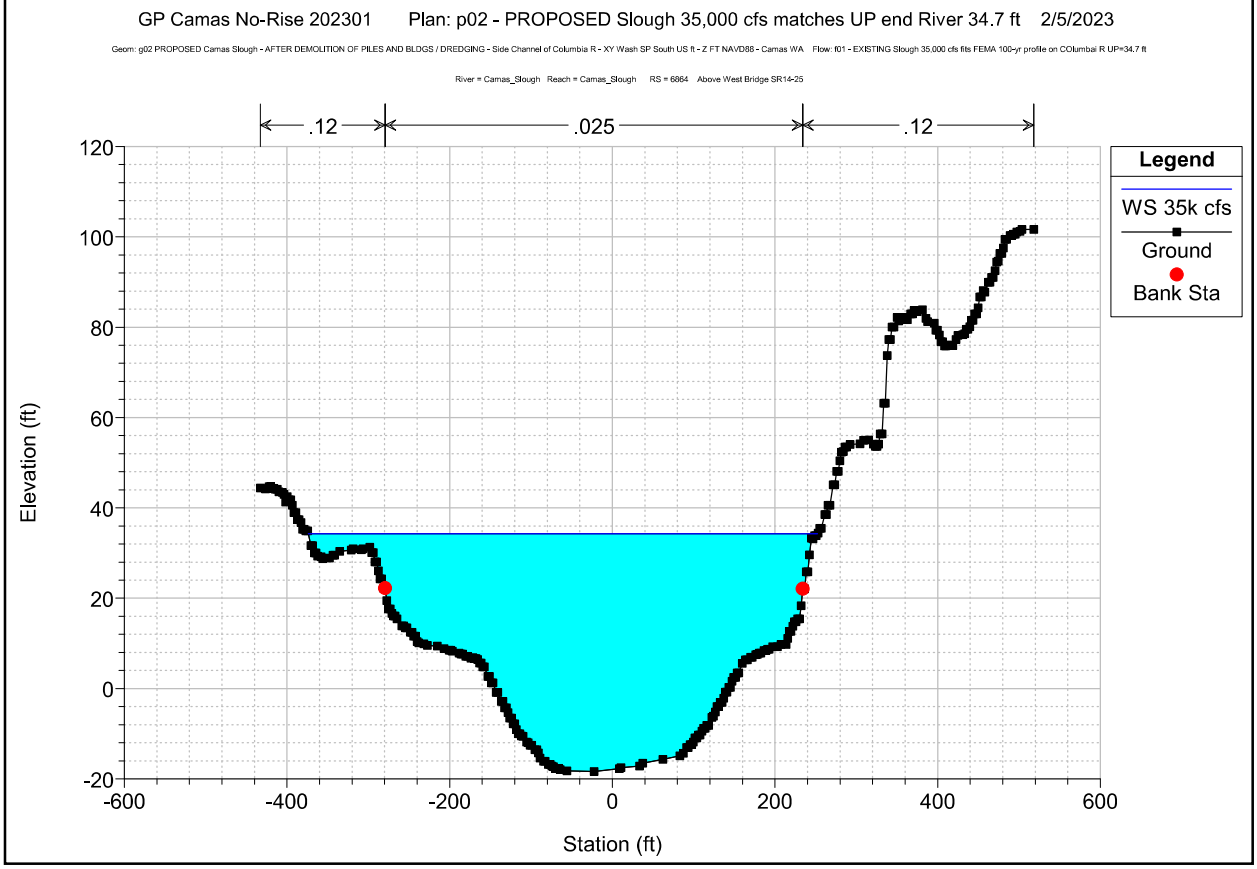

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7281 above DEMO'd str
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7220 DEMO left=LA-14 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

21


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 7151 below DEMO'd str
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
100
80
60
40
20
0
-20
-40
-1000
-800
-600
-400
-200
0
200
400
600

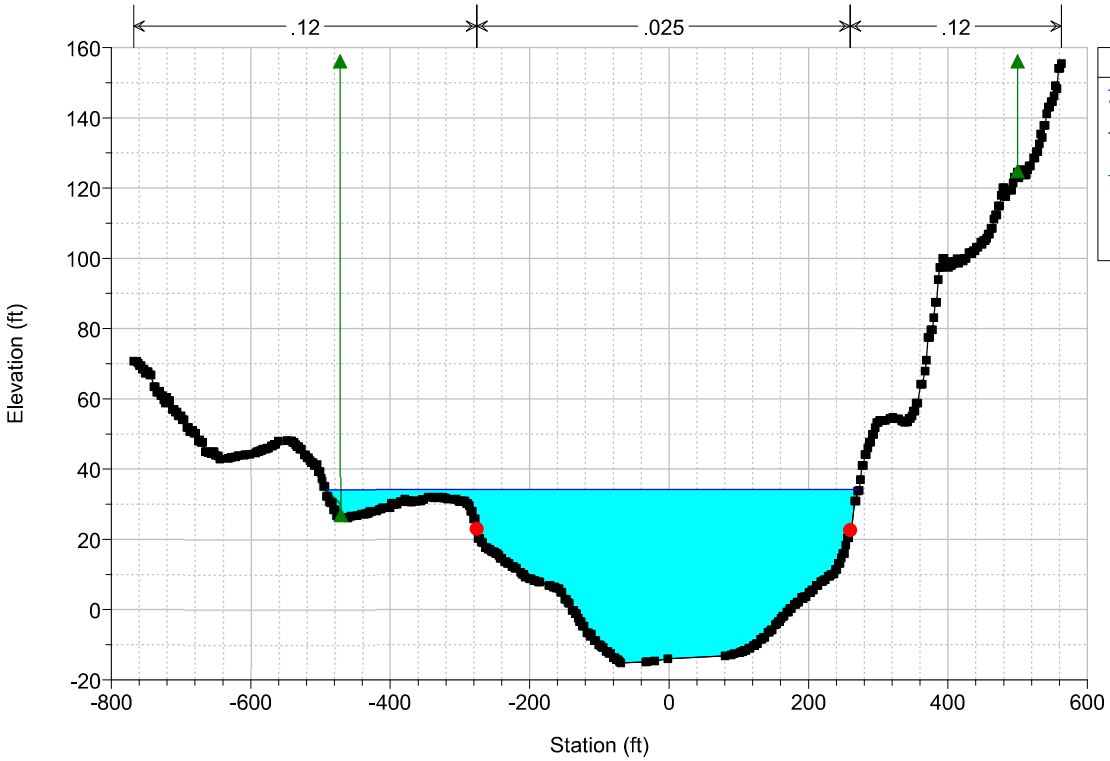

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 6864 Above West Bridge SR14-25
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
120
100
80
60
40
20
0
-20
-600
-400
-200
0
200
400
600

22

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023

Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

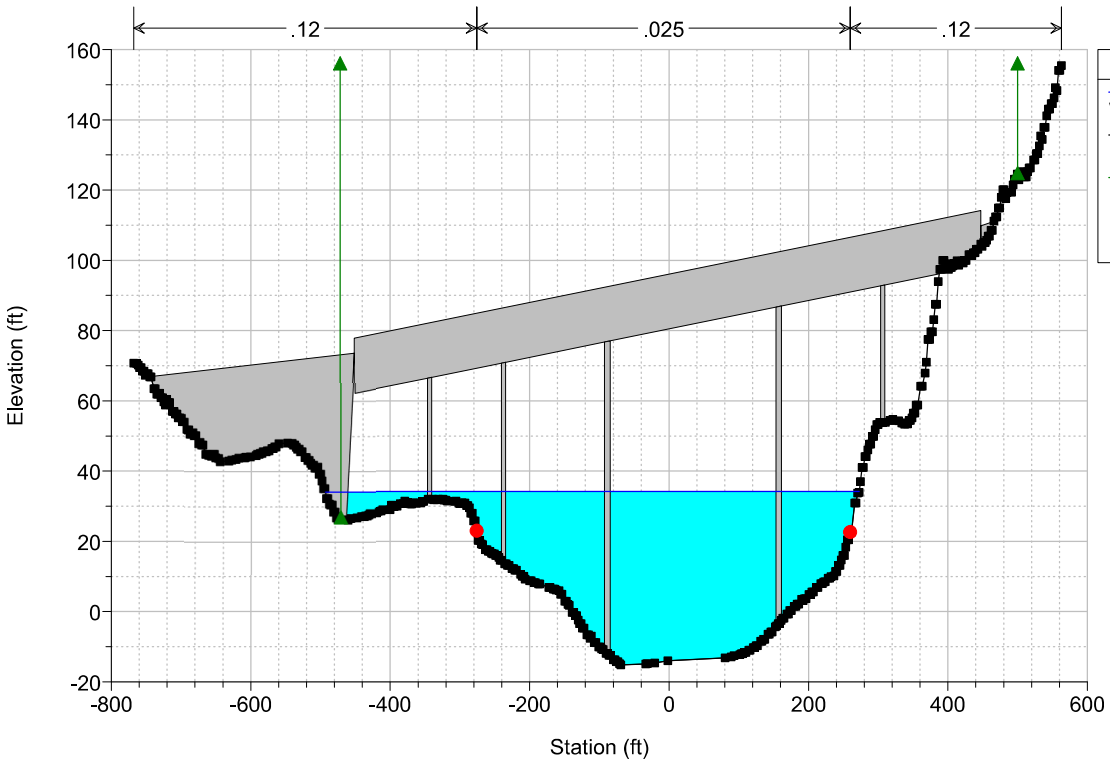
River = Camas_Slough Reach = Camas_Slough RS = 6440 UP West Bridge SR14-25



GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023

Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft

River = Camas_Slough Reach = Camas_Slough RS = 6428 BR West Bridge SR14-25



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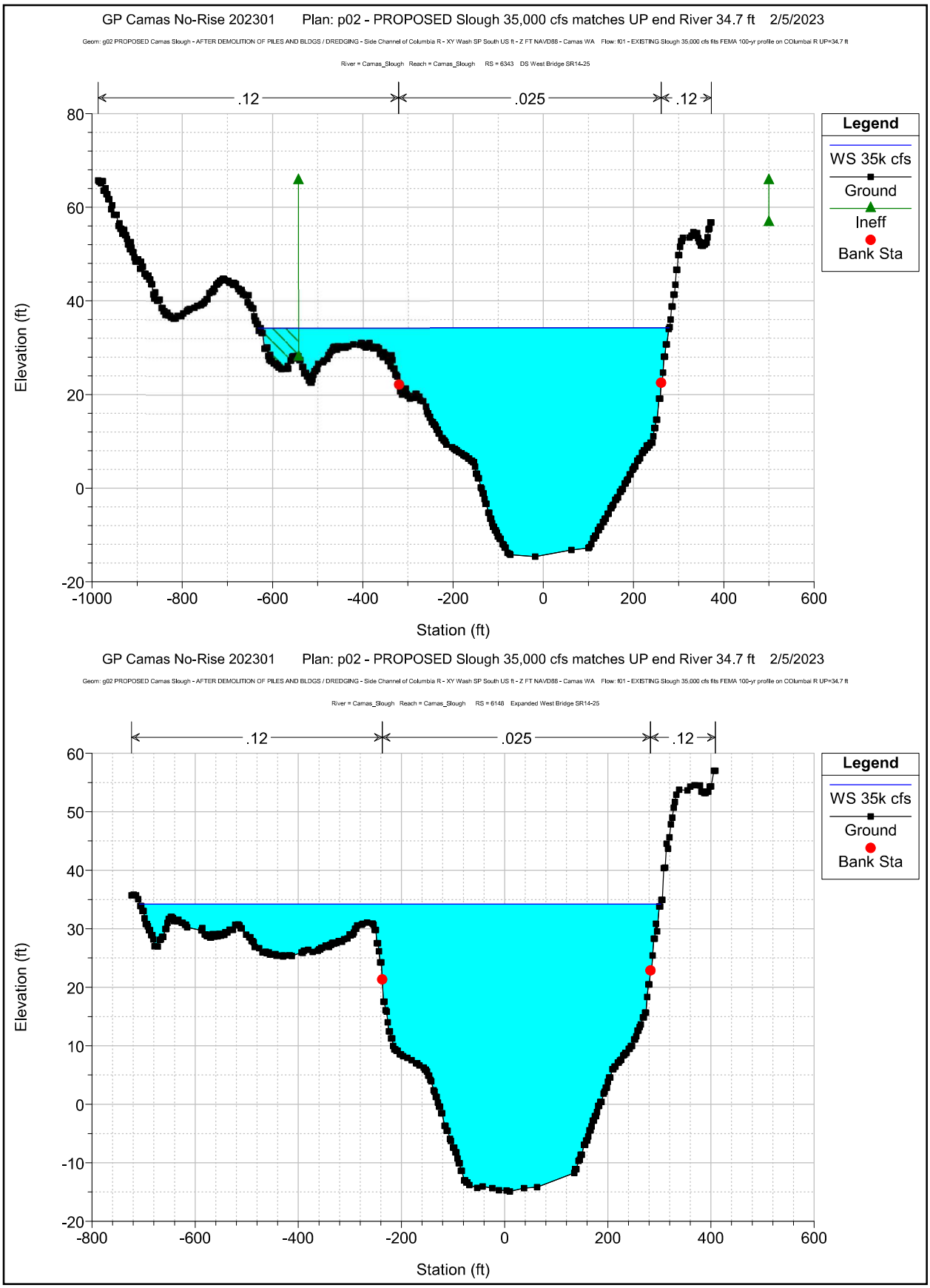
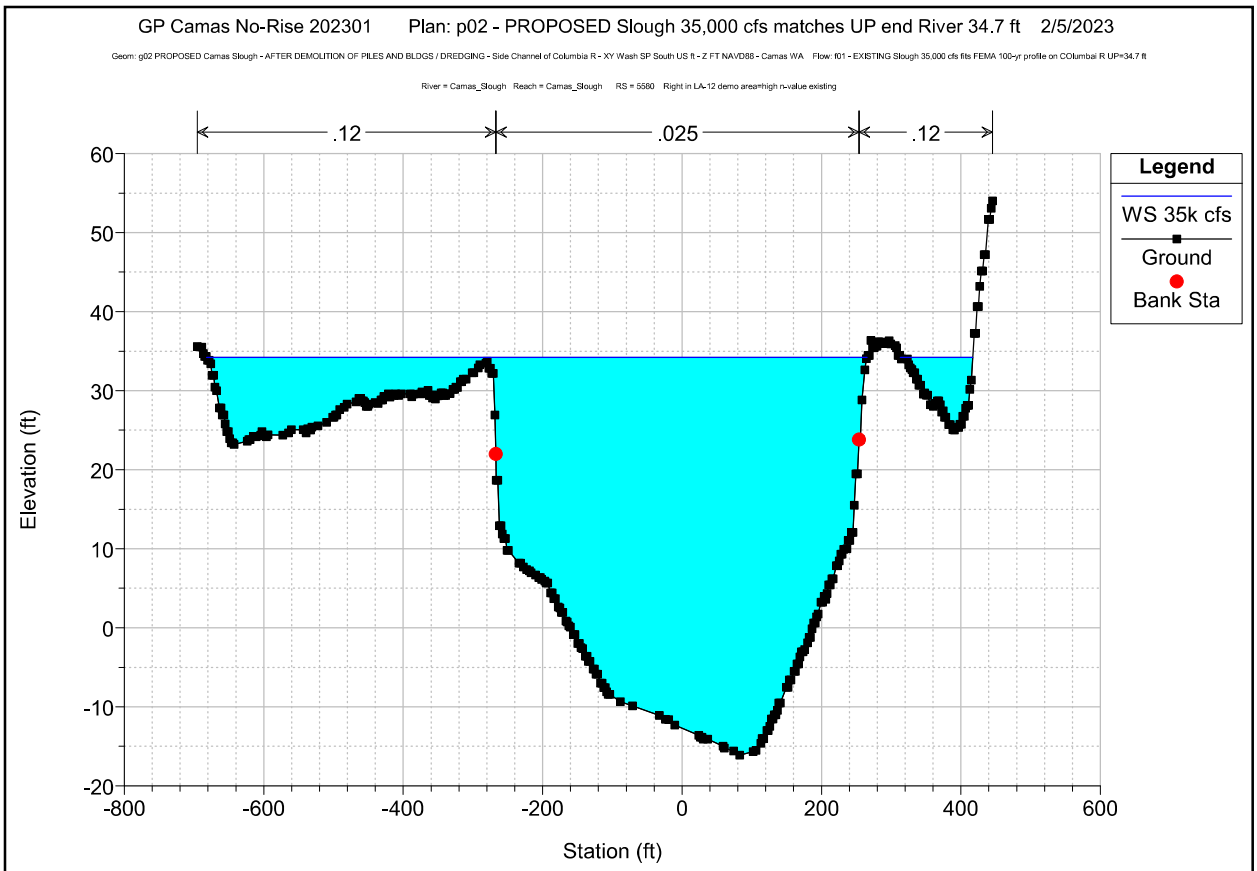
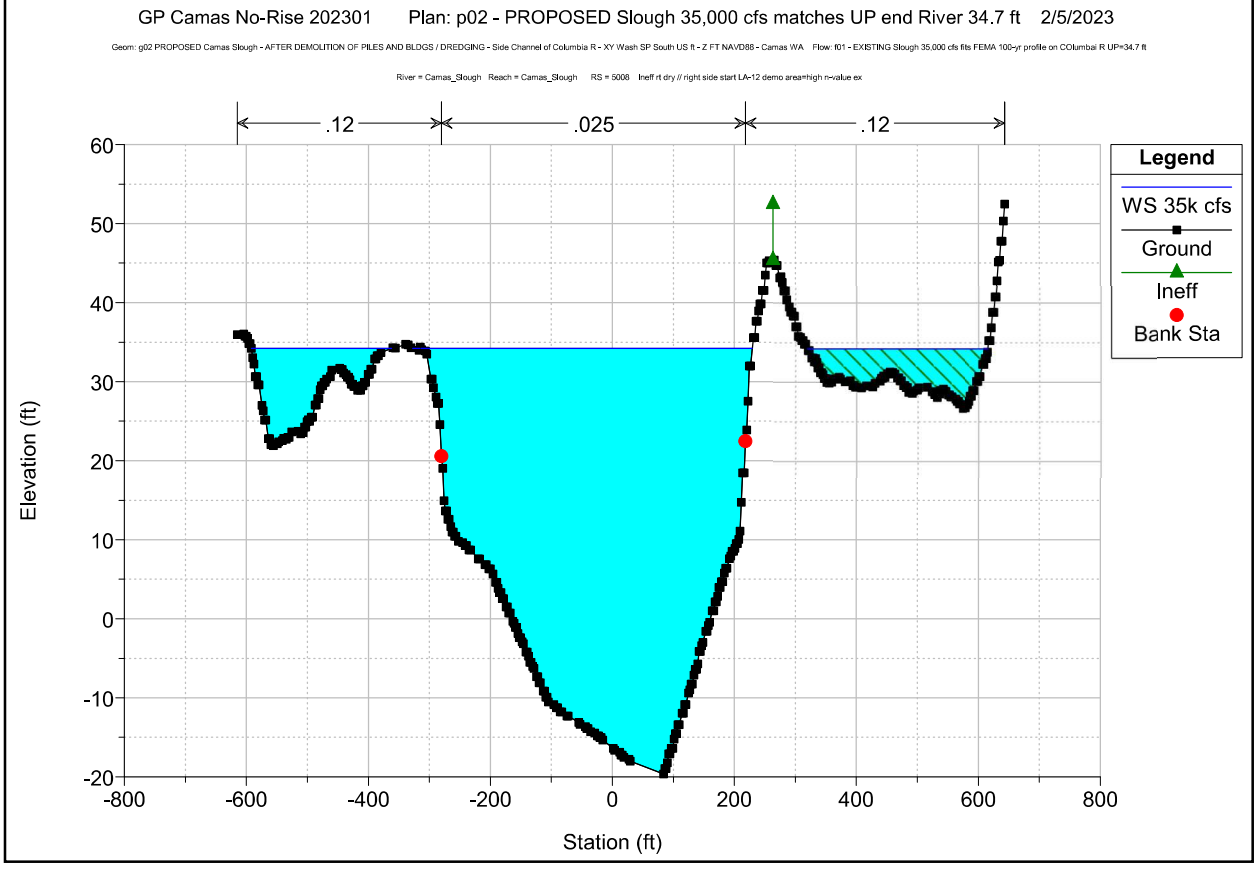
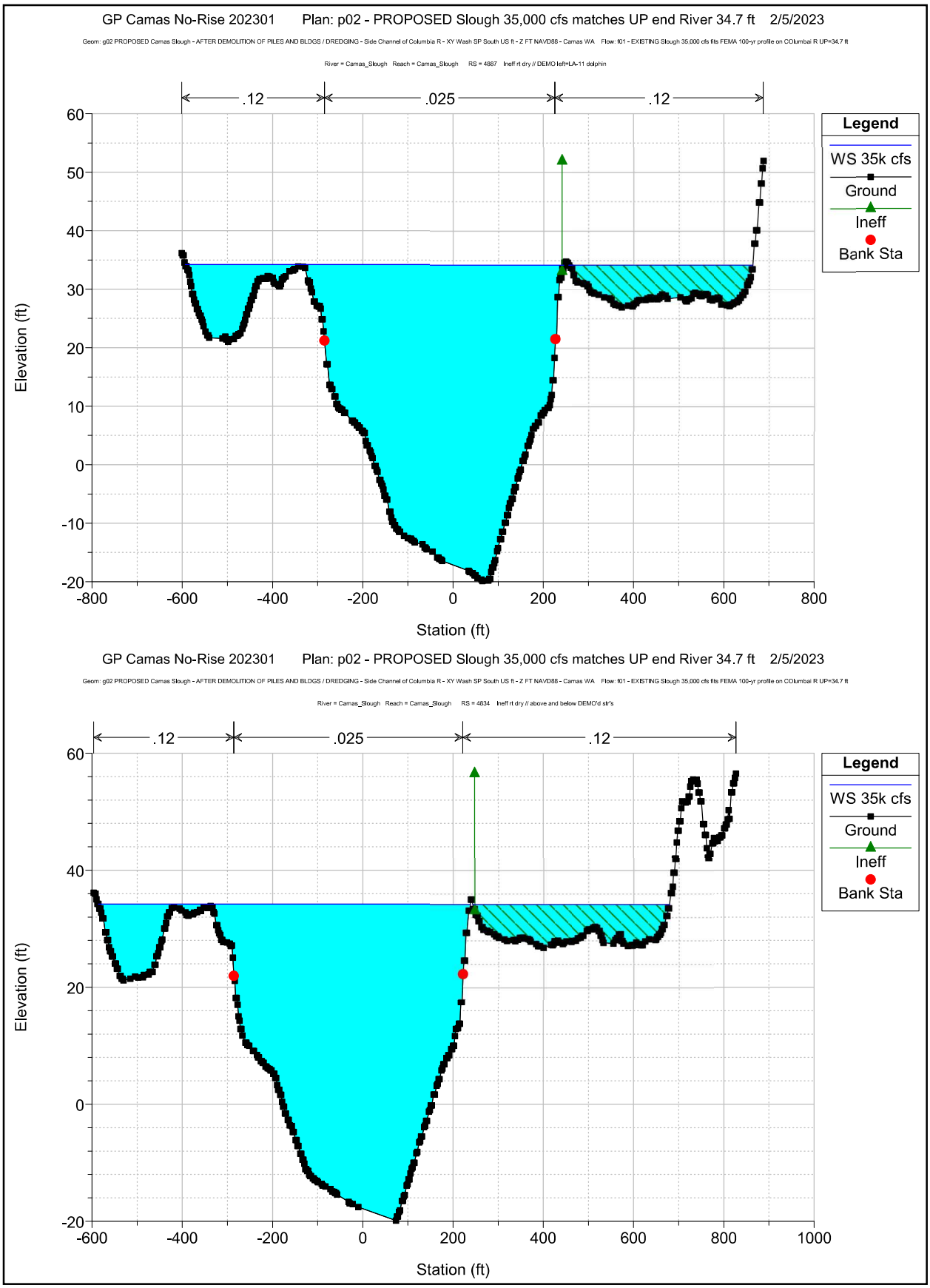

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 6343 DS West Bridge SR14-25
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 6146 Expanded West Bridge SR14-25
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

24

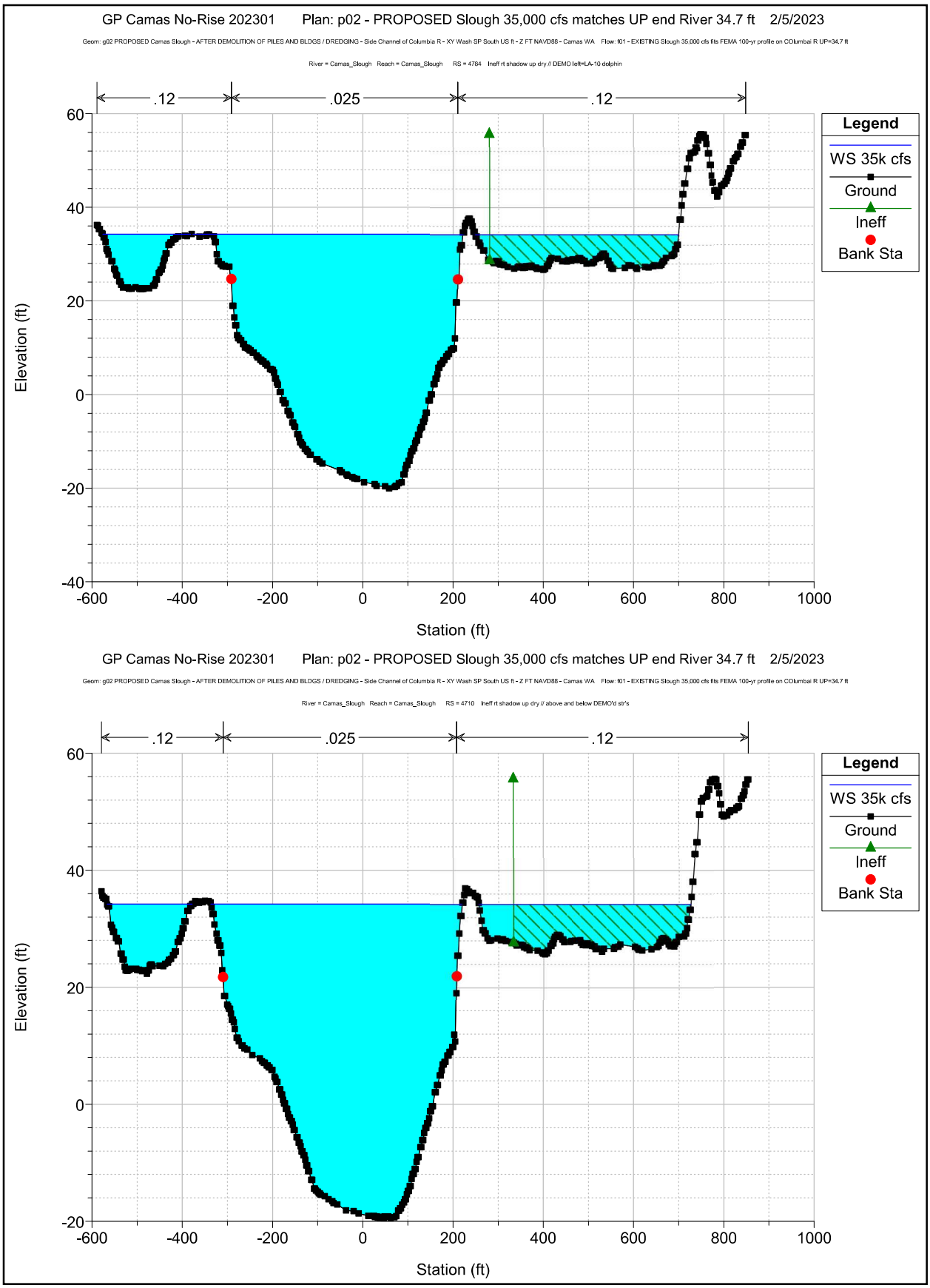

GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 5580 Right in LA-12 demo area=high n-value existing
.12
.025
.12
Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
60
50
40
30
20
10
0
-10
-20
-800
-600
-400
-200
0
200
400
600


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 5008 Ineff rt dry // right side start LA-12 demo area=high n-value ex
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
60
50
40
30
20
10
0
-10
-20
-800
-600
-400
-200
0
200
400
600
800

25


GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4887 Ineff rt dry // DEMO left=LA-11 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4634 Ineff rt dry // above and below DEMO'd str's
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

26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Geom: g02 PROPOSED Camas Slough - AFTER DEMOLITION OF PILES AND BLDGS / DREDGING - Side Channel of Columbia R - XY Wash SP South US ft - Z FT NAVD88 - Camas WA Flow: f01 - EXISTING Slough 35,000 cfs fits FEMA 100-yr profile on COlumbai R UP=34.7 ft
River = Camas_Slough Reach = Camas_Slough RS = 4784 Ineff rt shadow up dry // DEMO left=LA-10 dolphin
.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
60
40
20
0
-20
-40
-600
-400
-200
0
200
400
600
800
1000
GP Camas No-Rise 202301 Plan: p02 - PROPOSED Slough 35,000 cfs matches UP end River 34.7 ft 2/5/2023
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.12
.025
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WS 35k cfs
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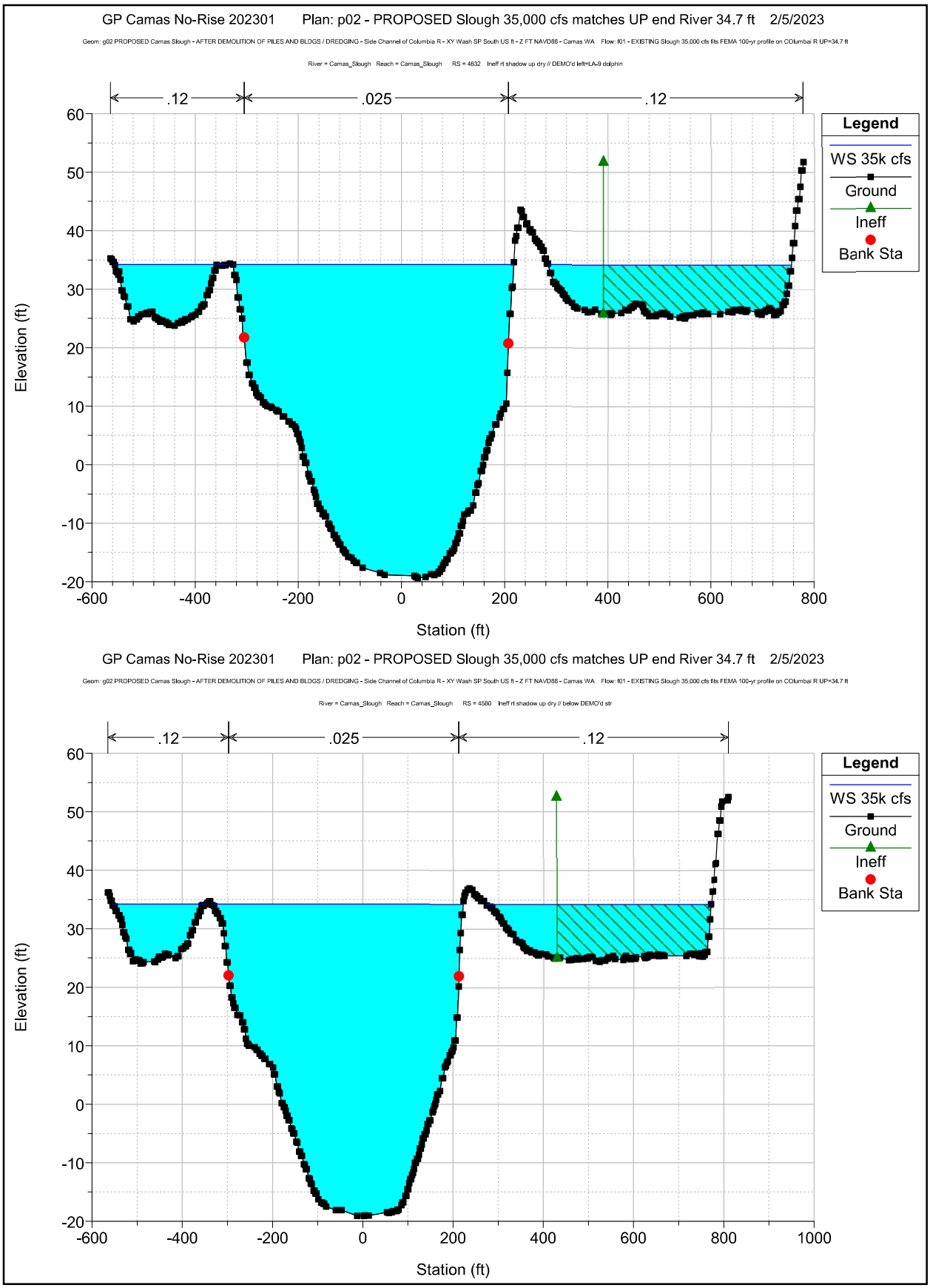
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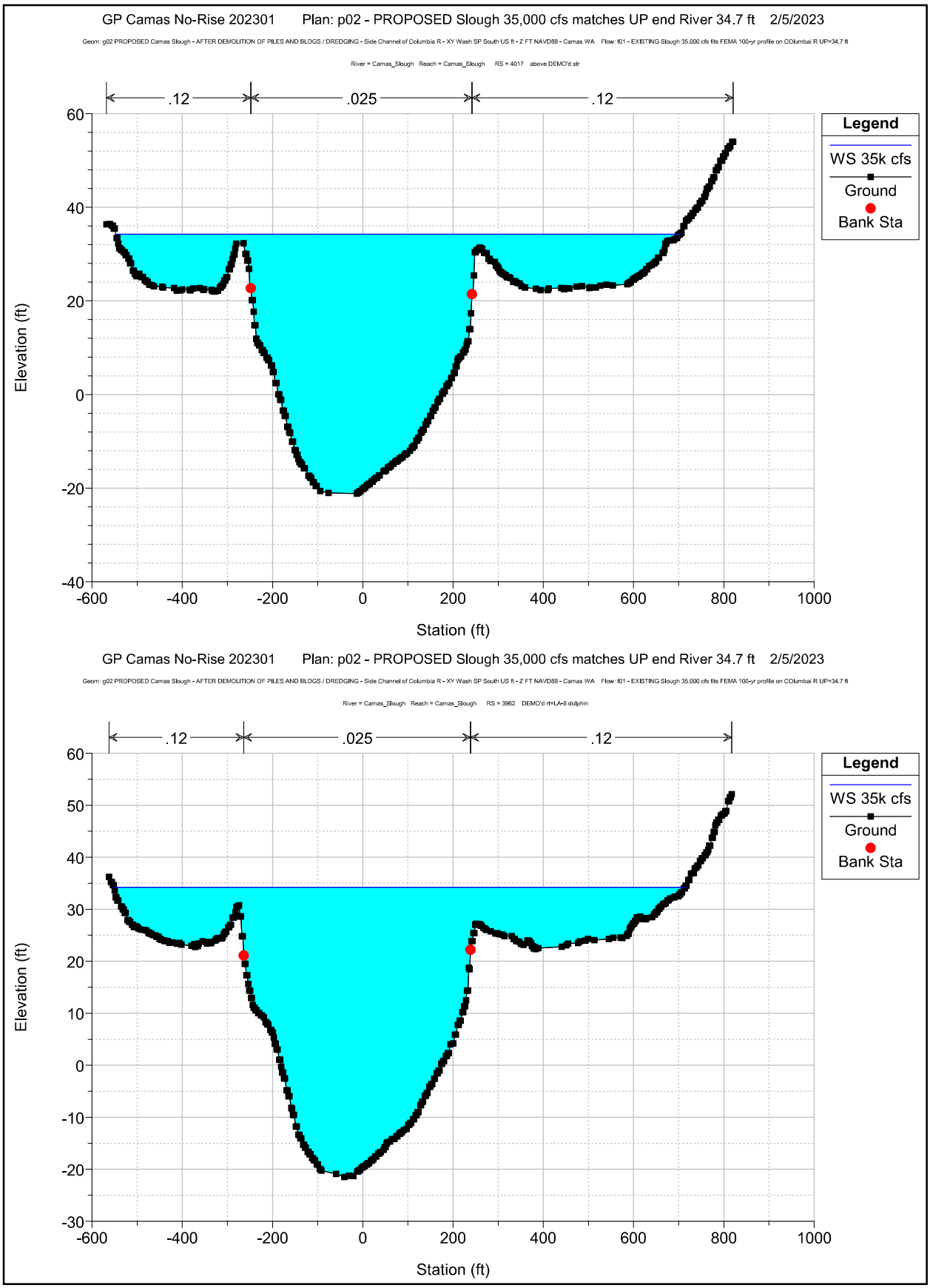
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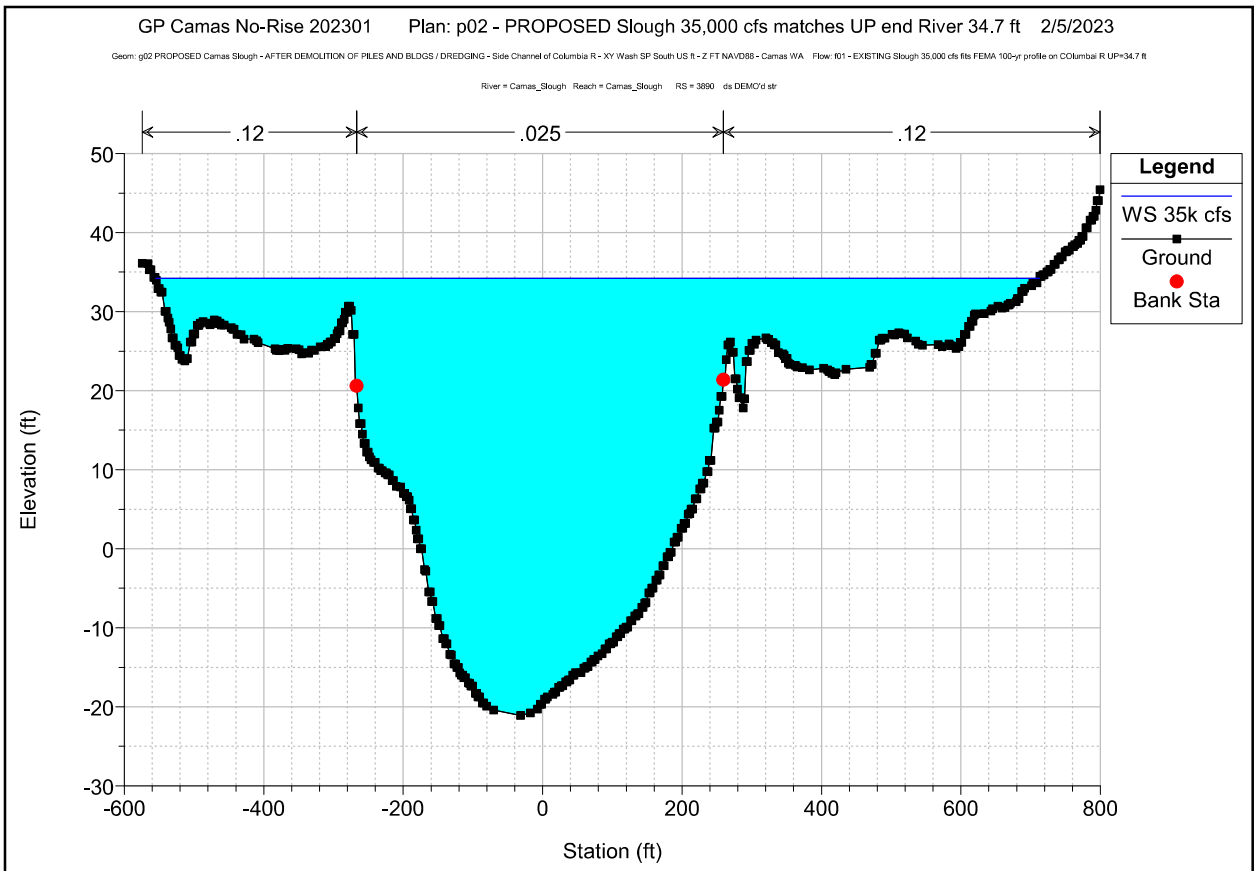
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Legend
WS 35k cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
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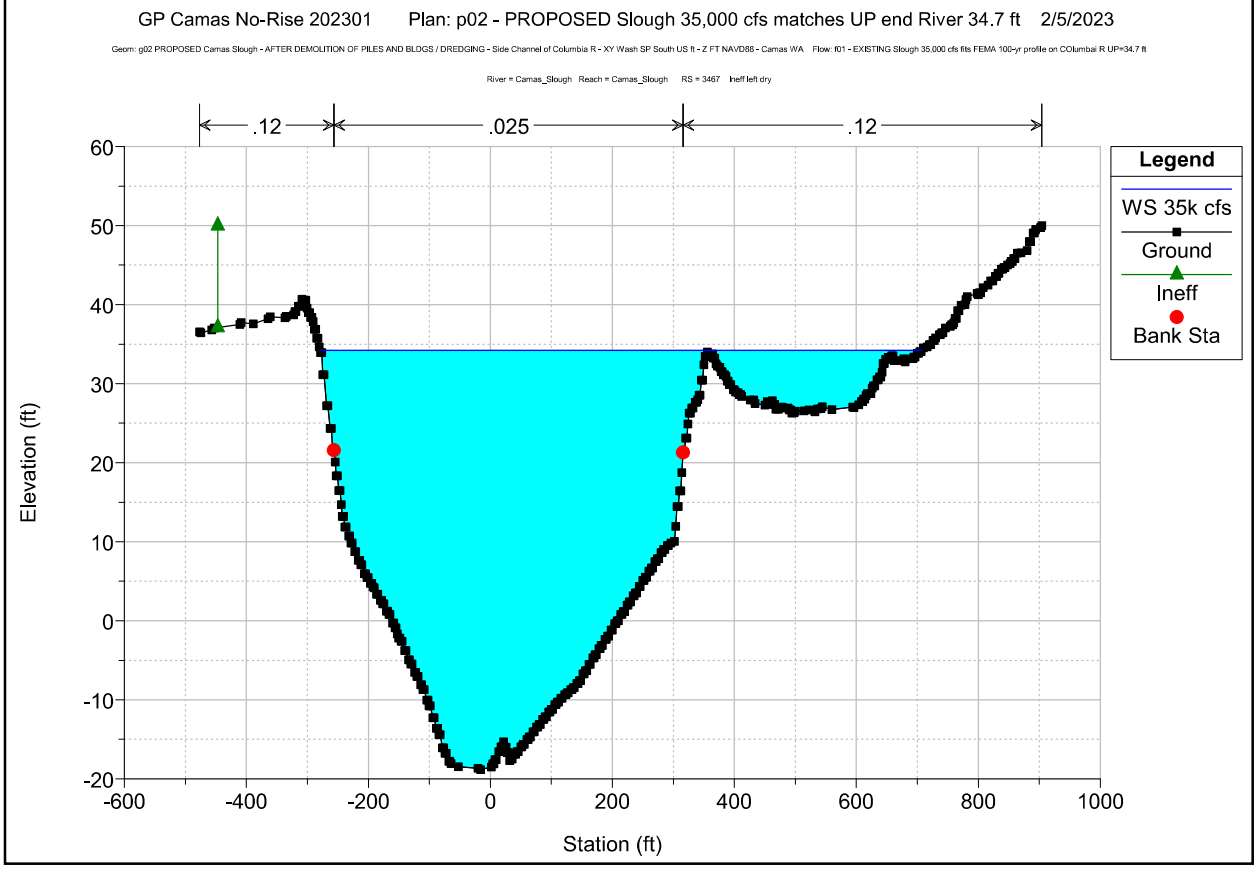
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.12
.025
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Legend
WS 35k cfs
Ground
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Bank Sta
Elevation (ft)
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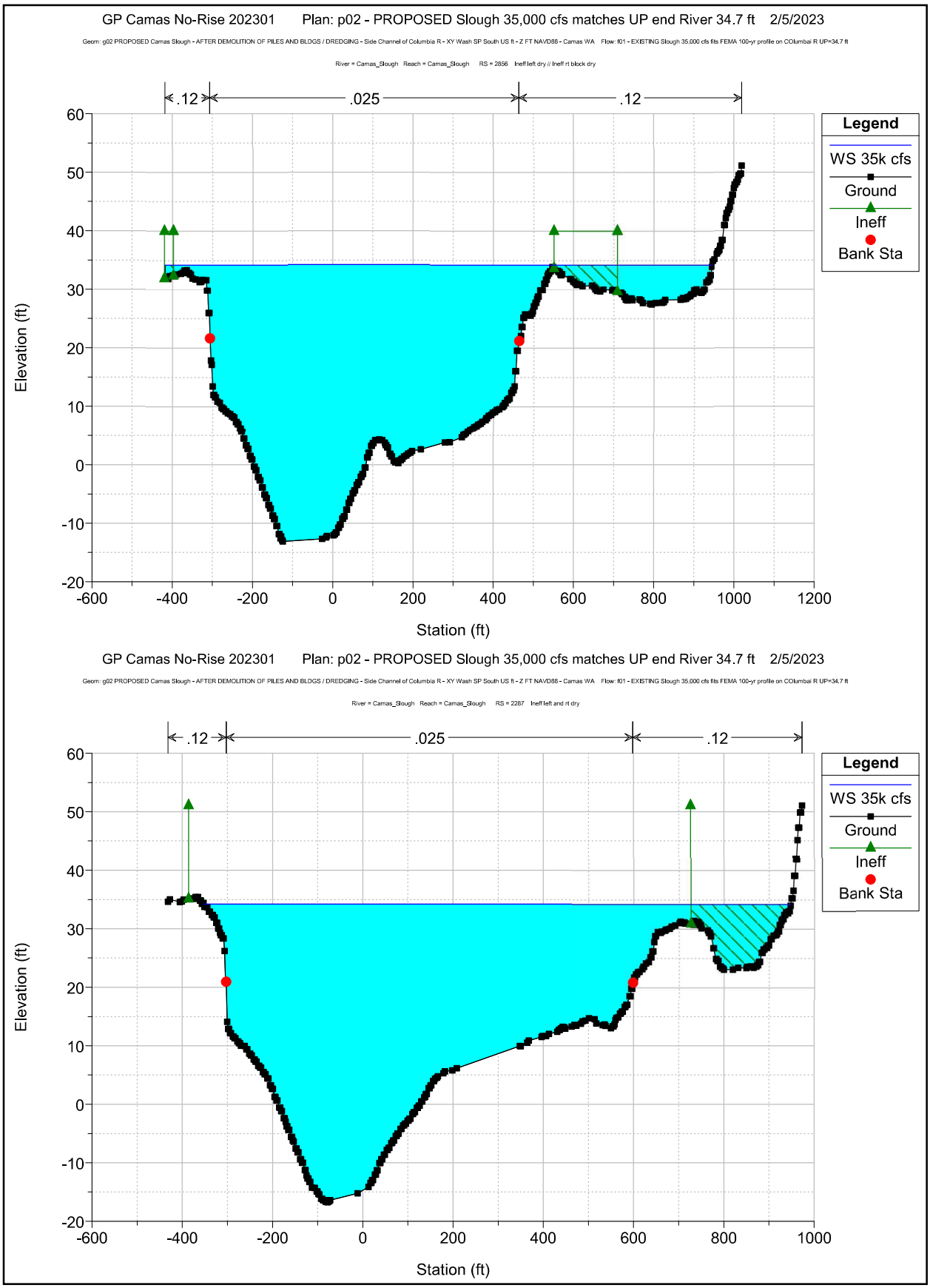
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.025
.12
Legend
WS 35k cfs
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Ineff
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Elevation (ft)
Station (ft)
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.025
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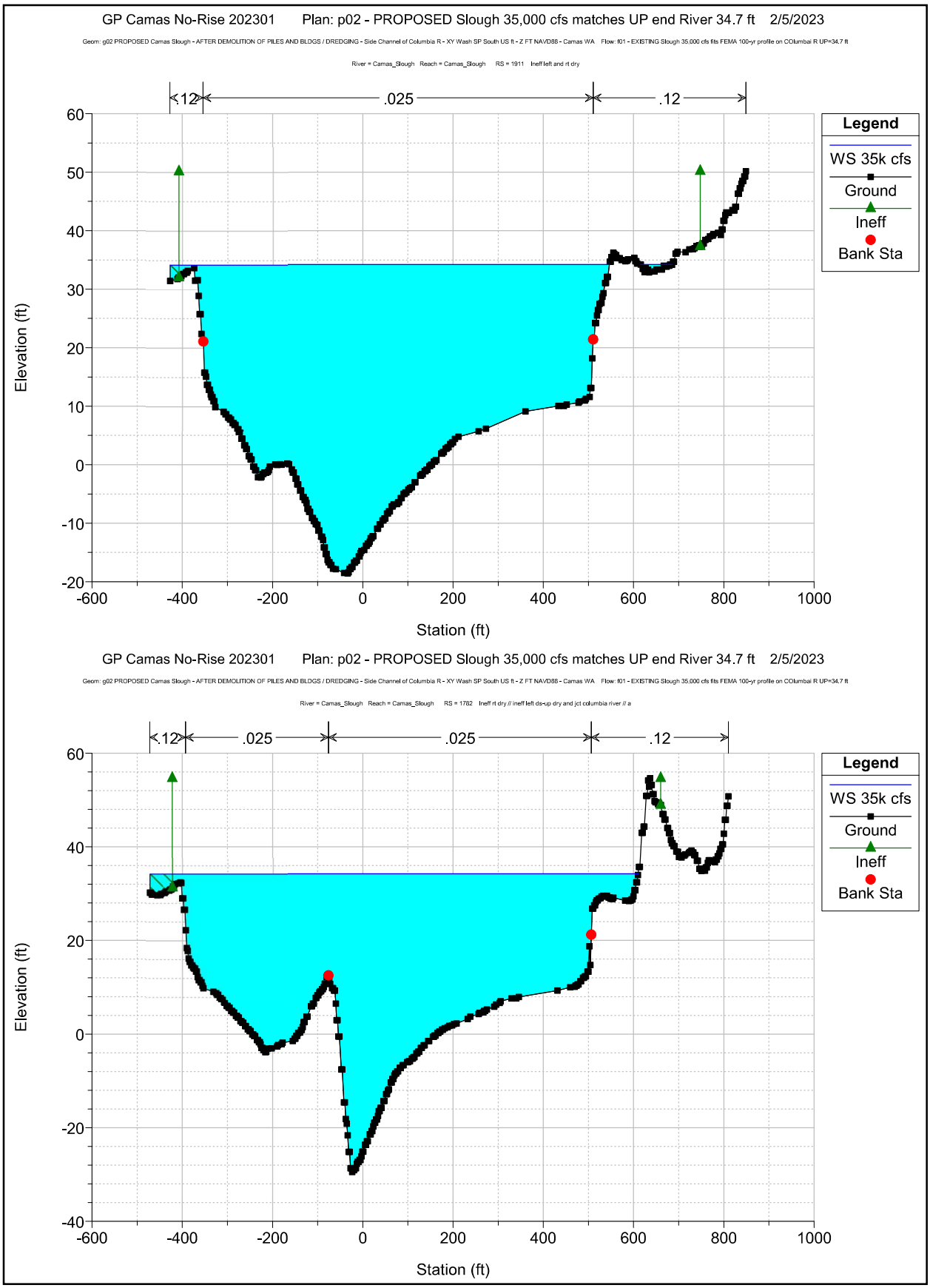
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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River = Camas_Slough Reach = Camas_Slough RS = 1911 Ineff left and rt dry
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Legend
WS 35k cfs
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Elevation (ft)
Station (ft)
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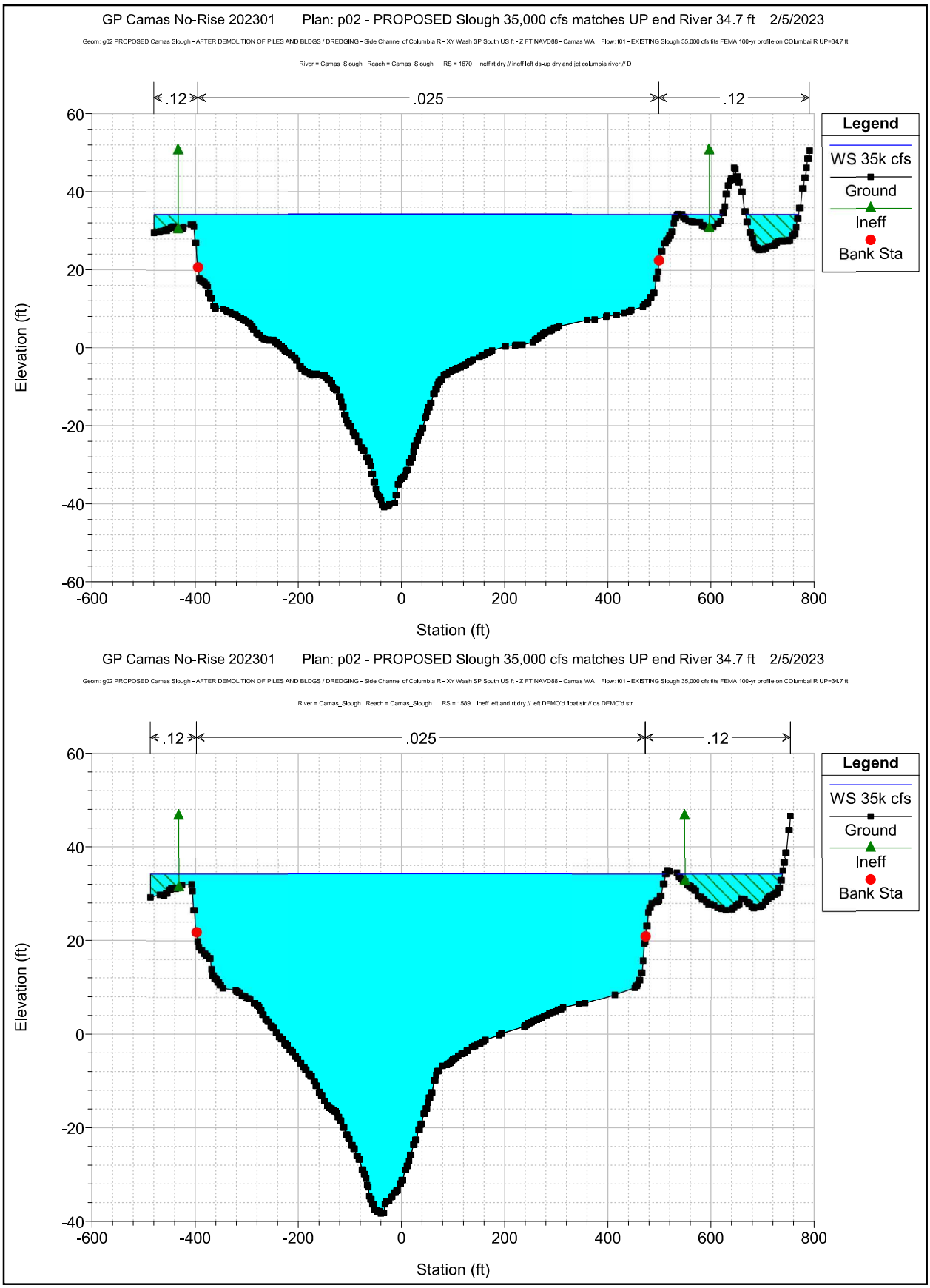
.12
.025
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

32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.12
.025
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Elevation (ft)
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Elevation (ft)
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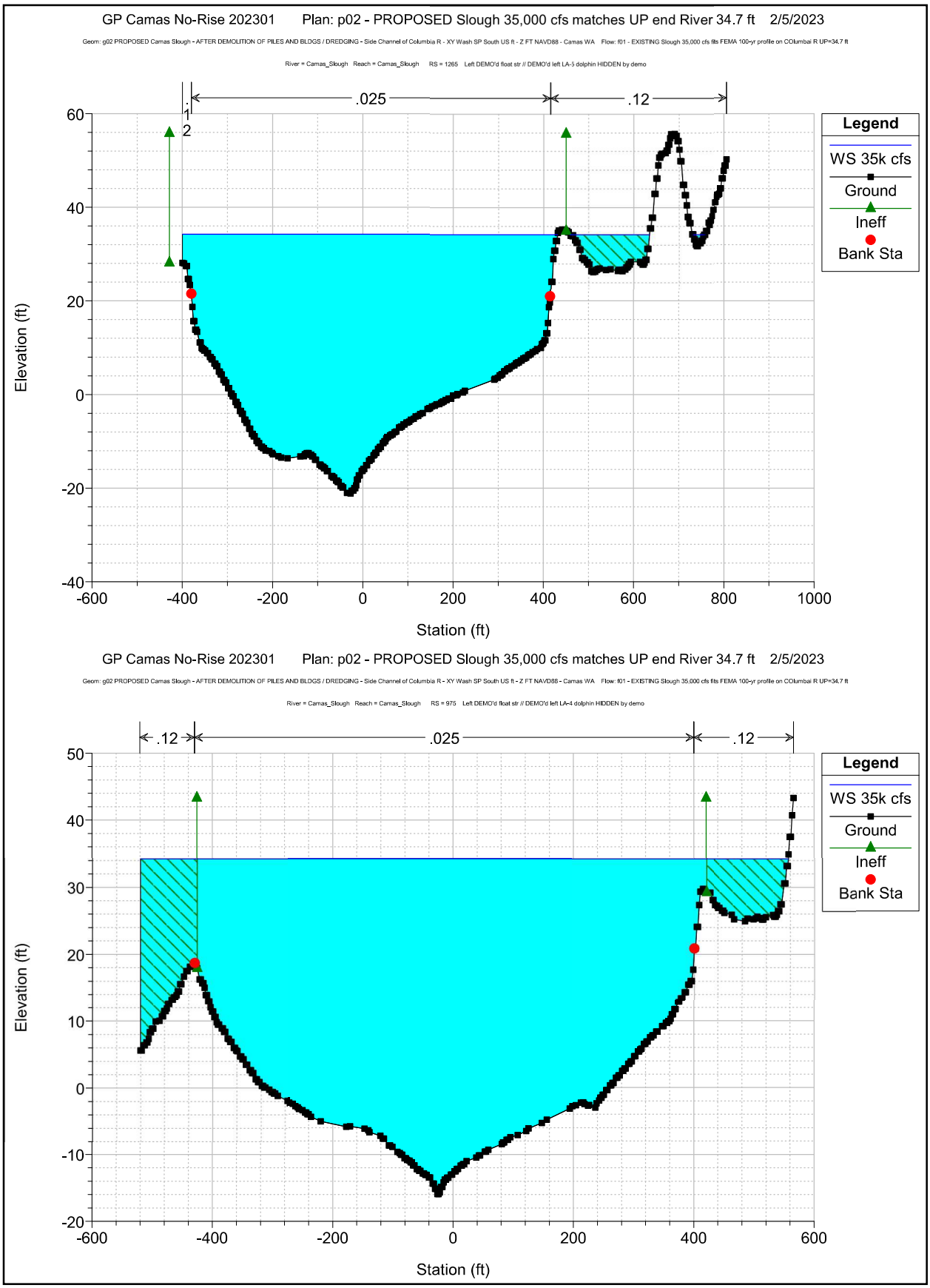
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.1
.2
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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.12
.025
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Legend
WS 35k cfs
Ground
Ineff
Bank Sta
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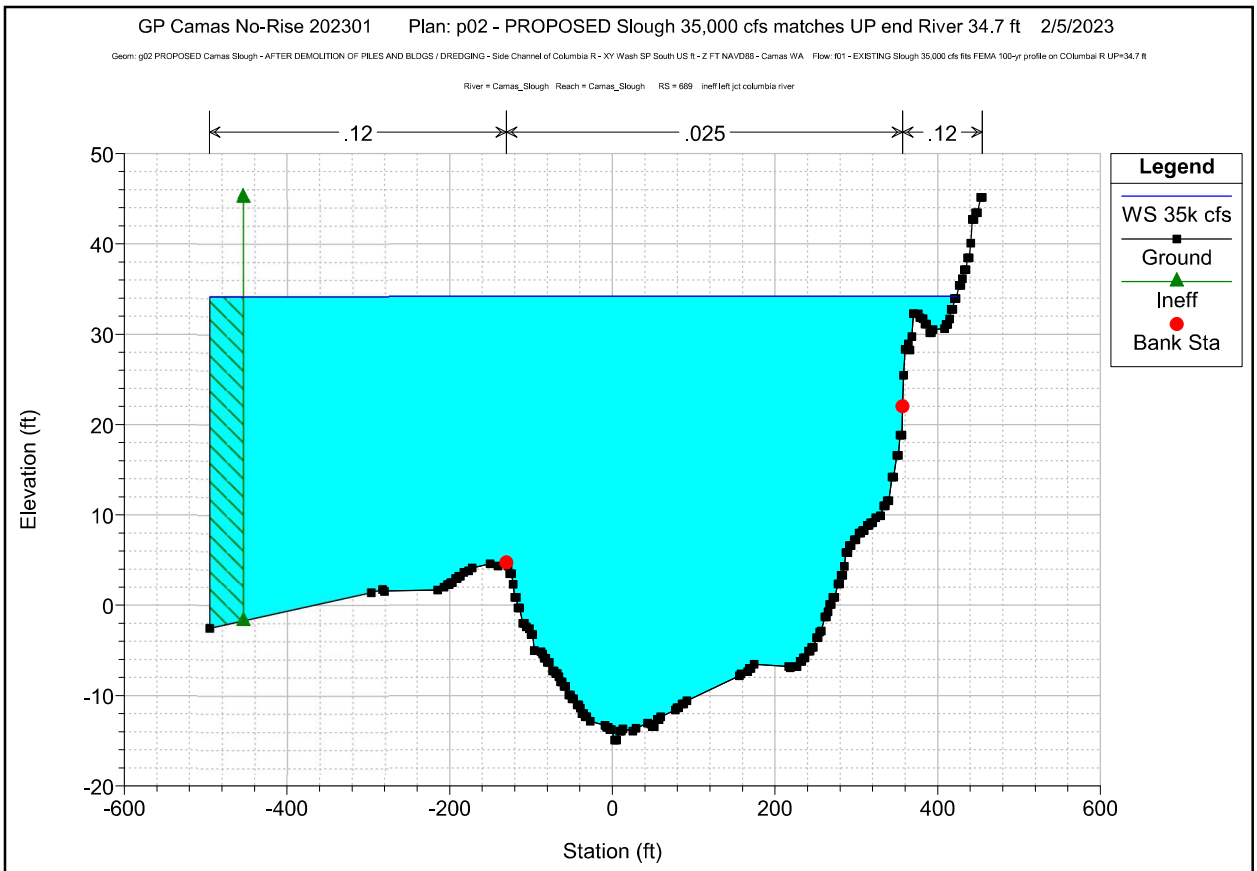
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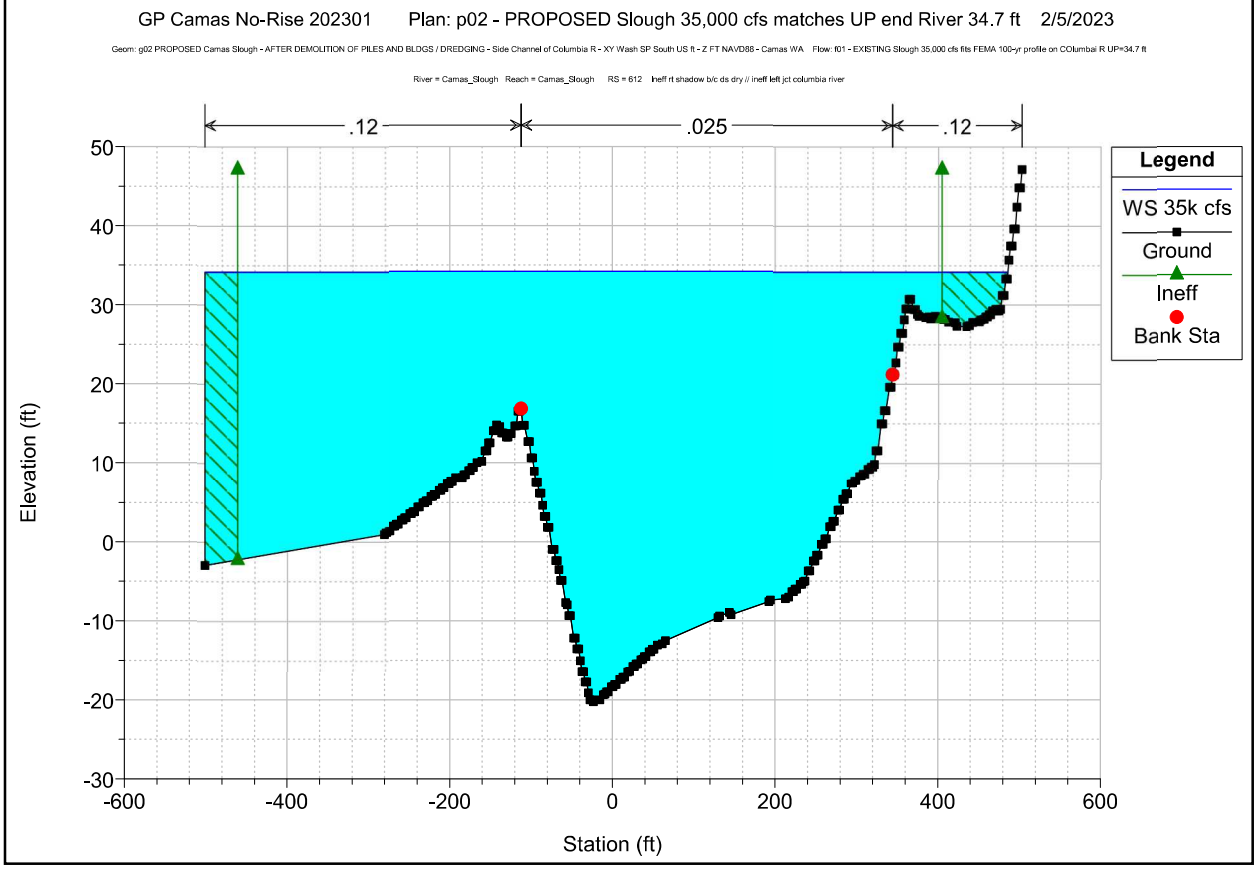
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.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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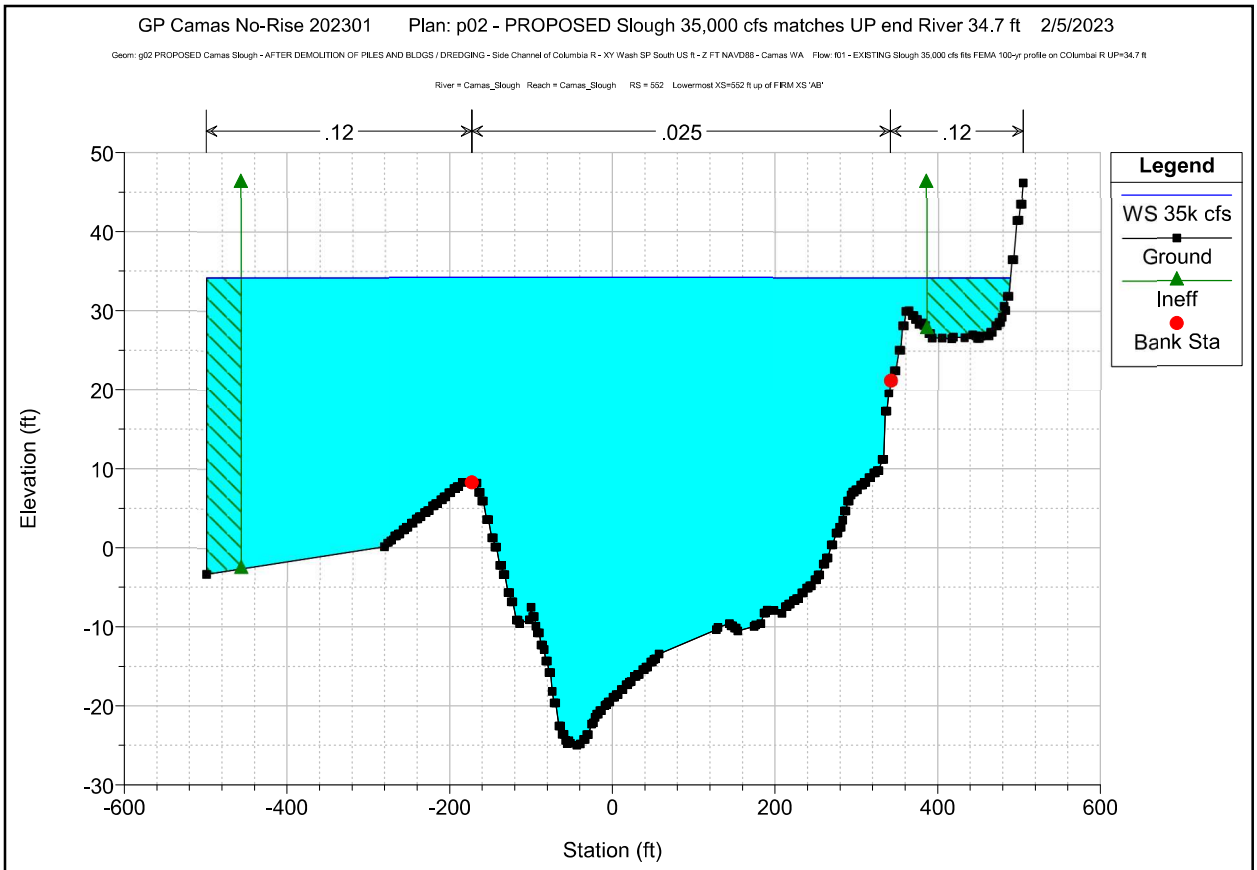
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.12
.025
.12
Legend
WS 35k cfs
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
50
40
30
20
10
0
-10
-20
-30
-600
-400
-200
0
200
400
600

Revised (Version 3) Tier 1 Evaluation for Dredged Materials Management

In-water and Overwater Structures Removal Project

Camas Mill, Camas, Washington

March 10, 2023

Original Submittal: August 5, 2020
Revised Submittal: November 16, 2020
Revised (Version 2) Submittal: January 21, 2021
Revised (Version 3) Submittal: March 10, 2023

Prepared for

Georgia-Pacific

Georgia-Pacific Consumer Operations LLC
Camas, Washington

Prepared by

TETRA TECH

19803 North Creek Parkway
Bothell, WA 98011

Exhibit 8 SHOR23-01

Table of Contents

1.0 INTRODUCTION 1

2.0 BRIEF PROJECT OVERVIEW 1

2.1 General Site Information 2

2.2 Dredging Locations and Activity Details 3

3.0 INFORMATION SUPPORTING TIER 1 EVALUATIONS 3

3.1 Recent Surveys and History 3

3.2 Conceptual Dredging Plans 5

3.3 Camas Slough Riverbank Design and Materials Disposal 7

3.4 New Riverbank Surfaces 7

4.0 LADY ISLAND DREDGED MATERIALS AREA 7

5.0 REFERENCES 8

List of Tables

Table 1. Dredging Locations and Descriptions 3
Table 2. Camas Slough Conceptual Dredge Prisms and Estimated Quantities 6

List of Figures

Figure 1 Site Plan Showing Locations of Structures to Be Removed
Figure 2 Outfall 002 Historical Sample Locations
Figure 3A Preliminary Grading Plan, Dock Warehouse Piers Plan View
Figure 3B Dock Warehouse Piers Dredge Prism, Cross Sections
Figure 4 Preliminary Grading Plan, PECO Dock

List of Appendices

Appendix A Bathymetry and Existing Conditions Survey
Appendix B Sediment Quality Result for NDPES Compliance at Outfalls 001 and 002

Exhibit 8 SHOR23-01

Acronyms and Abbreviations

City	City of Camas
COC	constituent of concern
CRD	Columbia River Datum
CSL	Cleanup Screening Level
DMA	Dredged Materials Area
DMMO	Dredged Materials Management Office
DMMP	Dredged Materials Management Program
DMMU	Dredged Materials Management Unit
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
GP	Georgia-Pacific Consumer Operations LLC
NPDES	National Pollutant Discharge Elimination System
PCB	polychlorinated biphenyl
RM	river mile
SCO	Sediment Cleanup Objective
SMS	Sediment Management Standards
USACE	U.S. Army Corps of Engineers
WAC	Washington Administrative Code

Record of Coordination

Action	Date	Note
Document Submitted to DMMP	August 10, 2020	Tier 1 only, no Sediment Sampling and Analysis Plan (SSAP) submitted
Comments Received from DMMP	September 2, 2020	Coordination meeting held between GP and DMMP
Document Revised	November 16, 2020	Substantive changes from August submission in response to DMMP comments were in Blue Text. An SSAP will be prepared as a separate document
Submitted to DMMP	December 2020	SSAP to be submitted as a separate document and references this document for introduction and background information
Comments Received from DMMP on 11/16/2020 Revised Tier 1	December 4, 2020	Comments received from DMMP
Revised (version 2)	January 21, 2021	Substantive changes from December 2020 submission in response to DMMP comments were in Blue Text. (Draft SSAP submitted as a separate document)
Comments Received from DMMP on 02/11/2021 Revised (version 2) Tier 1	February 11, 2021	Comments received from DMMP
Revised (version 3)	March 10, 2023	Substantive changes from January 2021 submission in response to DMMP comments and for changes in project scope. (Revised draft SSAP submitted as a separate document)

Exhibit 8 SHOR23-01

1.0 INTRODUCTION

Georgia-Pacific Consumer Operations LLC (GP) plans to abate and demolish structures located in-water and/or overwater along the Columbia River and Camas Slough in the City of Camas (the City) and unincorporated Clark County, Washington. Dredging will be required to enable barge access to remove some pilings. Dredging will also occur where the Camas Slough riverbank is to be reshaped following the removal of overwater structures. **Figure 1** provides a map of the locations of structures to be removed and shows two outfalls that are operational in the project area and are to be retained (Outfalls 001 and 002). Note all figures are attached following this narrative.

This memorandum was developed to supply information to the Dredged Material Management Program (DMMP) for a Tier 1 Evaluation following guidance for evaluation of environmental impacts of dredging and aquatic disposal of dredged sediments (DMMO 2021). A draft Tier I memorandum was submitted in August 2020 to DMMP and comments were received following a coordination call on September 2, 2020. A revised Tier I memo was submitted to DMMP in January 2021 and comments provided in February 2021. Comments on the January 2021 draft have been incorporated into this updated memorandum, along with changes to the project scope, which is primarily that pipelines in the Columbia River and Camas Slough are no longer proposed to be removed.

A change in the project description from the January 2021 version of this document is a decrease in proposed sediment quantities to be dredged because some structures originally proposed for removal are no longer included in the proposed project.

The purposes of this memorandum are to:

- Provide information needed for the DMMP to initiate a process to determine the suitability of dredged sediments for disposal.
- Initiate the process to understand project needs for compliance with antidegradation requirements, where needed.
- Provide a common understanding upon which to develop a Sampling and Analysis Plan, if needed.

To support a Tier 1 Evaluation, this memorandum provides the following detailed information:

- A general project description of the activities proposed for the GP Camas Mill's In-water/Overwater Structures Removal Project;
- Focused details on the areas requiring dredged sediment management, including a *Conceptual Dredging Plan* and preliminary sampling areas for dredged areas; and
- *Site History* and *Existing Conditions* related to sediment characteristics.

2.0 BRIEF PROJECT OVERVIEW

The In-water/Overwater Structures Removal project includes removal of one building-like industrial structure, five docks/piers, and approximately 3,000 piles/dolphins. Dredged materials management is required for dredging needed to facilitate riverbank repair/restoration following the removal of structures.

The project footprint includes:

- Areas along the Camas Slough, both north riverbank within the Camas Mill main site and south riverbank on Lady Island;
- Several other locations in the Camas Slough;
- Dolphins extending approximately 3 miles downriver from the Camas Mill in Camas Slough and the Columbia River.

Structures to be removed are shown in gold color on **Figure 1**. Work would occur following receipt of all permits and approvals during appropriate river conditions and regulatory open work windows. Several open work window periods are assumed to be needed.

2.1 General Site Information

The Camas Mill has been in operation since the 1880s making pulp and paper through a variety of technologies. Currently, the Camas Mill is an active industrial site operating one paper production line and covering approximately 190 acres north of the Camas Slough, as well as approximately 450 acres on Lady Island. The mill no longer manufactures pulp, does not perform any significant on-site chemical manufacturing/processing, nor does it utilize the waterways for shipping or log transport/storage.

Dredged materials have routinely been disposed of at the Lady Island Dredged Materials Area (DMA; see location shown on **Figure 1** at the western extent of Lady Island). The project area lies within Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16 Willamette Meridian. The project area lies within the City of Camas, Washington, with the exception of one dolphin to be removed on the Columbia River, located outside the City within unincorporated Clark County, Washington.

Lady Island lies between the Camas Slough and the Columbia River main channel and is owned in its entirety by GP. GP has an established state aquatic lands lease and several easements with the Washington State Department of Natural Resources (DNR) in Camas Slough and the Columbia River.

Water elevation of the Columbia River and Camas Slough in the project reach is controlled principally by releases from the upriver Bonneville Dam, flows from the Washougal River, and, to a smaller extent, diurnal tidal fluctuations (tidal prism is generally about 1 foot in the project area). Water elevations are seasonal, with peak high elevations reached most years in June and low water elevations occurring in September and October.

The Columbia River and Camas Slough are listed for water quality impairment under Section 303(d) of the Clean Water Act due to temperature exceedance and low dissolved oxygen concentrations.

The Washington State Department of Ecology (Ecology) notified GP in 2020 of credible evidence of liability for previous releases of hazardous substances under the state's Model Toxics Control Act based on previously known spills (no new or recent occurrences) (Ecology 2020). Ecology assigned soils on the main Camas Mill parcel to Site No. 15156, and did not assign groundwater, surface waters, or sediments. The presence of contaminants has not been confirmed, no specific contaminants of concern have been identified for the site, and no site actions have been identified at this time. No other sites are listed in the project vicinity.

Invasive plant species have been reported in the vicinity of Lady Island and Camas Slough and include poison hemlock, garlic mustard, tansy ragwort, indigo bush, and Japanese knotweed (WSDA 2022). No aquatic invasive plant species were identified in WSDA documents.

Bathymetric and upland surveys of the project area were completed in 2020 (see **Appendix A**).

2.2 Dredging Locations and Activity Details

The following locations and activities are proposed:

- Barge access to enable removal of the Dock Warehouse piers and portion of the Camas Slough riverbank will require dredging of sediments.
- Structures and approximately 3,000 piles would be removed, including those along approximately 1,000 feet of Camas Slough riverbank where portions of the riverbank would be reshaped to a slope of approximately 3 horizontal to 1 vertical.

Table 1 provides details on the proposed activities that will involve dredging. **Figure 1** shows the overall project locations indicating structures to be removed**.**

Table 1. Dredging Locations and Descriptions

Location	Structure to be Removed/Activity	Description of Location and Activity
Camas Slough	Access dredging for the removal of the Dock Warehouse Pier	Sediment would be removed at the three piers at the Dock Warehouse to create draft for demolition barges. Several known occurrences of previous dredging immediately adjacent to this area at the PECO dock.
Camas Slough	Structure/pile removal and bank reshaping	Piles and structures to be removed along approximately 1,000 feet of riverbank. Currently, the area supports various docks/piers. Removal of piles and riverbank shaping would occur. Equipment access mainly from land.

Abbreviations:
CRD = Columbia River Datum
RM = river mile

3.0 INFORMATION SUPPORTING TIER 1 EVALUATIONS

The following sections provide a discussion of conceptual dredging plans and the histories of the area to be dredged, along with existing relevant information on sediment characteristics for the Camas Slough locations.

3.1 Recent Surveys and History

Camas Slough is a side-channel of the Columbia River separated from the main channel by Lady Island (see **Figure 1**). The eastern end (upriver) of Camas Slough is formed by the mouth of the Washougal River. Camas Slough is a fairly shallow and relatively still-water reach that receives significant sediment deposition, as demonstrated by the need to conduct periodic maintenance dredging. Previously dredged areas have covered approximately 23 acres of Camas Slough. The most recent maintenance dredging in 2020 was performed only in front of the Fire Water Pumphouse (structure to be retained) (see **Figure 1**).

Exhibit 8 SHOR23-01

A bathymetric/hydrographic survey of the Camas Slough was completed in early 2020 (**Appendix A)**. A diver inspection survey was performed in February 2020, which provided visual information on existing conditions (**Appendix A)**. The most recent sediment sampling to support a suitability determination was performed in 2007 to support a dredged materials disposal determination, although 2017 sampling was done at Outfall 002 (ESA 2018) for National Pollutant Discharge Elimination System (NPDES) compliance (**Appendix B**).

Recent sampling and determinations for Camas Slough Sediments included the following:

- **2007:** A Suitability Determination was made by the DMMP for Dredged Materials Management Units (DMMUs) 1 through 4. Data provided for this analysis included analysis for all freshwater constituents of concern (COCs) along with potential bioaccumulation chemicals and an elution assay. DMMU 1 was located 0.3 mile upriver from any proposed dredging for this project (and was the location of 2020 maintenance dredging). DMMU 2 was in the immediate area of new dredging proposed for this project (Dock Warehouse vicinity). DMMU 4 was located at Lease Area 3, approximately 1.5 miles downriver from any dredging proposed for this project. DMMU 3 was located 1 mile downriver (Lease Area 12), and this area was not approved for dredging based on limited test data; it appeared the new sediment surface would not pass antidegradation standards for cadmium, zinc, PCBs and Dioxins/Furans. All dredged materials were disposed at the Lady Island DMA, including the approximately 3,000 cubic yards dredged from Lease Area 12/DMMU 3.
- **2008:** As stated, dredging at DMMU 3 occurred in 2008 without full agency approvals and was subject of a post-violation determination, which included sampling of the new sediment surface post-dredging. Regulatory determinations resulted in: (1) no conclusive evidence of degradation; (2) implementation of a compensatory wetland restoration site on the Washougal River; and (3) an assumed, but unconfirmed, presence of sediments that may exceed state clean-up levels at the Lady Island DMA.
- **2015:** A Tier 1 evaluation made by the DMMP based on the 2007 data supported maintenance dredging with disposal at Lady Island DMA. This dredging has occurred approximately every other year in Camas Slough.
- **2017:** An antidegradation determination was received based on 2007 data for DMMUs 1 and 2, but the determination did not cover DMMUs 3 and 4 because no continued maintenance dredging would occur in those areas.
- **2017:** Shallow sediment sampling was undertaken near Outfall 002 for compliance with an existing NPDES permit. None of the results from the samples analyzed exceeded any of the DMMP freshwater Screening Level 1 (SL1) criteria, and reporting limits for non-detected analytes were also below the criteria.

Establishment of the wastewater treatment facility on Lady Island in the 1970s enabled wastewaters to be piped from the mill across Camas Slough to treatment facilities. The Lady Island Wastewater Treatment Facility currently operates to receive and treat both Camas Mill wastewater and industrial stormwater from the Camas Mill site. Treated wastewater is discharged to the Columbia River via Outfall 001, as mentioned above. No wastewater is discharged to Camas Slough.

Exhibit 8 SHOR23-01

In the Camas Slough, Outfall 002 currently conveys mainly municipal stormwater from areas originating upgradient of the Camas Mill.

One other outfall in the Camas Slough conveys City of Camas municipal stormwater collected from residential and commercial areas located upgradient of the Camas Mill. This outfall is covered under the City's Municipal Stormwater permit (WAR0405004). The outfall is in the vicinity of the Riverbank Pumphouse. The City is currently implementing a mapping program to identify and map to GIS locations all stormwater outfalls to be completed by 2023 (City of Camas 2022).

As mentioned above, Outfall 002 is regulated under an NPDES industrial discharge permit. Outfall 002 remains operational and would not be altered by this project. A sediment sampling and analysis event was performed by GP in 2017-2018 to comply with NPDES monitoring requirements at operating Outfall 002. Sediment samples to depths of approximately 8 inches below the surface were collected (see **Figure 2** for Outfall 002 historic sampling locations; Data Report for that sampling is included in **Appendix B**).

Sediment characterization included conventional parameters (ammonia, sulfide, total organic carbon, percent total solids, total volatile solids, grain size), metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), semivolatile organic compounds, organotins, total PAHs, organochloride pesticides, petroleum hydrocarbons, polychlorinated biphenyls (PCBs), and dioxins/furans. No other COCs were identified as requiring analysis for this outfall.

Analysis of sediments for conventional parameters and chemical data showed that no parameter exceeded any of the Sediment Management Standards (SMS)—Freshwater Sediment Cleanup Objectives (Washington Administrative Code [WAC] 173-204-563) [Ecology 2013] and had a total toxic equivalency concentration for Dioxins/Furans between 0.314 and 0.412 ng/kg TEQ. Results of midge (*Chironomus dilutus*) 20-day survival and growth bioassays show that none of the sediment samples exceeded the Sediment Cleanup Objective (SCO) or Cleanup Screening Level (CSL) criteria for mortality or growth. An amphipod (*Hyalella azteca*) 10-day survival bioassay showed that none of the sediment samples resulted in an exceedance for mortality under either the SCO or the CSL of the SMS guidelines.

3.2 Conceptual Dredging Plans

According to the DMMP, current risk ranking for sediment dredging projects in Camas Slough is "Moderate." Based on the Camas Slough management rank, the maximum sediment volume for each DMMU is 40,000 cubic yards. Based on previous sediment sampling data, the Camas Slough sediment is heterogeneous. Because the sediment is presumed to be heterogeneous, a surface unit of 4 feet thickness and a subsurface unit for the remaining dredge prism is indicated for each riverbed area.

Two distinct types of dredge areas exist in the Camas Slough project area:

1. Riverbank dredging/excavation—areas above and below ordinary high water for areas currently covered by structures. Work on the riverbank would be performed by equipment staged on the uplands portion of the riverbank, and all work would be performed "in the dry."

Exhibit 8 SHOR23-01

2. Various dock structures would be removed from approximately 1,000 continuous linear feet of riverbank. Riverbank reshaping following the removal of structures would expose new surfaces to the aquatic system.

Table 2 provides a summary of estimated sediment quantities to be managed by location in Camas Slough.

Table 2. Camas Slough Conceptual Dredge Prisms and Estimated Quantities

Camas Slough Location	Dredged Material Management Unit	Estimated Quantity (Cubic Yards)
Dock Warehouse Piers, Surface Unit	CS1-A	6,900
Dock Warehouse Piers, Subsurface Unit	CS1-B	3,600
Total Camas Slough Riverbed Sediments		**10,500**

Camas Slough Riverbed Design and Disposal

At the Dock Warehouse Piers, an area must be dredged to enable access by demolition crews using barges. **Figures 3A and 3B** provide a plan view and cross-section profiles for this area. This area is separated from the riverbank grading area at the 2-foot elevation contour (Columbia River Datum; CRD). The 2-foot elevation separation was based on assumed ability of operations to complete riverbank excavation/dredging from the upland side and mainly in the dry when river water levels are at this level or lower. Z-Layer testing will be required beneath the newly exposed dredged surface in the Dock Warehouse Piers area to meet antidegradation requirements.

Management of dredged materials will depend on physical and chemical properties, which will determine whether materials are suitable for reuse. Armoring rock, where present on the shoreline, will be removed, placed on the barge segregated from the finer grained sediments, and handled and managed separately from the dredged sediments. Where feasible and appropriate, the armoring rock will be reused in appropriate upland locations. Armoring rock will not be handled as dredged material and will not be disposed of in river, at the Lady Island DMA, or in any other dredged material management area.

GP proposes that dredged sediments from Camas Slough's riverbed be disposed of based on the following protocol[1]:

1. If found suitable for in-water disposal and reuse based on chemical and physical criteria, sediments would be beneficially reused by this project for fill for riverbank and riverbed shaping following the removal of structures in the Camas Slough in accordance with WDNR and any other applicable permits.
2. If found suitable as fill for upland areas, material would be used where needed, including on Camas Mill property and in other locations.

1. Unconfined flow lane disposal in the Columbia River does not appear to be accessible to this project.

Exhibit 8 SHOR23-01

3. If the material is found not to be suitable for in-water disposal and not usable in upland locations, then sediment material would be barged to the upland disposal site at the Lady Island DMA.
4. If materials are found not to be suitable for storage at the DMA or for other upland reuse, then the material would be disposed of at another appropriate approved upland location.

3.3 Camas Slough Riverbank Design and Materials Disposal

A conceptual riverbank grading plan is shown on **Figures 3A and 4**. Work on the riverbank would occur from the landward side and in the dry (estimated to be above approximately 2 feet CRD in the dry season). No in-water disposal is proposed for materials recovered from riverbank areas. Any materials excavated from the riverbank areas would be stockpiled, sampled, and characterized for disposal at a licensed disposal facility.

3.4 New Riverbank Surfaces

Since the riverbank area is currently occupied by structures, and to meet antidegradation requirements following demolition, GP proposes to sample final grades to determine the condition of surface materials after the structures are removed. Owing to some uncertainty in final grades and layout, a sampling and analysis plan for riverbank areas above +2 feet CRD will be developed once the riverbank work is nearing completion. Sampling would likely entail an appropriate number of grab-type samples and chemical analyses to adequately survey the area. Assuming sampled final grade materials are found suitable, a portion of the newly shaped riverbank area would then be planted with native plant species. Final surface materials are designed to be the finest materials coarse enough to remain in place, and similar to native cobbly-mix type riverbank materials.

If final grade materials were found to not be suitable to meet antidegradation requirements, then GP would work with agencies to determine appropriate actions, including the extent of over-excavation that may be needed and appropriate replacement materials to establish suitable final grades.

4.0 LADY ISLAND DREDGED MATERIALS AREA

While in-water reuse and other reuse is preferred by GP for suitable dredged materials, the Lady Island DMA would serve for upland disposal of suitable dredged materials that are not reused (see **Figure 1** for location of the DMA).

GP has a 30-year license with the DNR for the deposit, sale, and use of State-owned dredged material (expires in 2034). DNR has agreed that the proposed dredging activity and dredged materials accessed for this project are covered under this license, and activities will not require an additional license for use authorization (pers. communication, email to J. Dambrun, GP, from R. Schwartz, DNR, August 3, 2020).

The Lady Island DMA is approximately 5 acres and has been in use to successfully store dredged materials for more than 40 years. It is estimated that approximately 110,000 cubic yards of dredged sediments are currently stored in the DMA. The Lady Island DMA was previously regulated under state

Exhibit 8 SHOR23-01

landfill rules and had regulatory requirements for acceptable materials under a landfill operations management plan that required some materials testing. More recently, DMAs have been removed from landfill regulations in Washington, and a landfill management plan for the area is no longer required. Since approximately 2010, GP has routinely assessed all dredged materials entering the DMA using a traditional toxicity characteristic leaching procedure test.

Transportation to the Lady Island DMA would be via barge in Camas Slough to the Lady Island north shore to a landing where materials would be off-loaded and conveyed to the DMA via a short dirt access road. The material would be moved from the barge by a clamshell crane. As dredged materials are placed for storage, the material will be spread and sorted to remove extraneous material that may have been recovered incidental to dredging. The piles will be shaped with 2:1 sloping sides for stability.

Dredged materials will be managed throughout the process in a manner that prevents the return of sediment to the water. Best management practices will be implemented during transportation and placement so that the material does not wash from barges during transfer to the site or from the site after placement.

5.0 REFERENCES

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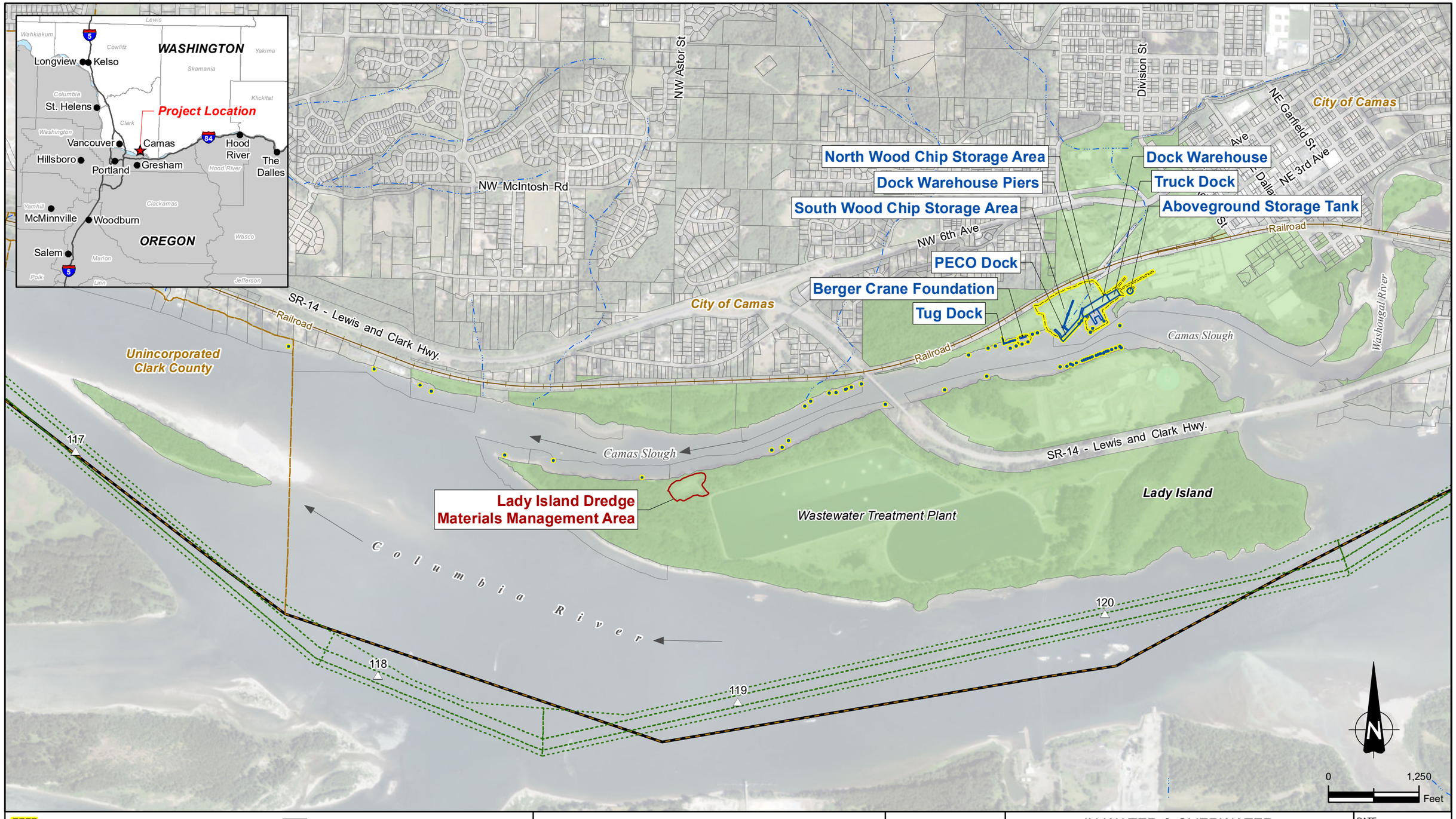
WSDA (Washington State Department of Agriculture. 2022. Washington State Noxious Weed Data Viewer. http://www.arcgis.com/apps/webappviewer/index.html?id=cec83bd1b9fc4d7681afd219a9197654. Accessed December 20, 2022.

FIGURES



Project Limits	Tax Lot
Columbia River Mile Marker	Tax Lot Owned by Georgia-Pacific
Stream/River	City Boundary
Structure To Be Removed	County Boundary
Dolphin To Be Removed	Federal Navigation Channel
Lady Island Dredge Materials Management Area	

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

PROJECT LOCATION

DATE: OCTOBER 2022
SCALE: 1 " = 1,250 '
PROJECT NO.
FIGURE: 603

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 1 - Project Location.mxd - sierra.marrs - 10/19/2022 - 3:37:33 PM

- Outfall 002
- Historical Sample Locations

NOTE: LOCATIONS OF SAMPLES ASSOCIATED WITH OUTFALL 002 COLLECTED IN SEPTEMBER 2017 FOR COMPLIANCE WITH CONDITIONS OF NPDES WASTE DISCHARGE PERMIT NO. WA0000256 (ESA 2018).

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

OUTFALL 002 HISTORICAL
SAMPLE LOCATIONS

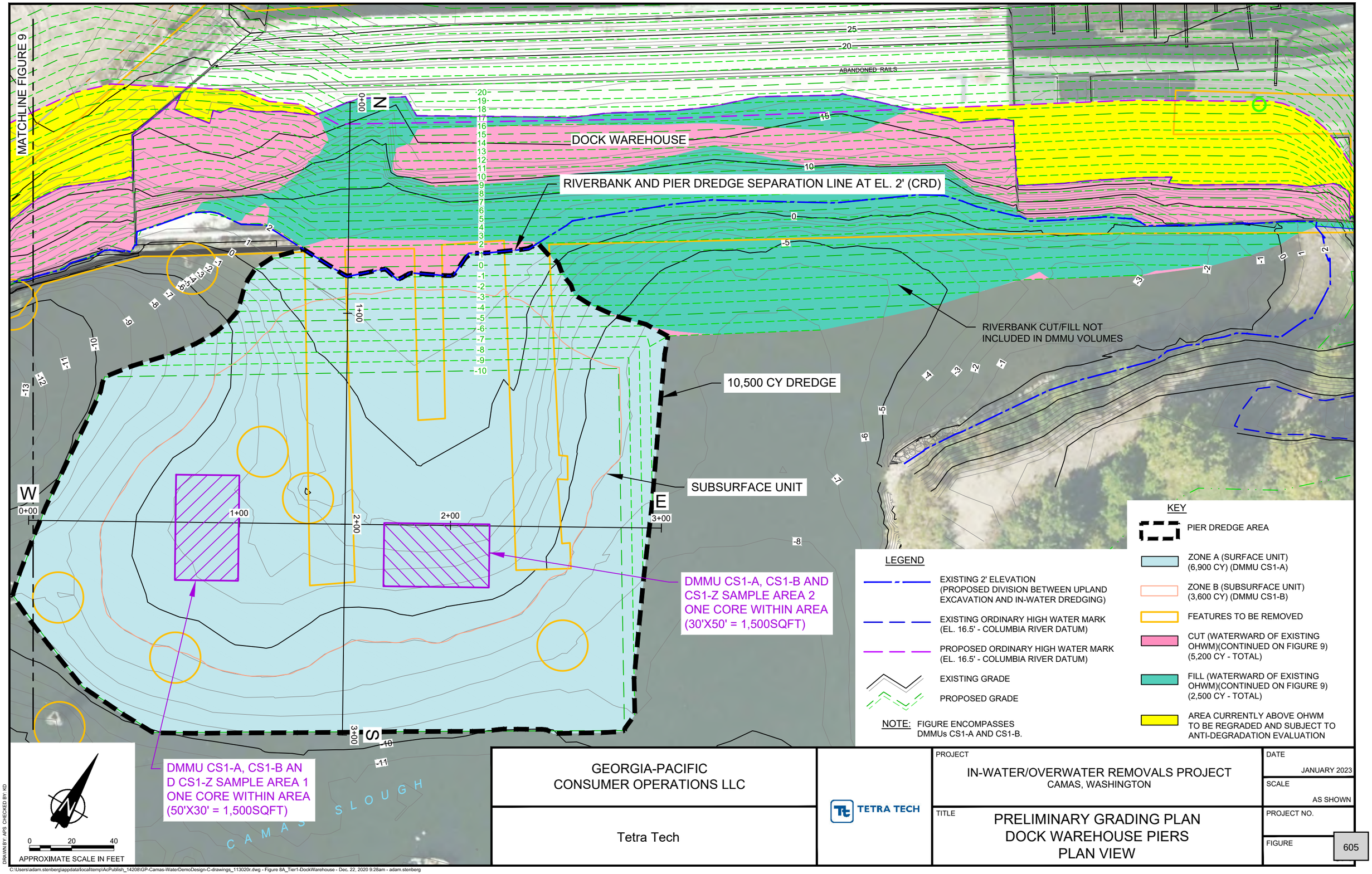
DATE
JANUARY 2023

SCALE
1 " = 35 '

PROJECT NO.

FIGURE
604

R:\PROJECTS\CAMAS_0117-0064\TIER_1\MAPS\Tier1_Figure_2.mxd - sierra.marrs - 1/5/2023 - 10:20:29 AM



GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

PROJECT
IN-WATER/OVERWATER REMOVALS PROJECT
CAMAS, WASHINGTON

DATE
JANUARY 2023

SCALE
AS SHOWN

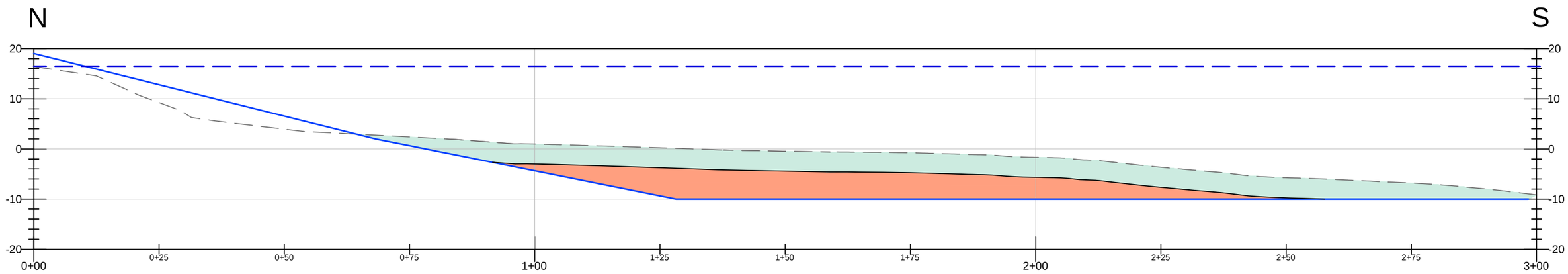
PROJECT NO.

TITLE
PRELIMINARY GRADING PLAN
DOCK WAREHOUSE PIERS
PLAN VIEW

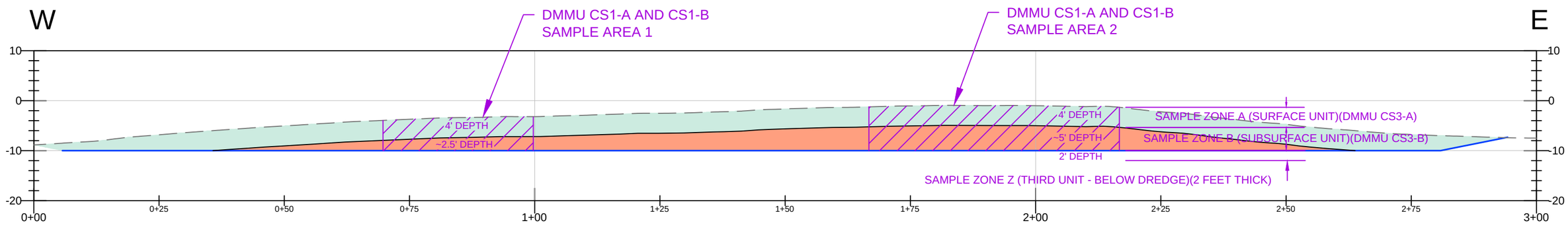
FIGURE
605

DRAWN BY: APS CHECKED BY: KD

C:\Users\adam.stenberg\appdata\local\temp\AcPublish_14208\GP-Camas-WaterDemoDesign-C-drawings_113020r.dwg - Figure 8A_Tier1-DockWarehouse - Dec. 22, 2020 9:28am - adam.stenberg



CROSS SECTION N-S



CROSS SECTION W-E

CROSS SECTION LEGEND

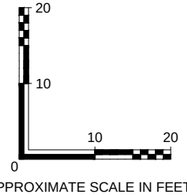
- ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- EXISTING GRADE
- DREDGING EXTENT

CAMAS SLOUGH - DMMU CS3 DETAIL

SAMPLED WITH TWO CORES.
SUBSAMPLES TAKEN FROM
ZONES A & B DEPTHS AND
COMPOSITED FOR 3 ANALYSES.

KEY

- ZONE A (SURFACE UNIT) (6,900 CY)
- ZONE B (SUBSURFACE UNIT) (3,600 CY)



APPROXIMATE SCALE IN FEET

CLIENT: GEORGIA-PACIFIC CONSUMER OPERATIONS LLC		PROJECT: IN-WATER/OVERWATER REMOVALS PROJECT, CAMAS, WASHINGTON	DATE: JANUARY 2023
Tetra Tech	TETRA TECH	TITLE: DOCK WAREHOUSE PIERS DREDGE PRISM CROSS SECTIONS	SCALE: AS SHOWN
			PROJECT NO.
			FIGURE: 606

DRAWN BY: PM CHECKED BY: JKH

C:\Users\adam.stenberg\Documents\PS18200620\DredgePrisms\tier1-Figures\GP Camas-Tier1-DredgePrisms_120920.dwg - Figure 8B_DockDredge (3) - Dec. 20, 2020 1:29pm - adam.stenberg

LEGEND

- EXISTING 2' ELEVATION (PROPOSED DIVISION BETWEEN UPLAND EXCAVATION AND IN-WATER DREDGING)
- EXISTING ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- PROPOSED ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- EXISTING GRADE
- PROPOSED GRADE

KEY

- CUT (WATERWARD OF EXISTING OHWM)(CONTINUED ON FIGURE 8A) (5,200 CY - TOTAL)
- FILL (WATERWARD OF EXISTING OHWM)(CONTINUED ON FIGURE 8A) (2,500 CY - TOTAL)
- AREA CURRENTLY ABOVE OHWM TO BE REGRADED AND SUBJECT TO ANTI-DEGRADATION EVALUATION
- PIER DREDGE AREA (10,500 CY)
- FEATURES TO BE REMOVED

MATCHLINE FIGURE 8A

PECO DOCK

PECO CRANE

RAILS

RAILS

CAMAS SLOUGH

4:1

5:1

6:1

0 40 80

APPROXIMATE SCALE IN FEET

DRAWN BY: APS CHECKED BY: KD

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CLIENT GEORGIA-PACIFIC CONSUMER OPERATIONS LLC		PROJECT IN-WATER/OVERWATER REMOVALS PROJECT CAMAS, WASHINGTON	DATE JANUARY 2023
	TETRA TECH		SCALE AS SHOWN
Tetra Tech		TITLE PRELIMINARY GRADING PLAN PECO DOCK	PROJECT NO.
			FIGURE 607

APPENDIX A: BATHYMETRY AND CONDITIONS SURVEY

CONDITIONS SURVEY

PRE-DEMO OIL STORAGE TANK
EASEMENTS 51-021224 AND 51-026441
IN-WATER PIPE INVESTIGATION

A PORTION OF UNPLATTED FIRST CLASS AND SECOND CLASS TIDELANDS AND BEDLANDS OF CAMAS SLOUGH AND COLUMBIA RIVER SITUATED IN THE SOUTH QUARTERS OF SECTION 11 AND THE NORTH QUARTERS OF SECTIONS 14 AND 15 TOWNSHIP 1 NORTH, RANGE 3 EAST OF THE WILLAMETTE MERIDIAN, CITY OF CAMAS, COUNTY OF CLARK, STATE OF WASHINGTON.

LANDS LYING BETWEEN COLUMBIA RIVER MILES 119–121

Georgia-Pacific

SURVEYED FOR

GEORGIA–PACIFIC CPG ENGINEERING
MAILING ADDRESS: 401 NE ADAMS ST., CAMAS, WA 98607
PROJECT MANAGER: ALDIS RAISTERS
PHONE NUMBER: 360–834–8430
EMAIL ADDRESS: ALDIS.RAISTERS@GAPAC.COM

PROJECT ENGINEER: KOORUS TAGHIGHI, WOOD PLC
PHONE NUMBER: 206–641–6301
EMAIL ADDRESS: KOORUS.TAGHIGHI1@WOODPLC.COM

LEGEND

AAC = ADVANCED AMERICAN CONSTRUCTION
AOI = AREA OF INTEREST
ASB = AERATION STABILIZATION BASIN
BTM EL = BOTTOM ELEVATION
CB = CATCH BASIN
CMP = CORRUGATED METAL PIPE
CRD = COLUMBIA RIVER DATUM
DWG = REFERENCED DRAWING
ESMT = EASEMENT
LA = DEPARTMENT OF NATURAL RESOURCES AQUATIC LEASE AREA NO. 81284S REF. SURVEY RECORDED IN BOOK 64, PAGE 94, RECORDS OF CLARK COUNTY).
SWLS = STATEWIDE LAND SURVEYING

AV — AIR VALVE
ANCHOR
BM — BENCHMARK
BOLLARD
CB — CATCH BASIN
CO — CLEANOUT
DATA POINT FLAG
AAC DIVER TEAM COORDINATE
DOLPHIN
XX — DOLPHIN/PILING DESIGNATION (SWLS SURVEY)
WHP X — DOLPHIN/PILING DESIGNATION W&H PACIFIC SURVEY, BK 49, PG 76, RECORDS OF CLARK COUNTY
DOWNSPOUT
E — ELECTRIC BOX
FINISHED FLOOR ELEVATION
FDC — FIRE DEPARTMENT CONNECTION
FIRE ALARM
FIRE HYDRANT
H COLUMN
MH — MANHOLE
OHW — ORDINARY HIGH WATER DELINEATION FLAG
PILING
PILINGS, JOINED
PILING AT TOP
PILING AT WATER SURFACE

PP — POWER POLE
D — STORM DRAIN MANHOLE
TEST PIT
LP — LIGHT POLE
X.X' — GROUND SPOT ELEVATION
UTIL — UTILITY AS NOTED
WATER SPIGOT
WATER VALVE
WETLAND DELINEATION FLAG

ASHPALT SURFACE
CONCRETE SURFACE
GRAVEL SURFACE
JERSEY BARRIER
OVERHEAD CONVEYOR
BUILDING LINE
CHAIN LINK FENCE
CONTOUR, INDEX (5')
CONTOUR, INTERMEDIATE (1')
GUARD RAIL
ORDINARY HIGH WATER
FLAGGING LINE
OVERHEAD POWERLINE
PROPOSED PIPE
WETLAND FLAGGING LINE

CONTOUR ELEVATIONS REFERRED TO NAVD88

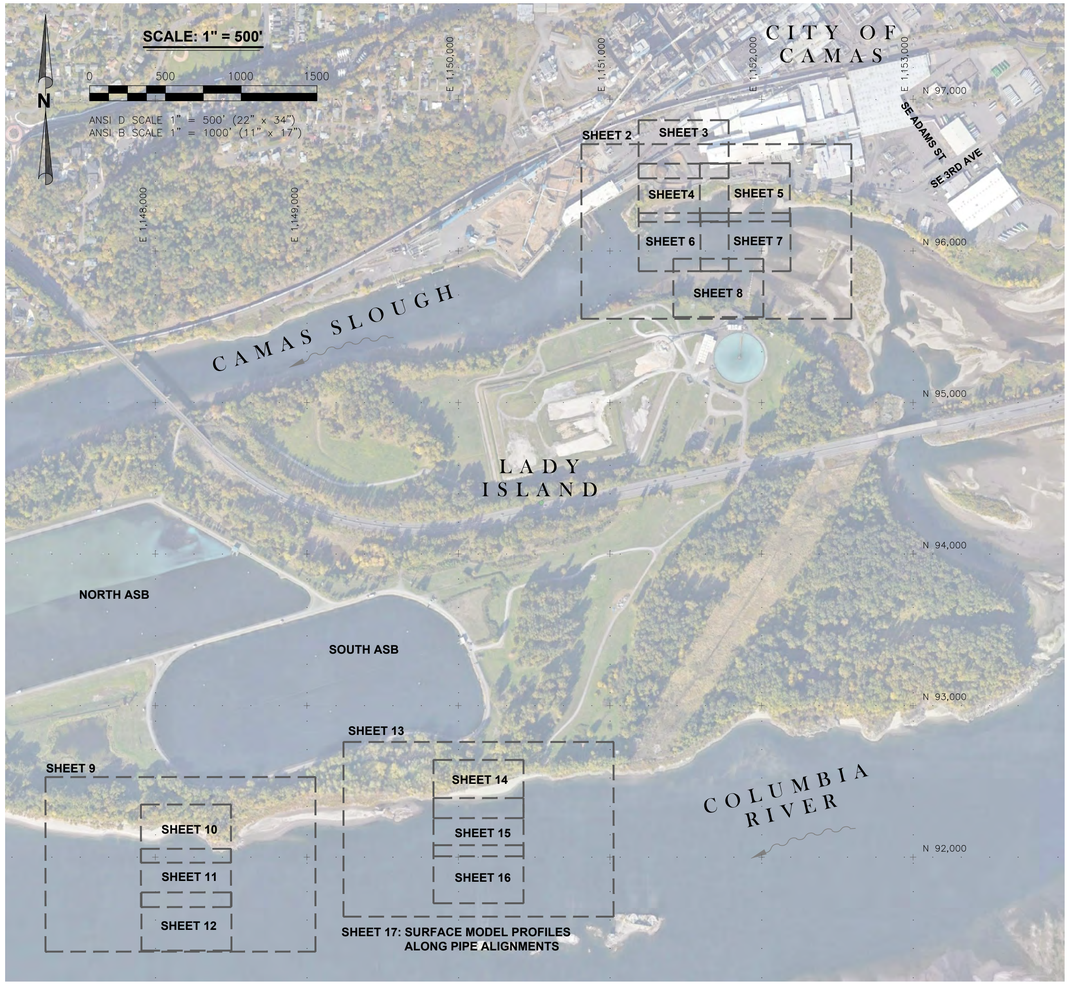
HORIZONTAL DATUM

REFERENCE FRAME: NORTH AMERICAN DATUM (NAD)83/2011 EPOCH 2010.0000
COORDINATE SYSTEM: US STATE PLANE COORDINATE SYSTEM WASHINGTON SOUTH ZONE 4602
FOOT DEFINITION: US SURVEY FOOT

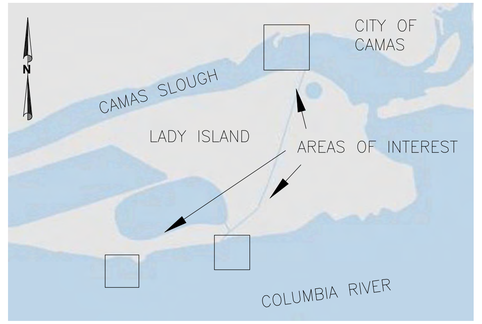
NAVD88 NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B

VERTICAL DATUM

ELEVATION DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (GEOID12B) AS DERIVED FROM WASHINGTON STATE DEPT. OF TRANSPORTATION CONTROL SURVEY MARK DESIGNATIONS GP06500–44 AND GP06014–87. SEE CONTROL TABLE BELOW.



VICINITY MAP NOT TO SCALE



CONTROL POINTS

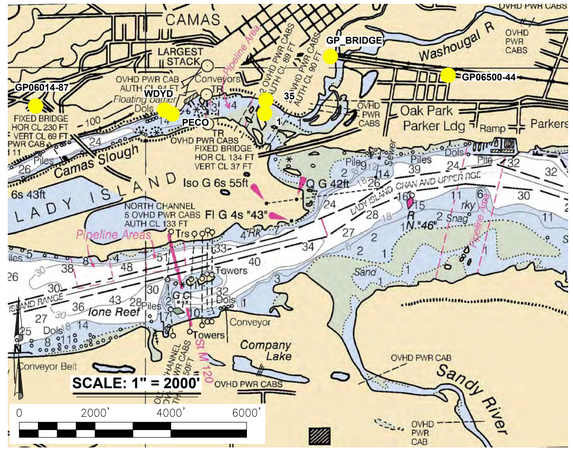


CHART SOURCE: NOAA COAST SURVEY NAVIGATIONAL CHART 18531 (SOUNDINGS IN FEET; CONTOUR ELEVATIONS REFERRED TO MEAN SEA LEVEL).

NOTES

1) CONTROL POINTS SET BY SWLS UTILIZING RTK GNSS RECEIVER AND ANTENNA. SURVEY HELD WASHINGTON STATE DEPT. OF TRANSPORTATION (WSDOT) CONTROL SURVEY MARK DESIGNATIONS GP06500–44 AND GP06014–87 FOR PROJECT CONTROL.
2) WETLAND AND ORDINARY HIGH WATER LOCATIONS FLAGGED IN THE FIELD BY WOOD GROUP PLC 07/16/2019–07/17/2019 AND MEASURED IN THE FIELD BY SWLS 08/20/2019.
3) NO BOUNDARY ANALYSIS PERFORMED FOR THIS SURVEY; NOT A CADASTRAL SURVEY NOR SUITABLE FOR BOUNDARY, LEASE, OR EASEMENT.
4) 1–FT CONTOURS ARE COMPUTER–GENERATED FROM SPOT ELEVATIONS MEASURED IN THE FIELD BY SWLS
5) IN–WATER SURVEY OF SITE–ACCESSIBLE PORTIONS OF EASEMENTS 51–021224 AND 51–026441 UTILIZED A SCANNING NORBIT iWBMHSh STX MULTIBEAM SONAR SYSTEM TO MEET INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO) ACCURACY AND BOTTOM SEARCH SPECIFICATIONS FOR SPECIAL ORDER SURVEYS. SURFACE MODEL GENERATED USING QIMERA, QGIS, AND CARLSON SOFTWARE.
6) SUBMARINE PIPE LOCATIONS DRAFTED WHERE PHYSICAL POSITION POSSIBLE. ALIGNMENTS POSITIONED IN RELATIONSHIP TO EXPOSED PIPES ON LAND, IN–WATER FEATURES, AND IN ACCORDANCE TO HISTORICAL ALIGNMENTS PROVIDED BY GEORGIA–PACIFIC. BURIED PIPE SEGMENTS WITHOUT CONCLUSIVE EVIDENCE OR VERIFICATION ARE BASED ON HISTORICAL ALIGNMENTS ROTATED TO UPLAND FEATURES; ACTUAL LOCATIONS OF PIPE MAY VARY.
7) DIVER COORDINATES SHOWN ARE NORTH AND SOUTH COORDINATES OF PIPE SEARCH AREAS PER ADVANCED AMERICAN CONSTRUCTION (AAC) DIVE INSPECTION REPORT (AAC JOB NUMBER 1120–028 / 01110). AAC FIELD INVESTIGATION PERFORMED 04/20–04/22 2020.
8) SATELLITE AND AERIAL IMAGERY SHOWN FOR GRAPHICAL REFERENCE ONLY. LOCATIONS AND RECTIFICATION ARE APPROXIMATE. 2018 IMAGERY ACQUIRED FROM GOOGLE EARTH PRO.

SWLS SURVEY DATES

SWLS SURVEY DATES:
WETLAND AND ORDINARY HIGH WATER FLAGGING POSITIONS: 08/20/2019
UPLANDS TOPOGRAPHY – OIL STORAGE TANK AREA: 03/02/2020 – 03/05/2020
IN–WATER BATHYMETRY MULTIBEAM – PIPE INVESTIGATION: 04/30/2020
UPLANDS TOPOGRAPHY – PIPE INVESTIGATION: 05/05/2020 – 05/14/2020

CONTROL POINTS

COORDINATES LISTED WITH UNITS IN US SURVEY FEET. ELEVATIONS ON NAVD88 UNLESS OTHERWISE NOTED. SEE DATUM INFORMATION THIS SHEET FOR FURTHER DETAIL.

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION	SOURCE
1	95884.02	1152795.58	9.30	RAILROAD SPIKE	SWLS 08/20/2019
35	96236.36	1152826.57	28.91	NAIL SPIKE	SWLS 11/22/2019
PECO	95905.41	1150353.44	28.19	1/2" REBAR RPC "SWLS CONTROL"	SWLS 09/11/2019
WDYD	96044.23	1150166.03	35.65	MAG NAIL	SWLS 09/11/2019
GP_BRIDGE	97316.07	1154596.58	51.76	1/2" REBAR RPC "SWLS CONTROL"	SWLS 07/29/2019
GP06500–44	96759.862	1157675.503	46.293	WSDOT BRASS DISK	WSDOT PUBLISHED 02/05/2013
GP06014–87	96223.626	1146779.639	173.080	WSDOT BRASS DISK	WSDOT PUBLISHED 02/14/2013
COE CF8516	90440.76	1169179.732	28.35*	USACE BRASS CAP	USACE PUBLISHED 04/27/2010
			21.02 (CRD)	21.02 FEET ABOVE ZERO GARY ISLAND 52 STAFF GAGE.	
CHINOOK	88878.08	1142785.87	24.97	NAIL SPIKE	SWLS 11/22/2019 (NOT SHOWN)

* = COMPUTED USING GEOID09
CRD = COLUMBIA RIVER DATUM

COLUMBIA RIVER DATUM

COLUMBIA RIVER DATUM CONVERSIONS PER USACE APPENDIX E "DATUM EQUATION DOCUMENT" OF UNITED STATES ARMY CORPS OF ENGINEERS (USACE) PORTLAND DISTRICT COMPREHENSIVE EVALUATION OF PROJECT DATUM COMPLIANCE REPORT, DATED 07/28/2014.

RIVER MILE	ORDINARY HIGH WATER (CRD)	NGVD29 TO OBTAIN CRD	NAVD88 (GEOID12A) TO OBTAIN CRD
119	18.0	−3.15	−6.78
120	18.2	−3.22	−6.89
120.1 IONE REEF		−3.45	
121	18.2	−3.56	−7.02

CRD "COLUMBIA RIVER DATUM"

EXAMPLE: ELEVATIONS AT RM 119 — ELEV. CRD 18.0' — ELEV NGVD29 21.15' — ELEV NAVD88 24.78'

DATA CONVERSION EXAMPLE AT RIVER MILE 19 USING USACE TABLE ABOVE

GREGORY D. SPURLOCK — STATE OF WASHINGTON — REGISTERED PROFESSIONAL LAND SURVEYOR
SIGNED: 06/04/2020

SHEET 1

REVISION:
REVISION:
REVISION:
REVISION:

SCALE: 1"=500'
DRAWN DATE: 05/20/2020
REVIEW DATE: 06/04/2020
SURVEY DATE: 03/05/2020

JOB NUMBER: 2019–355
DRAWN: T.M.S./A.O.
REVIEWED: G.D.S.
SHEET: 1 OF 17

STATEWIDE LAND SURVEYING INC.
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WEB: WWW.STATEWIDESURVEYING.COM

CLIENT: GEORGIA–PACIFIC

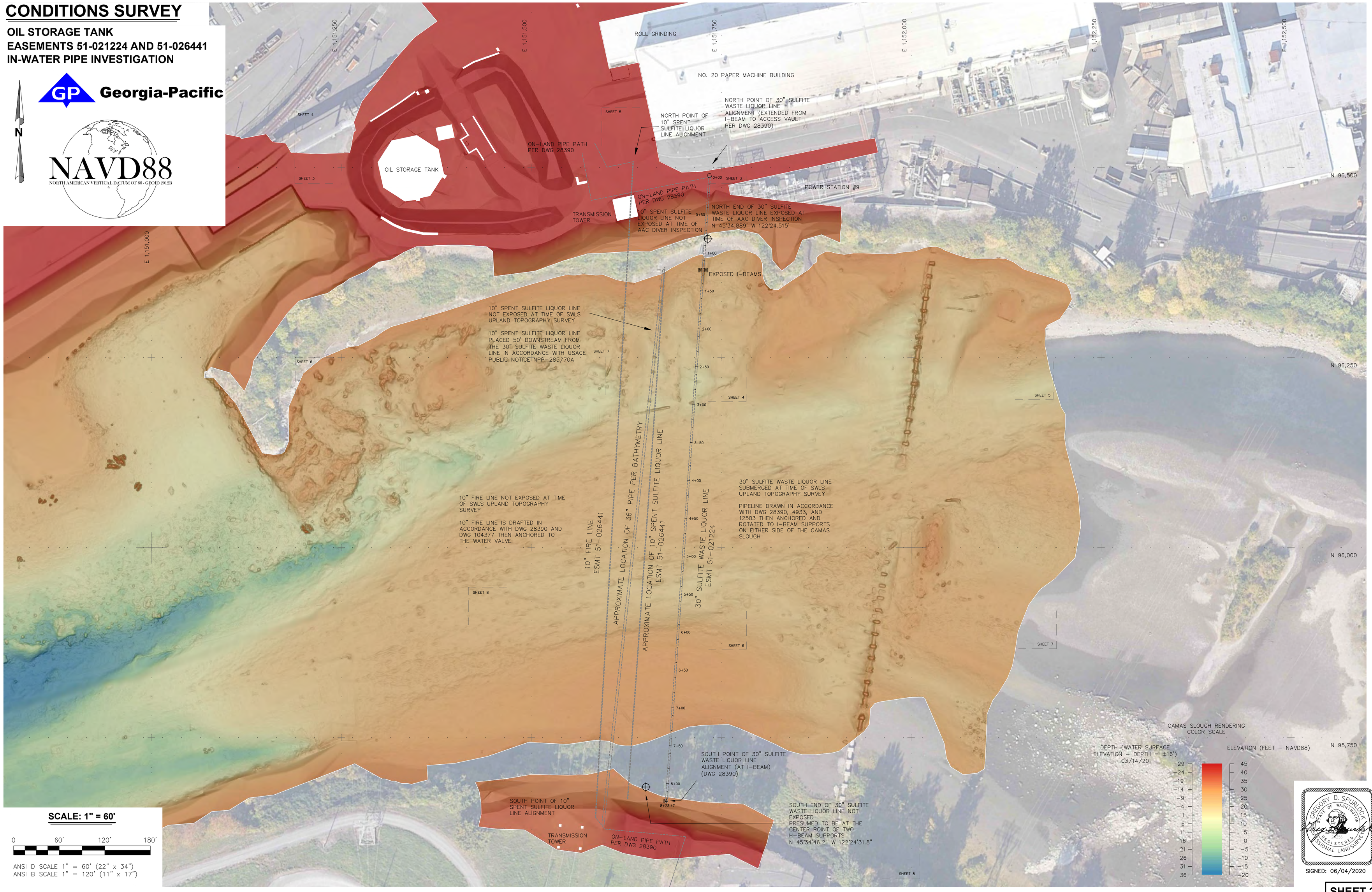
CONDITIONS SURVEY

OIL STORAGE TANK
EASEMENTS 51-021224 AND 51-026441
IN-WATER PIPE INVESTIGATION

Georgia-Pacific

N

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B



SCALE: 1" = 60'

0 60' 120' 180'

ANSI D SCALE 1" = 60' (22" x 34")
ANSI B SCALE 1" = 120' (11" x 17")

GREGORY D. SPURLOCK
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR

SIGNED: 06/04/2020

SHEET 2

REVISION:
REVISION:
REVISION:
REVISION:

SCALE: 1"=60'
DRAWN DATE: 05/20/2020
REVIEW DATE: 06/04/2020
SURVEY DATE: 03/05/2020

JOB NUMBER: 2019-355
DRAWN: T.M.S./A.O.
REVIEWED: G.D.S.
SHEET: 2 OF 17

CLIENT: GEORGIA-PACIFIC

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SWLS

CONDITIONS SURVEY

OIL STORAGE TANK

Georgia-Pacific

N

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B

CAMAS SLOUGH RENDERING
COLOR SCALE

DEPTH (WATER SURFACE ELEVATION − DEPTH = ±16')
03/14/20

DEPTH	ELEVATION (FEET − NAVD88)
−29	45
−24	40
−19	35
−14	30
−9	25
−4	20
1	15
6	10
11	5
16	0
21	−5
26	−10
31	−15
36	−20

E 1,151,300
E 1,151,350
E 1,151,400
E 1,151,450
E 1,151,500
E 1,151,550
E 1,151,600
E 1,151,650
E 1,151,700
E 1,151,750
N 96,850
N 96,800
N 96,750
N 96,700
N 96,650
N 96,600

CAR BARN
AWNING
FFE = 38.55'
NO. 3 FINISHING
RIM=37.24'
RIM=37.23'
METAL LID
METAL RISER
FFE = 41.03'
METAL LID
RIM=37.33'
CB
RIM=36.78'
BTM EL
=71.4'
FFE = 39.36'
ROLL GRINDING
RIM=38.40'
PAPER MACHINE BUILDING
CB
RIM=36.78'
BTM EL
=69.8'
OVHD PIPES CONTINUE WEST UNDER CONVEYOR
EXIT
BTM EL
=68.2'
OVHD PIPES
RIM=36.14'
FFE = 36.65'
CB
RIM=37.85'
CB
RIM=35.10'
BTM EL
=66.8'
(31.2' AGL)
PIPE CONTINUES UNDERGROUND UNSURVEYED
OIL STORAGE TANK
CB
RIM=35.02'
FFE = 39.38'
CB
RIM=36.80'
MATCHLINE
SHEETS 3, 4,
AND 5
VAULT
0+00

SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

GREGORY D. SPURLOCK
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR
SIGNED: 06/04/2020

SHEET 3

REVISION:
REVISION:
REVISION:
REVISION:

SCALE: 1"=20'
DRAWN DATE: 05/20/2020
REVIEW DATE: 06/04/2020
SURVEY DATE: 03/05/2020

JOB NUMBER: 2019-355
DRAWN: T.M.S./A.O.
REVIEWED: G.D.S.
SHEET: 3 OF 17

STATEWIDE LAND SURVEYING INC.
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CLIENT: GEORGIA-PACIFIC

CONDITIONS SURVEY

OIL STORAGE TANK
IN-WATER PIPE INVESTIGATION
EASEMENTS 51-021224 AND 51-026441

Georgia-Pacific

N

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B

OIL STORAGE TANK
PIPE CONTINUES UNDERGROUND UNSURVEYED
OVHD PIPES
FUEL OIL LINE
RIM=36.14'
FFE = 36.65'
CB RIM=37.85
RIM=35.10'
BTM EL =66.8' (31.2' AGL)
RIM=35.19'
CB RIM=35.02'
FFE = 39.38'
CB RIM=36.80'
MATCHLINE SHEETS 3, 4, AND 5
VAULT
0+00
0+50
1+00
1+50
2+00
2+50
RIM=36.19'
TRANSMISSION TOWER
PIPE CROSSING
<4" LARGE ARMOR ROCK
4" AIR VENT
ROCK WALL
W4 F4 12.7'
W4 F3 13.1'
W4 F2 12.6'
W4 F1 11.7'
DP5 12.0'
EL=20.7'
EL=21.0'
EL=27.2'
WETLAND NO. 4
TRANSMISSION TOWER
W5 F1 15.6'
W5 F2 15.7'
W5 F3 11.8'
W5 F4 15.9'
W5 F5 15.7'
W5 F6 14.9'
W5 F7 14.2'
W5 F8 14.0'
W5 F9 13.6'
W5 F10 13.0'
P4"
20"
WETLAND NO. 5
EDGE OF WATER ELEVATION 14.7' NAVD88 (03/14/20 3 PM)
MATCHLINE SHEETS 4, 5, 6, 7
N 96,550
N 96,500
N 96,450
N 96,400
N 96,350
N 96,300
E 1,151,200
E 1,151,250
E 1,151,300
E 1,151,350
E 1,151,450
E 1,151,500
E 1,151,550
E 1,151,600
E 1,151,650
E 1,151,700
E 1,151,750

CAMAS SLOUGH RENDERING COLOR SCALE

DEPTH (WATER SURFACE ELEVATION – DEPTH = ±16') 03/14/20

	ELEVATION (FEET – NAVD88)
−29	45
−24	40
−19	35
−14	30
−9	25
−4	20
1	15
6	10
11	5
16	0
21	−5
26	−10
31	−15
36	−20

SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

GREGORY D. SPURLOCK
STATE OF WASHINGTON
REGISTERED PROFESSIONAL LAND SURVEYOR
SIGNED: 06/04/2020

SHEET 4

REVISION:
REVISION:
REVISION:
REVISION:

SCALE: 1"=20'
DRAWN DATE: 05/20/2020
REVIEW DATE: 06/04/2020
SURVEY DATE: 03/05/2020

JOB NUMBER: 2019-355
DRAWN: T.M.S./A.O.
REVIEWED: G.D.S.
SHEET: 4 OF 17

STATEWIDE LAND SURVEYING INC.
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CLIENT: GEORGIA-PACIFIC

612

CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENTS 51-021224 AND 51-026441

Georgia-Pacific

SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B

N

E 1,151,700
E 1,151,750
E 1,151,800
E 1,151,850
E 1,151,900
E 1,151,950
E 1,152,000
E 1,152,050
E 1,152,100
E 1,152,150

N 96,500
N 96,450
N 96,400
N 96,350
N 96,300

FFE = 39.38'
CB
RIM=36.80'
MATCHLINE SHEETS 3, 4, AND 5
VAULT
0+00
PIPE CROSSING
<4" LARGE ARMOR ROCK
RIM=36.19'
TRANSMISSION TOWER
4" AIR VENT
0+50
POWER STATION #9
CONTOURS AT GROUND SURFACE BENEATH POWER STATION #9
W5 F11 15.6'
W5 F12 15.7'
W5 F13 11.8'
W6 F8 11.1'
W6 F7 11.7'
W6 F6 12.7'
W6 F5 15.7'
W6 F4 16.9'
W6 F9 12.0'
DP7 12.0'
1+00
1+50
2+00
2+50
MATCHLINE SHEETS 4, 5, 6, 7

CAMAS SLOUGH RENDERING
COLOR SCALE

DEPTH (WATER SURFACE ELEVATION – DEPTH = ±16')
03/14/20

−29 −24 −19 −14 −9 −4 1 6 11 16 21 26 31 36

ELEVATION (FEET – NAVD88)

45 40 35 30 25 20 15 10 5 0 −5 −10 −15 −20

GREGORY D. SPURLOCK
STATE OF WASHINGTON
REGISTERED PROFESSIONAL LAND SURVEYOR

SIGNED: 06/04/2020

SHEET 5

REVISION:
REVISION:
REVISION:
REVISION:

SCALE: 1"=20'
DRAWN DATE: 05/20/2020
REVIEW DATE: 06/04/2020
SURVEY DATE: 03/05/2020

JOB NUMBER: 2019-355
DRAWN: T.M.S./A.O.
REVIEWED: G.D.S.
SHEET: 5 OF 17

CLIENT: GEORGIA-PACIFIC

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WEB: WWW.STATEWIDESURVEYING.COM

SWLS

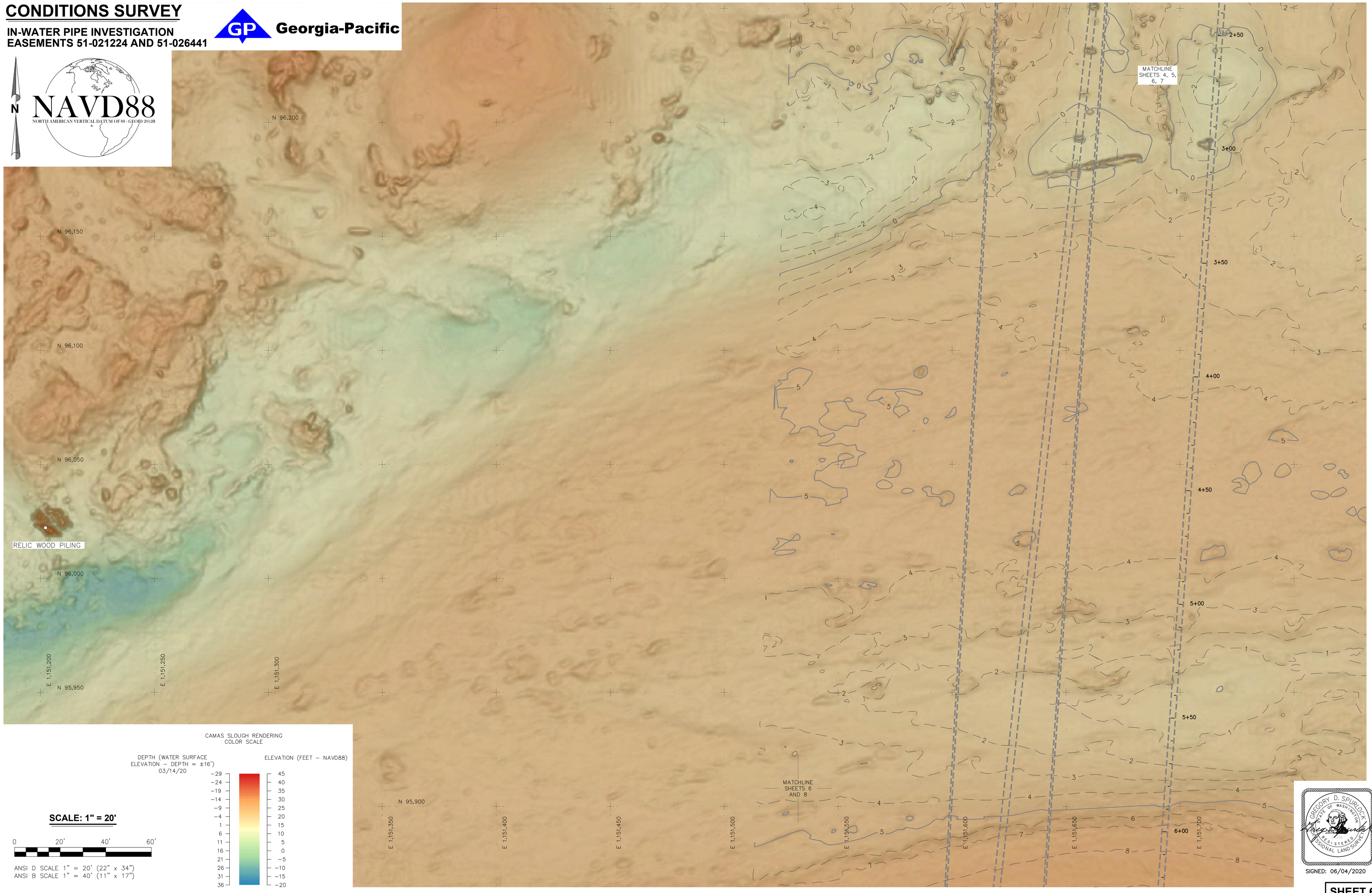
CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENTS 51-021224 AND 51-026441

Georgia-Pacific

N

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B



CAMAS SLOUGH RENDERING
COLOR SCALE

DEPTH (WATER SURFACE ELEVATION − DEPTH = ±16')
03/14/20

	ELEVATION (FEET − NAVD88)
−29	45
−24	40
−19	35
−14	30
−9	25
−4	20
1	15
6	10
11	5
16	0
21	−5
26	−10
31	−15
36	−20

SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

GREGORY D. SPURLOCK
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR

SIGNED: 06/04/2020

SHEET 6

JOB NUMBER: 2019-355	SCALE: 1"=20'
DRAWN: T.M.S./A.O.	DRAWN DATE: 05/20/2020
REVIEWED: G.D.S.	REVIEW DATE: 06/04/2020
SHEET: 6 OF 17	SURVEY DATE: 03/05/2020

REVISION:
REVISION:
REVISION:
REVISION:

CLIENT: GEORGIA-PACIFIC

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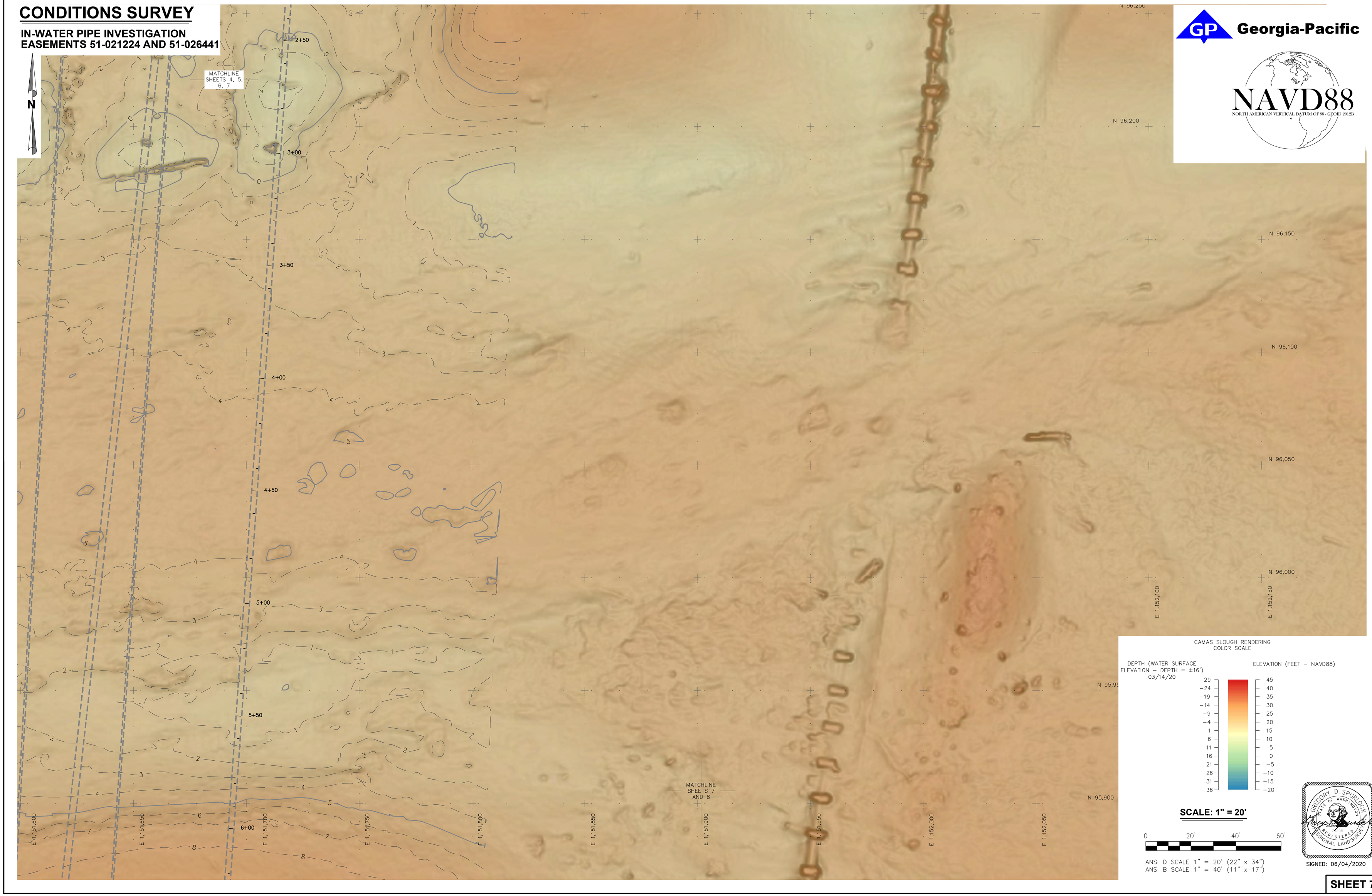
SWLS

CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENTS 51-021224 AND 51-026441



Georgia-Pacific

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B

CAMAS SLOUGH RENDERING
COLOR SCALE

DEPTH (WATER SURFACE ELEVATION – DEPTH = ±16')
03/14/20

−29 −24 −19 −14 −9 −4 1 6 11 16 21 26 31 36

ELEVATION (FEET – NAVD88)

45 40 35 30 25 20 15 10 5 0 −5 −10 −15 −20

SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

GREGORY D. SPURLOCK
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR

SIGNED: 06/04/2020

SHEET 7

JOB NUMBER: 2019-355	SCALE: 1"=20'	REVISION:	
DRAWN: T.M.S./A.O.	DRAWN DATE: 05/20/2020	REVISION:	
REVIEWED: G.D.S.	REVIEW DATE: 06/04/2020	REVISION:	
SHEET: 7 OF 17	SURVEY DATE: 03/05/2020	REVISION:	

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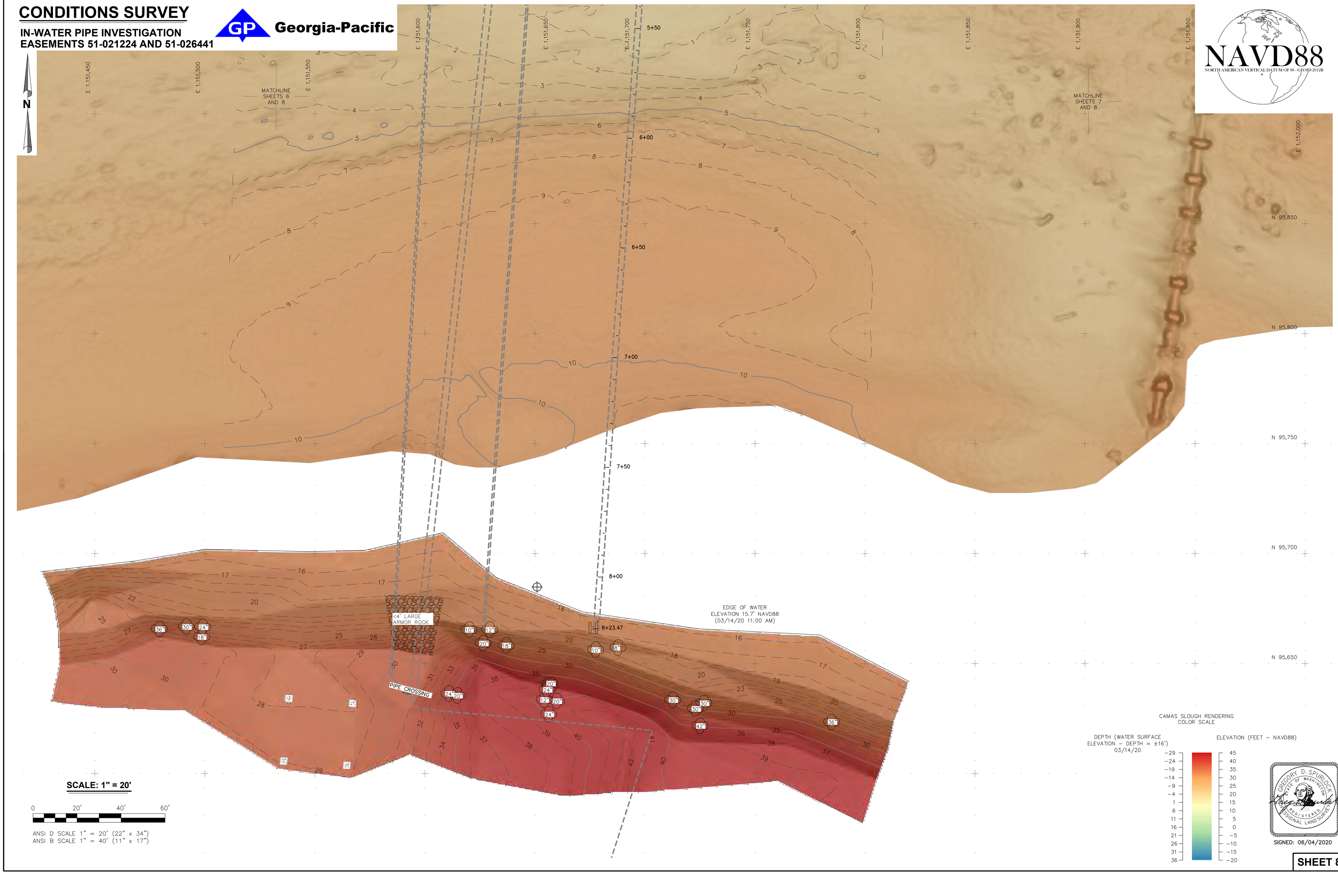
CLIENT: GEORGIA-PACIFIC

SWLS

CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENTS 51-021224 AND 51-026441

Georgia-Pacific



SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

GREGORY D. SPURLOCK
STATE OF WASHINGTON
REGISTERED PROFESSIONAL LAND SURVEYOR

SIGNED: 06/04/2020

SHEET 8

REVISION:	REVISION:	REVISION:	REVISION:

JOB NUMBER: 2019-355
DRAWN: T.M.S./A.O.
REVIEWED: G.D.S.
SHEET: 8 OF 17

CLIENT: GEORGIA-PACIFIC

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SWLS

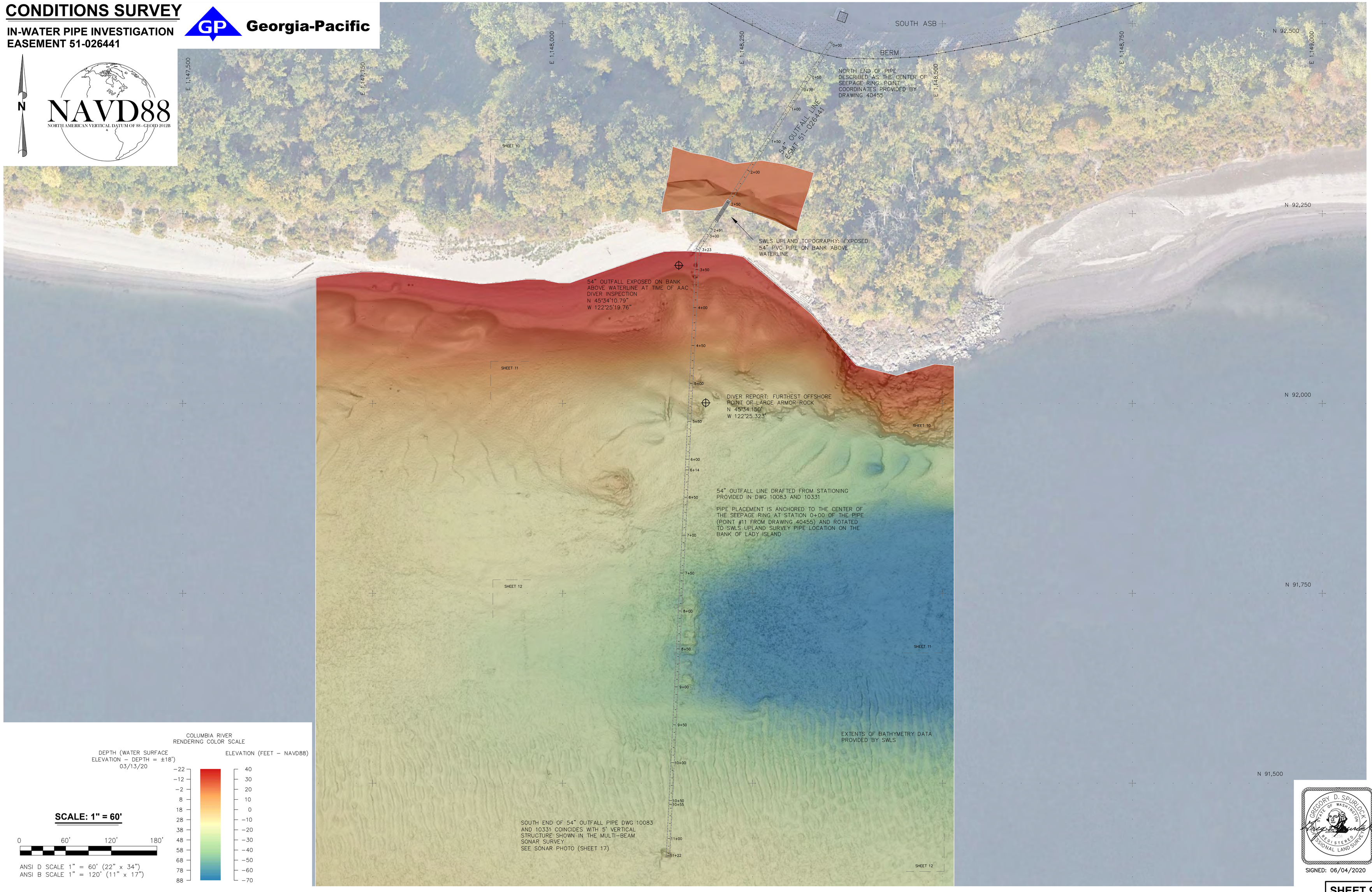
CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENT 51-026441

Georgia-Pacific

N

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B



COLUMBIA RIVER
RENDERING COLOR SCALE

DEPTH (WATER SURFACE ELEVATION − DEPTH = ±18')
03/13/20

	ELEVATION (FEET − NAVD88)
−22	40
−12	30
−2	20
8	10
18	0
28	−10
38	−20
48	−30
58	−40
68	−50
78	−60
88	−70

SCALE: 1" = 60'

0 60' 120' 180'

ANSI D SCALE 1" = 60' (22" x 34")
ANSI B SCALE 1" = 120' (11" x 17")

GREGORY D. SPURLOCK
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR

SIGNED: 06/04/2020

SHEET 9

617

JOB NUMBER: 2019-355 | SCALE: 1"=20' | REVISION:
DRAWN: T.M.S./A.O. | DRAWN DATE: 05/20/2020 | REVISION:
REVIEWED: G.D.S. | REVIEW DATE: 06/04/2020 | REVISION:
SHEET: 9 OF 17 | SURVEY DATE: 03/05/2020 | REVISION:

CLIENT: GEORGIA-PACIFIC

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SWLS

CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENT 51-026441

Georgia-Pacific

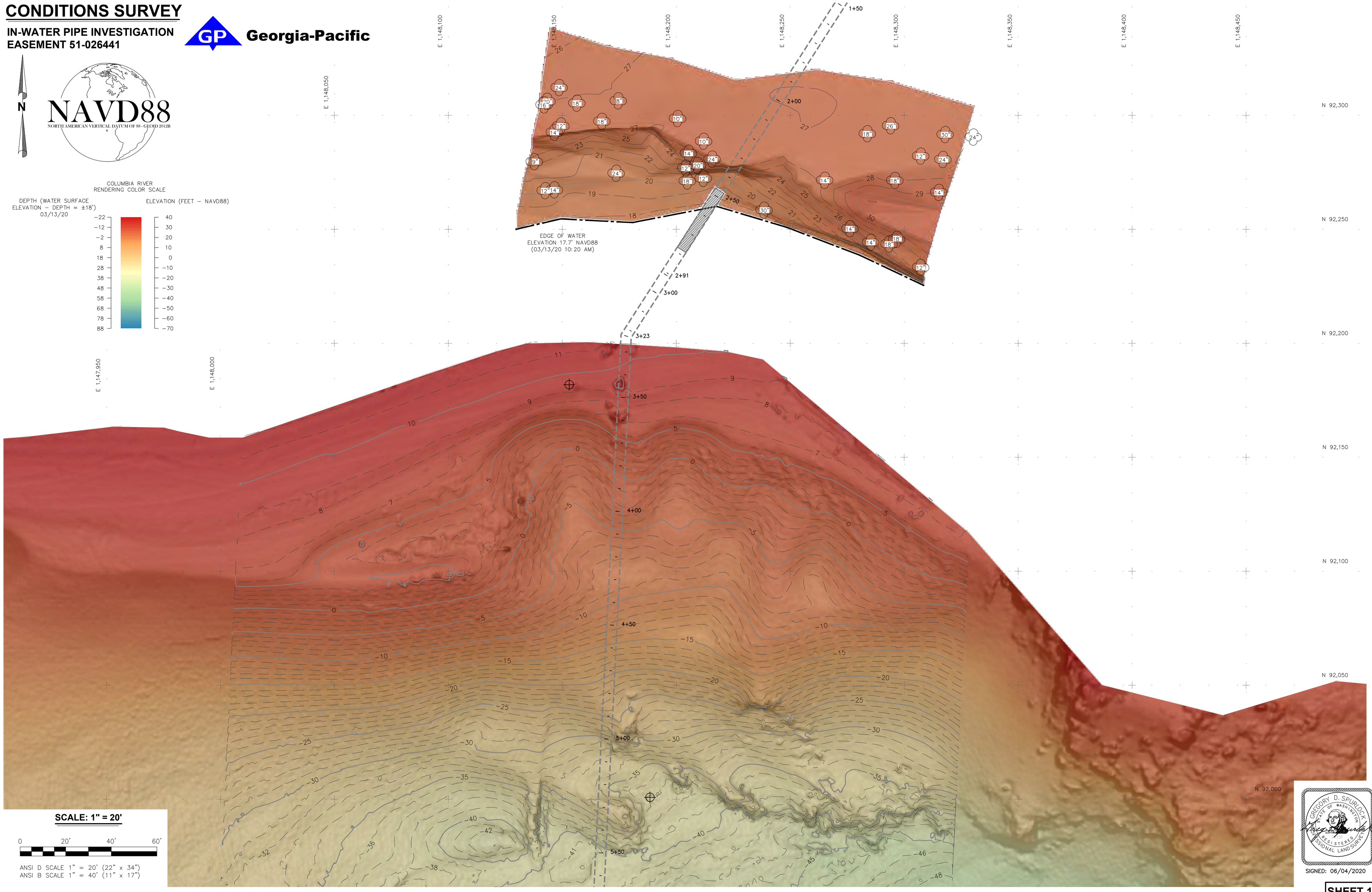
N

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B

COLUMBIA RIVER
RENDERING COLOR SCALE

DEPTH (WATER SURFACE ELEVATION − DEPTH = ±18')
03/13/20

	ELEVATION (FEET − NAVD88)
−22	40
−12	30
−2	20
8	10
18	0
28	−10
38	−20
48	−30
58	−40
68	−50
78	−60
88	−70



SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

GREGORY D. SPURLOCK
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR

SIGNED: 06/04/2020

SHEET 10

REVISION:
REVISION:
REVISION:
REVISION:

SCALE: 1"=20'
DRAWN DATE: 05/20/2020
REVIEW DATE: 06/04/2020
SURVEY DATE: 03/05/2020

JOB NUMBER: 2019-355
DRAWN: T.M.S./A.O.
REVIEWED: G.D.S.
SHEET: 10 OF 17

CLIENT: GEORGIA-PACIFIC

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SWLS

618

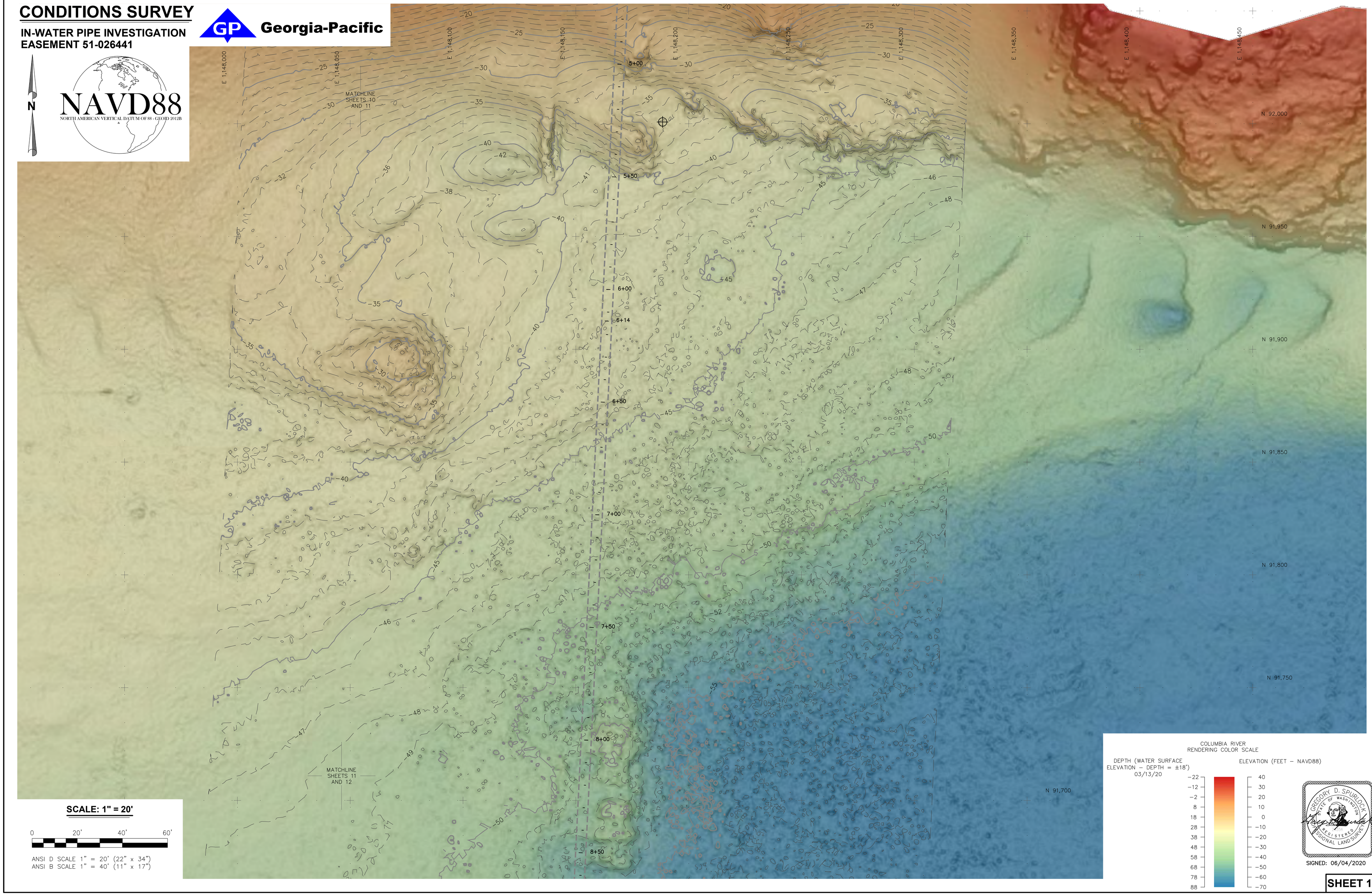
CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENT 51-026441

Georgia-Pacific

N

NAVD88
NORTH AMERICAN VERTICAL DATUM OF '88 - GEOID 2012B



SCALE: 1" = 20'

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ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

COLUMBIA RIVER
RENDERING COLOR SCALE

DEPTH (WATER SURFACE ELEVATION – DEPTH = ±18')
03/13/20

−22 −12 −2 8 18 28 38 48 58 68 78 88

ELEVATION (FEET – NAVD88)

40 30 20 10 0 −10 −20 −30 −40 −50 −60 −70

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SHEET 11

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CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENT 51-026441

Georgia-Pacific

N

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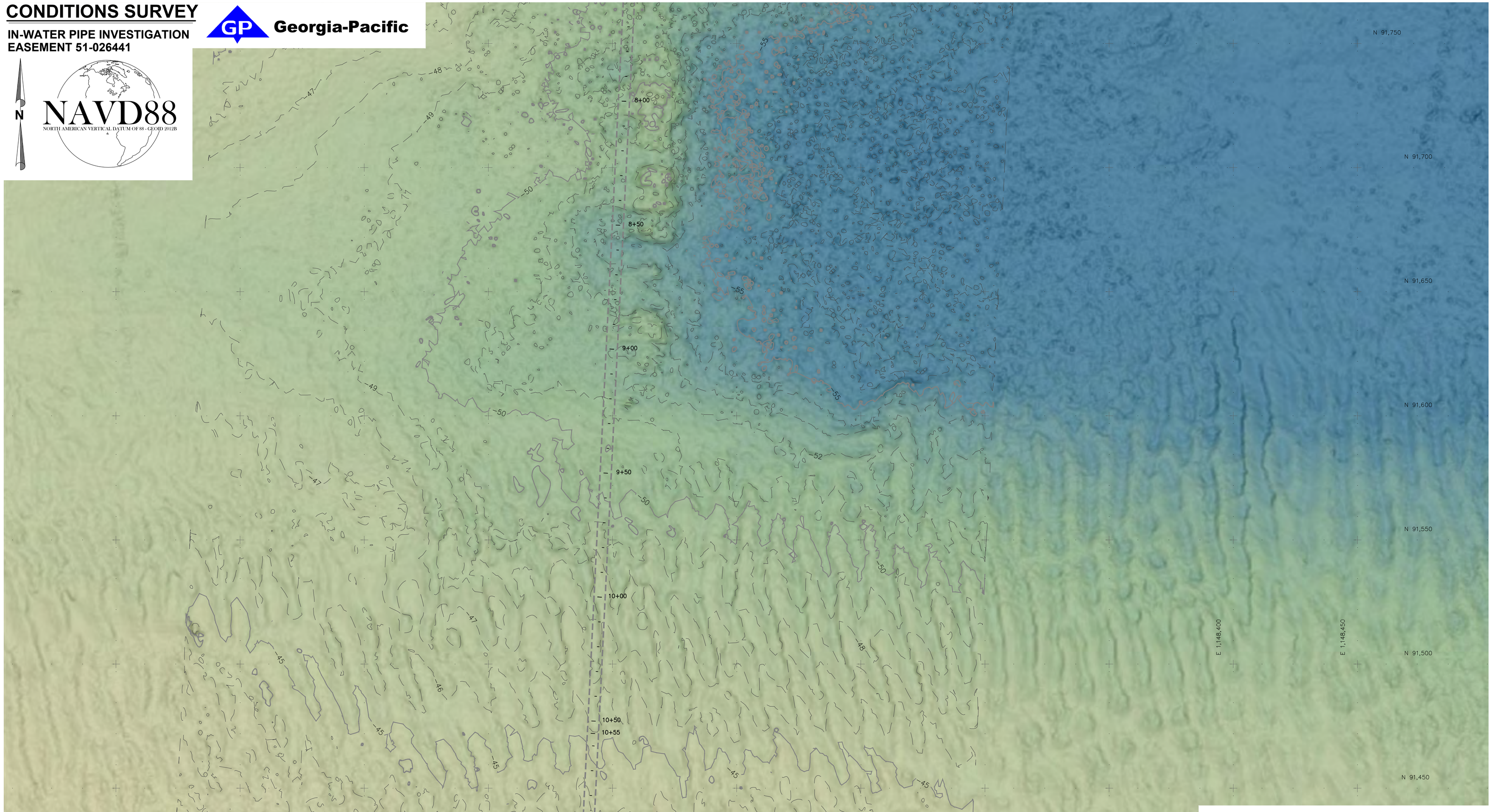

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COLUMBIA RIVER
RENDERING COLOR SCALE

DEPTH (WATER SURFACE ELEVATION – DEPTH = ±18')
03/13/20

−22 −12 −2 8 18 28 38 48 58 68 78 88

ELEVATION (FEET – NAVD88)

40 30 20 10 0 −10 −20 −30 −40 −50 −60 −70

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SHEET 12

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CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENT 51-021224

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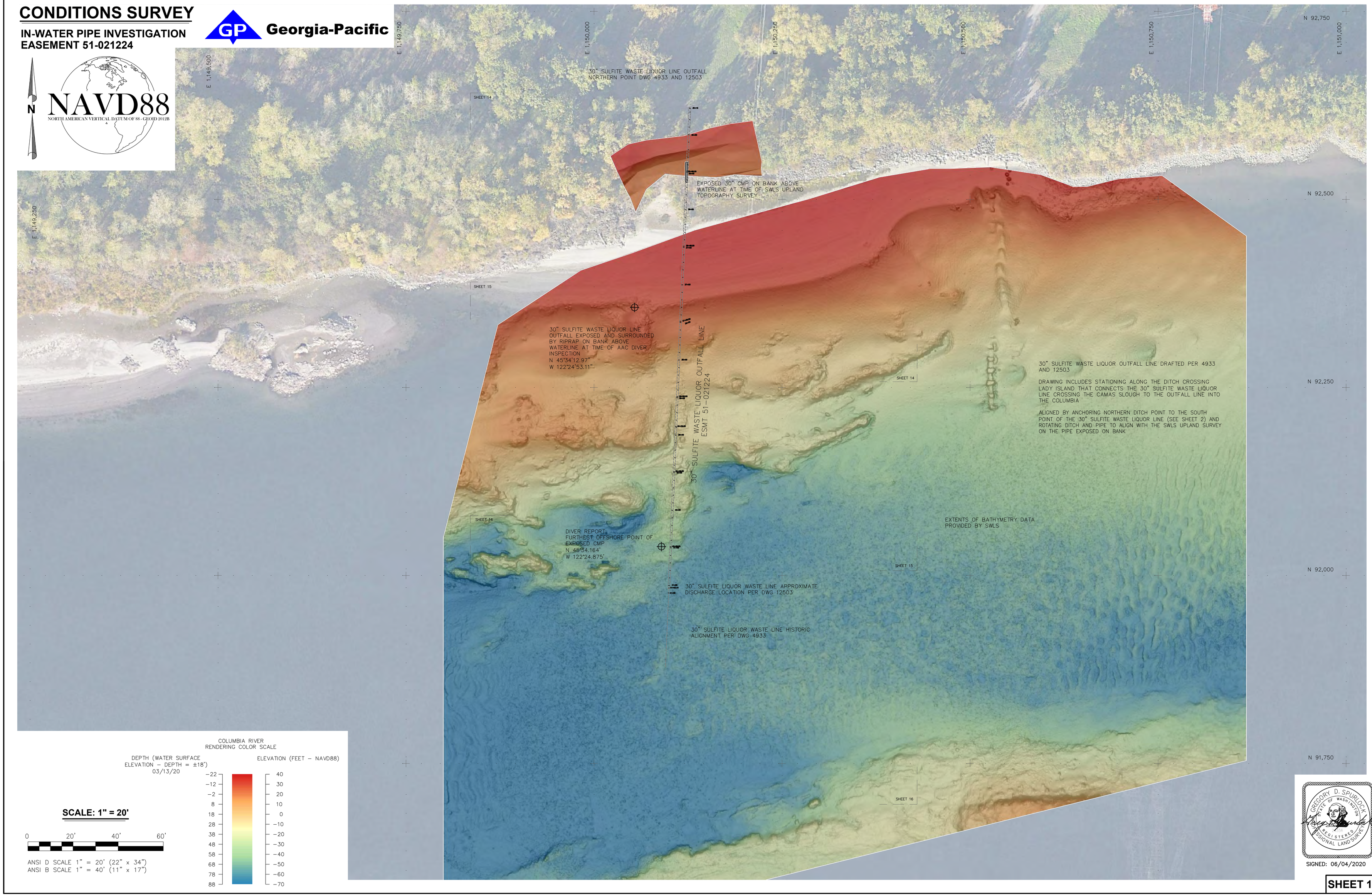

COLUMBIA RIVER
RENDERING COLOR SCALE

DEPTH (WATER SURFACE ELEVATION − DEPTH = ±18') 03/13/20	ELEVATION (FEET − NAVD88)
−22	40
−12	30
−2	20
8	10
18	0
28	−10
38	−20
48	−30
58	−40
68	−50
78	−60
88	−70

SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

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621

CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENT 51-021224

Georgia-Pacific

N

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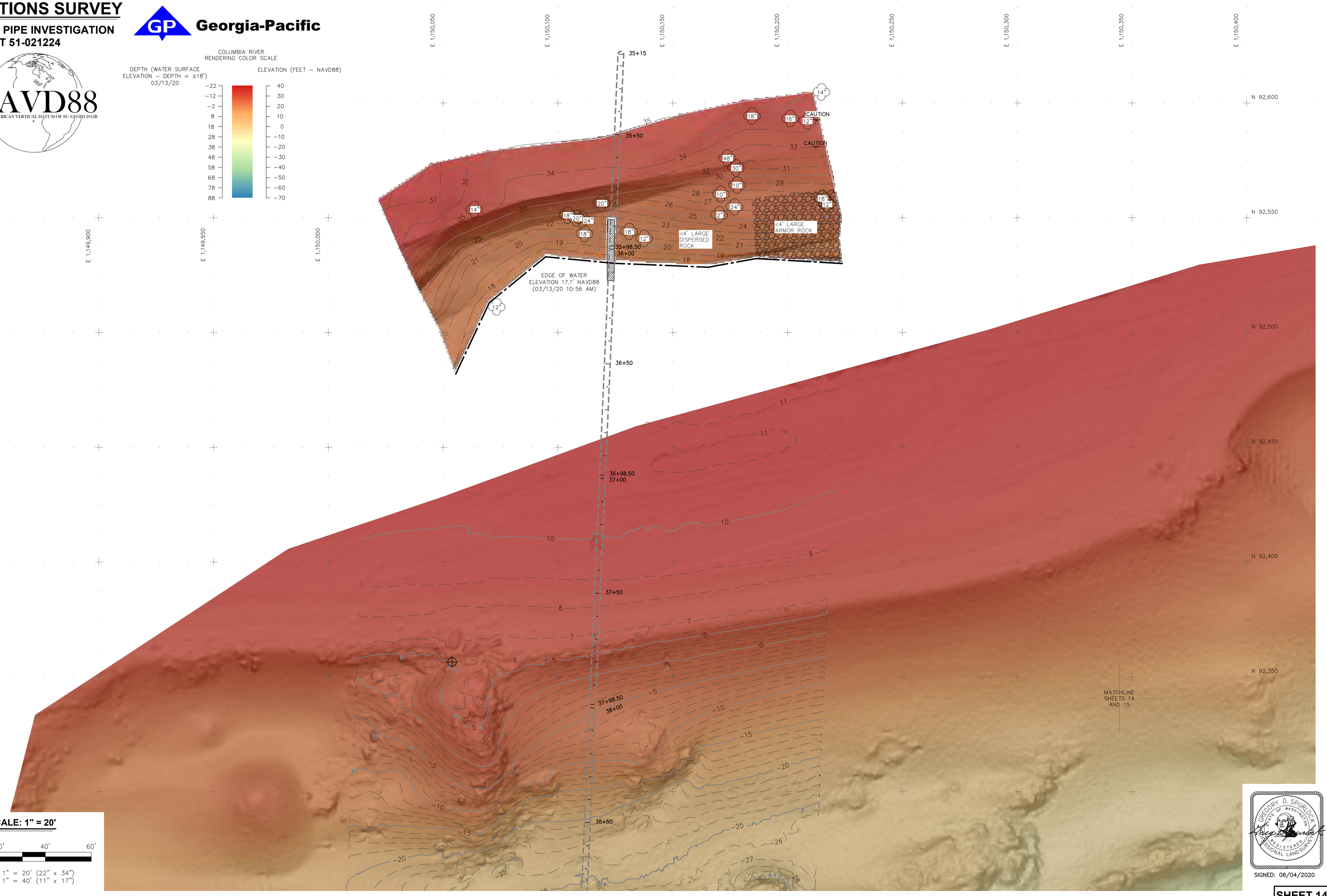
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B

COLUMBIA RIVER
RENDERING COLOR SCALE

DEPTH (WATER SURFACE ELEVATION − DEPTH = ±18')
03/13/20

	ELEVATION (FEET − NAVD88)
−22	40
−12	30
−2	20
8	10
18	0
28	−10
38	−20
48	−30
58	−40
68	−50
78	−60
88	−70



SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

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CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
EASEMENT 51-021224

Georgia-Pacific

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B

N

E 1,149,850 E 1,149,900 E 1,149,950 E 1,150,000 E 1,150,050 E 1,150,100 E 1,150,150 E 1,150,200 E 1,150,250 E 1,150,300 E 1,150,350 E 1,150,400

N 92,350 N 92,300 N 92,250 N 92,200 N 92,150 N 92,100 N 92,050

37+50
37+98.50
38+00
38+50
38+98.50
39+00
39+38.50
39+50
39+98.50
40+00
40+50
40+98.50
41+00

SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

COLUMBIA RIVER
RENDERING COLOR SCALE

DEPTH (WATER SURFACE ELEVATION – DEPTH = ±18')
03/13/20

ELEVATION (FEET – NAVD88)

−22 −12 −2 8 18 28 38 48 58 68 78 88

40 30 20 10 0 −10 −20 −30 −40 −50 −60 −70

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SHEET 15

623

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SCALE: 1"=20'
DRAWN DATE: 05/20/2020
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EASEMENT 51-021224

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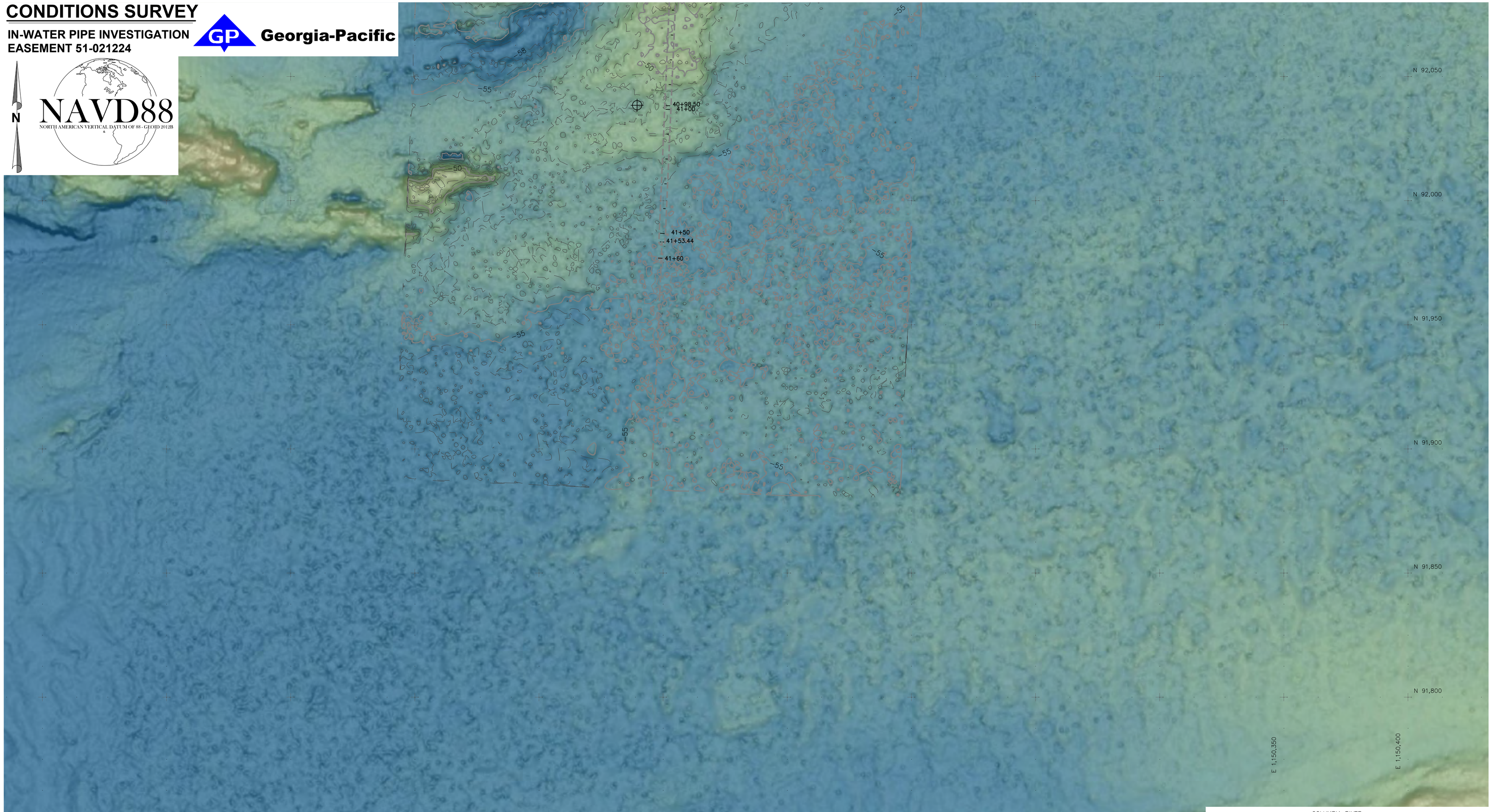

SCALE: 1" = 20'

0 20' 40' 60'

ANSI D SCALE 1" = 20' (22" x 34")
ANSI B SCALE 1" = 40' (11" x 17")

COLUMBIA RIVER
RENDERING COLOR SCALE

DEPTH (WATER SURFACE ELEVATION − DEPTH = ±18')
03/13/20

	ELEVATION (FEET − NAVD88)
−22	40
−12	30
−2	20
8	10
18	0
28	−10
38	−20
48	−30
58	−40
68	−50
78	−60
88	−70

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SHEET 16

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CONDITIONS SURVEY

IN-WATER PIPE INVESTIGATION
SURFACE PROFILES

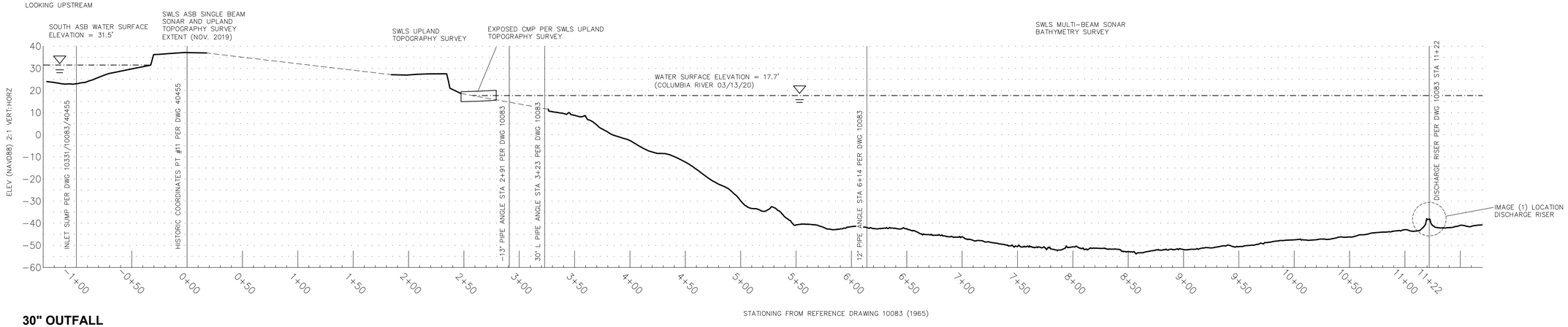
Georgia-Pacific

N

NAVD88
NORTH AMERICAN VERTICAL DATUM OF 88 - GEOID 2012B

LEGEND
- SURVEYED SURFACE
- INTERPOLATED SURFACE
- WATER SURFACE
- EXPOSED PIPE

54" OUTFALL



30" OUTFALL

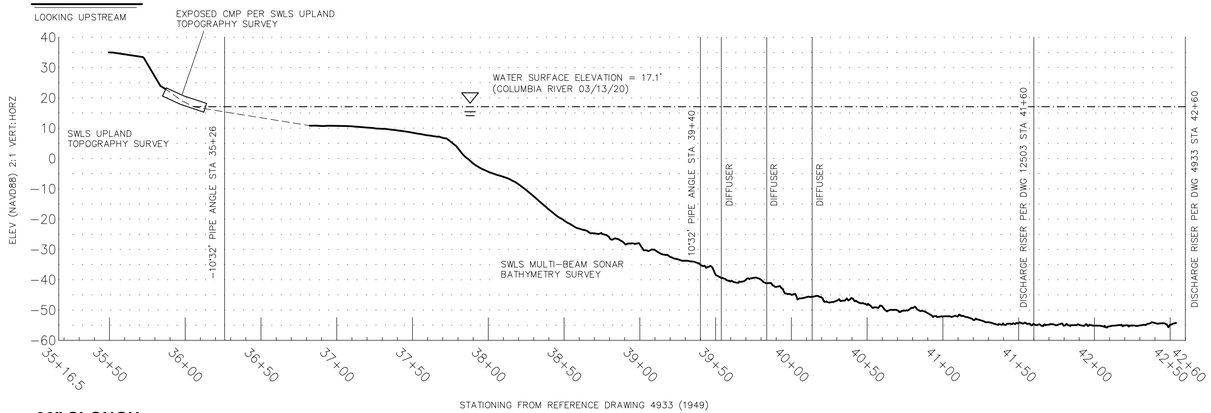


IMAGE (1): SIDE SCAN SONAR IMAGE OF 54" OUTFALL DISCHARGE RISER, COLUMBIA RIVER APPROX. DEPTH TO TOP OF RISER ±55'

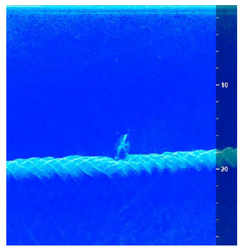
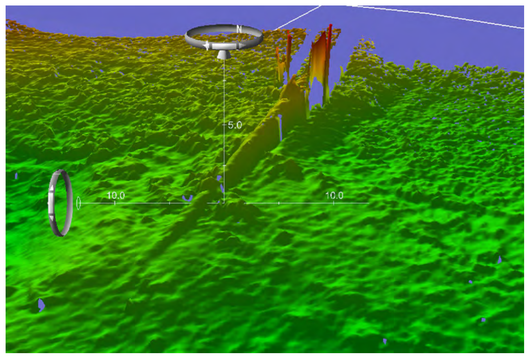
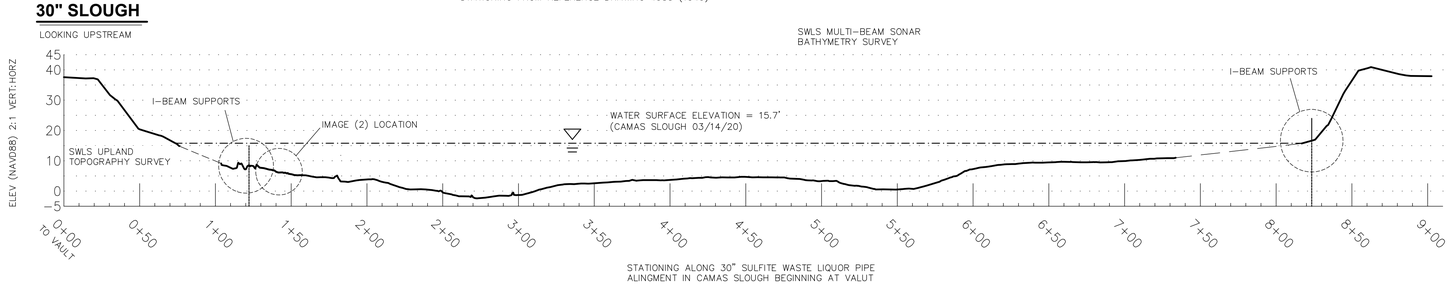


IMAGE (2): 30" STEEL PIPE AND GIRDERS, NORTH SIDE OF CAMAS SLOUGH 3D MODEL IMAGE (QIMERA SOFTWARE)



30" SLOUGH



VERTICAL SCALE: 1" = 25'

0 50' 100' 150'

ANSI D SCALE 1" = 25' (22" x 34")
ANSI B SCALE 1" = 50' (11" x 17")

HORIZONTAL SCALE: 1" = 50'

0 50' 100' 150'

ANSI D SCALE 1" = 50' (22" x 34")
ANSI B SCALE 1" = 100' (11" x 17")

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SHEET 17

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APPENDIX B: SEDIMENT QUALITY RESULTS FOR NDPES COMPLIANCE AT OUTFALLS 001 AND 002

SEDIMENT DATA REPORT

NPDES Waste Discharge Permit No. WA0000256

Prepared for
Georgia-Pacific Consumer Operations LLC

February 2018

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TABLE OF CONTENTS

Page

CHAPTER 1. Introduction 1-1

CHAPTER 2. Field Sampling and Laboratory Analytical Procedures: Deviations from the Sediment Sampling and Analysis Plan 2-1

CHAPTER 3. Sampling Station Locations.....3-1
3.1 Outfall 001 Area 3-1
3.2 Outfall 002 Area 3-6

CHAPTER 4. Sample Results 4-1
4.1 Sediment Chemistry and Conventional Analyses.....4-1
4.2 Sediment Biological Tests.....4-8

CHAPTER 5. References 5-1

Appendices

Appendix A Field Notes and Sample Forms A-1
Appendix B Lab Results B-1
Appendix C Quality Assurance 1 Memorandum C-1

List of Figures

Figure 1 G-P Camas Mill Vicinity and Outfall Locations 1-2
Figure 2a G-P Camas Mill Outfall 001 Sediment Sampling Locations 3-4
Figure 2b G-P Camas Mill Outfall 002 Sediment Sampling Locations 3-5

List of Tables

Table 1 Surficial Sediment Grab Sampling Locations and Depths 3-2
Table 2 Columbia River Freshwater Sediment Results of Chemistry and Conventional Analyses 4-2
Table 3 Camas Slough Freshwater Sediment Results of Chemistry and Conventional Analyses.....4-5
Table 4 Columbia River Freshwater Sediment Biological Test Results.....4-9

CHAPTER 1.
Introduction

This Sediment Data Report was prepared to meet National Pollution Discharge Elimination System (NPDES) sediment monitoring requirements for the Georgia-Pacific Consumer Operations LLC NPDES Waste Discharge Permit No. WA0000256. Requirements for a Sediment Sampling and Analysis Plan (SSAP) and Sediment Data Report are specified in Special Condition S12 of the NPDES permit (Ecology 2016). Sediment baseline monitoring is required to characterize sediment quality in the vicinity of two facility discharge locations, Outfalls 001 and 002 (Figure 1), including comparisons to the Sediment Quality Standards (SQS) in Washington's Sediment Management Standards (SMS, Chapter 173-204 WAC). The purpose of baseline monitoring is to determine whether there are current SQS exceedances in depositional areas near the discharge locations.

Sediment sampling was performed between September 12 and 14, 2017, according to the August 18, 2017 SSAP approved by Ecology on August 22, 2017 (ESA 2017), with final adjustments to the target sampling locations near Outfall 002 approved on August 30, 2017. Delivery of samples to the laboratories was completed on September 15, 2017, and sample analyses were completed on December 21, 2017.

This document is organized to include the data report requirements identified in Appendix A of the *Final Sediment Cleanup User's Manual II: Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards*, Chapter 173-204 WAC (SCUM II, Ecology 2015). The report includes a description of deviations from the approved SSAP, a general vicinity map and sampling station maps, coordinates for all sampling locations, sediment data tables summarizing the chemical and conventional variables in the same units as the SQS, a sediment data table summarizing all biological results and statistical analyses, and an interpretation of the results compared to the Sediment Quality Standards. Appendices include copies of the field notebook and sample log forms, complete laboratory data packages that include chain-of-custody forms, and a quality assurance (QA1) memorandum. In addition to the written report, data have been submitted to Ecology's Environmental Information Management (EIM) database according to the instructions on the EIM website, and Ecology's MyEIM tools were used to confirm the accuracy of the submitted data.

SOURCE: NAIP, 2013; OSM, 2016

Camas Mill . 160430

Figure 1

Georgia-Pacific Camas Mill Vicinity and Outfall Locations

CHAPTER 2.

Field Sampling and Laboratory Analytical Procedures: Deviations from the Sediment Sampling and Analysis Plan

Detailed methods and procedures were presented in the SSAP for field sampling, sample handling, laboratory analyses, quality assurance reviews, data analyses, recordkeeping, and reporting. These methods and procedures are not repeated in this Sediment Data Report. However, deviations from the SSAP are described below.

The primary deviations from the SSAP were in the number and location of sediment samples, because it was not physically possible to collect surface sediment grabs at all six target locations near each outfall (see field notebook copies in Appendix A). Due to extensive rock outcroppings between Lady Island and Ione Reef, samples could not be collected in the high-current environment at the two downstream-most stations near Outfall 001 (Figure 2). Shallow water and gravel and cobble substrate prevented access to and sampling of sediment at all of the target stations near Outfall 002. Sampling was attempted moving farther offshore until sand deposits were encountered 140 to 190 feet from the target locations, and samples were successfully obtained at five Camas Slough sites (Figure 3). Chapter 3 and the Quality Assurance Memorandum (Appendix C) provide further documentation of the sediment sampling efforts and station locations.

Although not required in the SSAP, the field crew collected a set of duplicate samples for chemistry analyses and conventional parameters at station OF2-5, labeled OF2-5D. Duplicates were not collected for analysis of sulfides, and dioxins and furans.

Samples shipped from TestAmerica to Maxxam for analysis of dioxins and furans were received at temperatures ranging from 3.8 to 4.8 °C. No action was taken to qualify dioxin and furan results that were received slightly above the recommended maximum 4.0 °C holding temperature.

There were four deviations from compliance with recommended maximum holding times, as summarized below. Additional documentation of laboratory analytical procedures is found in the data packages from TestAmerica and Northwestern Aquatic Sciences (Appendix B).

(1) Samples were analyzed for total organic carbon (TOC) 23 to 25 days after sample collection due to a laboratory instrument breakdown; therefore, those sample results were outside the Puget Sound Estuary Program (PSEP)-specified holding time (14 days).

(2) Semi-volatile organic compounds (SVOCs) were re-extracted for low-level analysis of five compounds that were not detected in the original analysis at concentrations higher than Sediment Cleanup Objectives (SCOs). TestAmerica had not frozen any archived

sample material. The re-extractions were performed 57 to 84 days after sample collection with unfrozen sample material; therefore, those sample results were outside of the specified holding time (14 days). For one of the three sample batches (i.e., samples OF1-1, OF1-2 and OF1-3), TestAmerica did not have any remaining sediment and they obtained archived sample material for SVOC re-extraction from the bioassay laboratory.

(3) Organotins were re-extracted and re-analyzed after the initial analysis found laboratory control sample results to be outside control limits for monobutyltin and tetra-n-butyltin. Re-extraction of organotins occurred 22 to 24 days after sample collection; therefore, those sample results were also outside the specified holding time (14 days).

(4) Dioxins and furans from two of the three sample batches (samples OF1-1 through OF1-4, OF2-4, and OF2-5) were analyzed by Maxxam on October 8, ten to 11 days past the recommended maximum holding time of 14 days.

CHAPTER 3.
Sampling Station Locations

Table 1 provides latitude and longitude coordinates, with a datum of NAD 83 HARN, for sampling station locations near each outfall, including locations where sampling was attempted but unsuccessful. Figures 2a and 2b show the locations of the original target sampling stations, actual stations sampled with each grab location, and the locations of grab samples that were unsuccessful due to rock outcroppings or cobble and coarse gravel substrate. Below are notes describing what was encountered in the field at the SSAP-target sampling stations near Outfalls 001 and 002, and at adjusted sampling locations near Outfall 002. Copies of the field notebook and sample log forms are included in Appendix A.

3.1 Outfall 001 Area

Sampling Outfall 001 stations began on the second sampling day, starting at the upstream end (OF-1). The field team was able to access and collect sediment (sand) from the target stations OF1-1, OF1-2, and OF1-3, as identified in the SSAP.

The third sampling day was started by attempting to collect sediment from OF1-6 station, but no sample material was retrieved in the Ponar grab sampler. The current was strong on the ebb tide in the morning, so the crew moved to Camas Slough and collected the OF2-4 and OF2-5 samples (as described in Section 3.2) while waiting for high tide and better river sampling conditions near Outfall 001.

The crew returned to the Outfall 001 area in the afternoon of the third day near high tide, and started sampling at OF1-4. They collected enough sediment (sand) for analysis, but had a number of unsuccessful grabs (Ponar retrieved with no sample material inside), possibly due to rocky substrate.

The field team attempted multiple grabs at OF1-5 and could not obtain a sample. The bottom in this area appeared rocky on the sonar imagery, and they noted more rock along the adjacent Lady Island shoreline in this area.

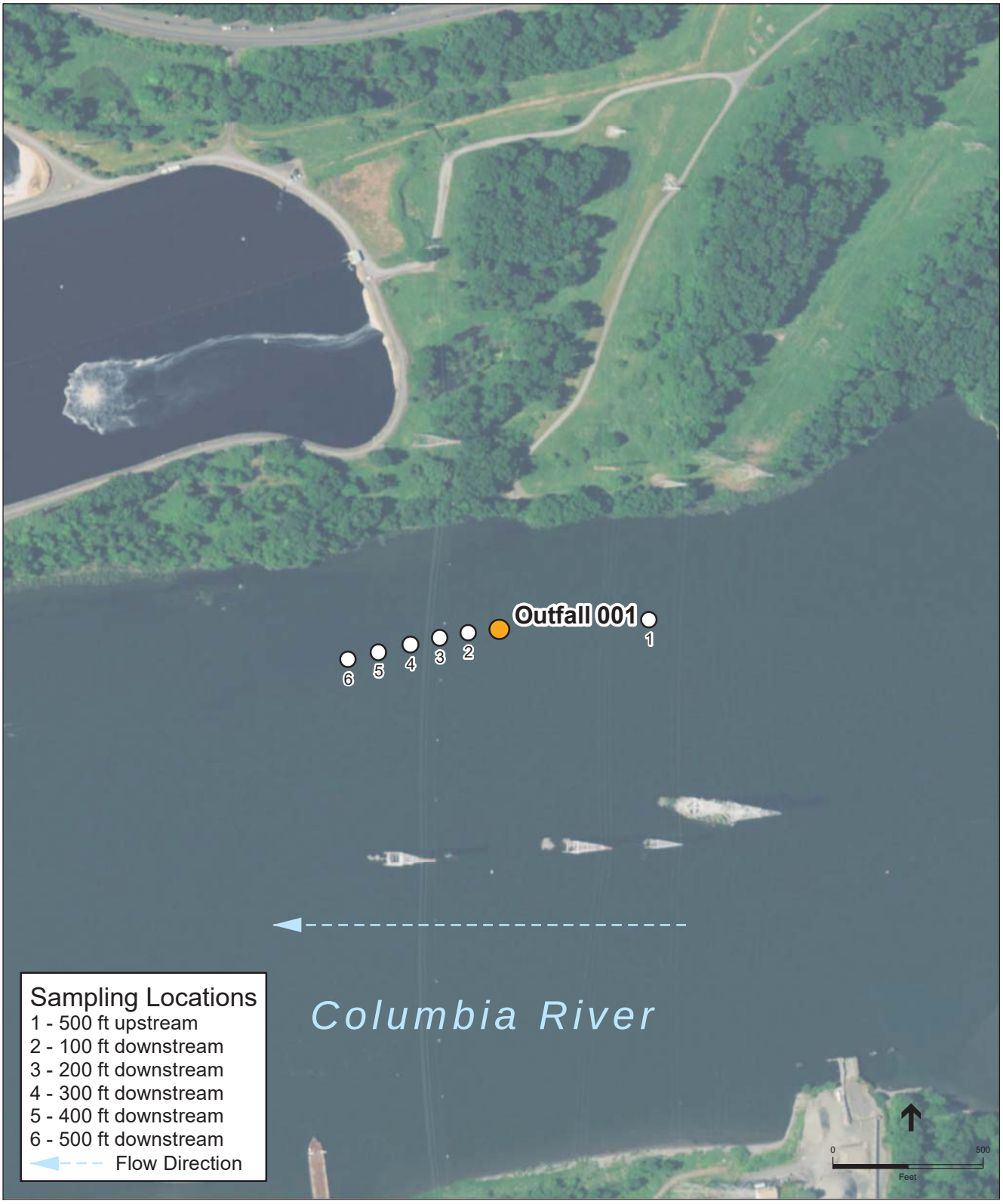
A second attempt was made to sample OF1-6 again and no sample material was retrieved. The river bottom appeared to be rocky in this area in the sonar imagery. The Ponar got hung up in current on something on the bottom (likely rock) after only a couple of attempts, and the crew could not immediately retrieve it (i.e., the winch could not pull it up). It finally popped loose and they were able to haul it in. They did not attempt further sampling at the OF1-6 station due to the rocky substrate, strong currents, and safety concerns.

TABLE 1
SURFICIAL SEDIMENT GRAB SAMPLING LOCATIONS AND DEPTHS

Outfall	Sampling Station and Sample Number	Grab	Sample Collection Date	Latitude	Longitude	Sediment Depth Below Water Surface (ft)	Sediment Sample Depth (cm)
001	Outfall	none	none	45°34'11.41"	-122°24'46.64"	NR	NR
001	OF1-1	A	9-13-2107	45°34'11.94"	-122°24'39.49"	53.7	0 to 8.5
		B	9-13-2107	45°34'11.98"	-122°24'39.63"	54.5	0 to 8.0
		C	9-13-2107	45°34'11.79"	-122°24'39.69"	54.2	0 to 8.0
001	OF1-2	A	9-13-2107	45°34'11.22"	-122°24'48.08"	59.0	0 to 6.0
		B	9-13-2107	45°34'11.33"	-122°24'48.28"	59.0	0 to 7.0
		C	9-13-2107	45°34'11.24"	-122°24'48.07"	59.5	0 to 6.0
001	OF1-3	A	9-13-2107	45°34'11.06"	-122°24'49.43"	59.5	0 to 5.5
		B	9-13-2107	45°34'11.08"	-122°24'49.34"	59.2	0 to 3.0
		C	9-13-2107	45°34'11.00"	-122°24'49.42"	59.0	0 to 7.0
		D	9-13-2107	45°34'11.15"	-122°24'49.33"	59.2	0 to 3.0
001	OF1-4	A	9-14-2017	45°34'10.78"	-122°24'50.79"	62.0	0 to 5.5
		B	9-14-2017	45°34'10.83"	-122°24'50.63"	56.0	0 to 4.0
		C	9-14-2017	45°34'10.93"	-122°24'50.77"	62.0	0 to 5.0
001	OF1-5	none	none	45°34'10.48"	-122°24'52.09"	58.0	0 to 5.0
		none	none	45°34'10.43"	-122°24'52.20"	NR	NR
		none	none	45°34'10.69"	-122°24'52.30"	NR	NR
		none	none	45°34'10.69"	-122°24'52.38"	NR	NR
		none	none	45°34'10.56"	-122°24'52.40"	NR	NR
001	OF1-6	none	none	45°34'10.13"	-122°24'53.74"	NR	NR
		none	none	45°34'10.24"	-122°24'53.94"	NR	NR
002	Outfall	none	none	45°34'53.19"	-122°24'29.22"	0.0	NR
002	OF2-1	A	9-12-2017	45° 34' 50.55"	-122° 24' 26.07"	6.0	0 to 7.0
		B	9-12-2017	45° 34' 50.52"	-122° 24' 26.13"	5.5	0 to 4.5
		C	9-12-2017	45° 34' 50.48"	-122° 24' 26.31"	6.0	0 to 6.5
002	OF2-2	A	9-12-2017	45° 34' 50.58"	-122° 24' 28.20"	5.0	0 to 5.0
		B	9-12-2017	45° 34' 50.57"	-122° 24' 28.07"	5.0	0 to 8.5
		C	9-12-2017	45° 34' 50.52"	-122° 24' 28.18"	4.5	0 to 8.5
002	OF2-3	A	9-12-2017	45° 34' 50.33"	-122° 24' 30.11"	4.7	0 to 8.5
		B	9-12-2017	45° 34' 50.48"	-122° 24' 30.21"	4.8	0 to 8.5
		C	9-12-2017	45° 34' 50.33"	-122° 24' 30.22"	4.8	0 to 8.5
002	OF2-4	A	9-14-2017	45° 34' 50.64"	-122° 24' 29.19"	6.0	0 to 6.0
		B	9-14-2017	45° 34' 50.64"	-122° 24' 29.22"	6.0	0 to 5.5
		C	9-14-2017	45° 34' 50.65"	-122° 24' 29.23"	6.7	0 to 5.0
		D	9-14-2017	45° 34' 50.66"	-122° 24' 29.23"	6.3	0 to 4.5
		E	9-14-2017	45° 34' 50.75"	-122° 24' 29.20"	7.2	0 to 5.0

Outfall	Sampling Station and Sample Number	Grab	Sample Collection Date	Latitude	Longitude	Sediment Depth Below Water Surface (ft)	Sediment Sample Depth (cm)
002	OF2-5	A	9-14-2017	45° 34' 50.16"	-122° 24' 29.37"	3.7	0 to 8.0
		B	9-14-2017	45° 34' 50.12"	-122° 24' 29.37"	4.0	0 to 7.0
		C	9-14-2017	45° 34' 50.81"	-122° 24' 29.36"	4.1	0 to 8.0

NR = not recorded



SOURCE: NAIP, 2013; OSM, 2016

Camas Mill . 160430

Figure 2a

Outfall 001 Sampling Locations

SOURCE: NAIP, 2013; OSM, 2016

Camas Mill . 160430

Figure 2b

Outfall 002 Sampling Locations

3.2 Outfall 002 Area

Attempts were made to access all SSAP target locations on the first day of sampling. The boat was able to reach the targets for OF2-1, OF2-3, and OF2-6. However, the other three target stations (OF2-2, OF2-4, and OF2-5) were not accessible due to their locations in extremely shallow water associated with a gravel/cobble bar. From the points where the boat grounded on the bar, attempting to access OF2-2, OF2-4, and OF2-5, cobble bed material was visible underwater extending north to the shoreline. Sampling attempts at the reachable OF2-1, OF2-3, and OF2-6 stations encountered cobble/gravel-dominated bed material in the Ponar. No sand or finer sediments could be retrieved at these locations for sample collection and analysis.

After attempting to access/sample all SSAP target stations, attempts were continued farther from shore in the same general area as the target stations. Following several failed grabs due to continued cobble bed material extending offshore, sand deposits were located approximately 140 to 190 feet generally south from the target locations. During the first day, samples were collected at adjusted stations OF2-1, OF2-2, and OF2-3, marking the approximate upstream, downstream, and mid-point of the east-west extent of the target coordinates. Additional samples from adjusted stations 2-4 and 2-5 were collected on the third day of sampling. Sampling stations were numbered in the order of sample collection.

Enough sample material was obtained with 3 successful grabs at OF2-1, OF2-2, OF2-3, and OF2-5. Five successful grabs were necessary at OF2-4, which seemed to mark the northern extent of sand deposition and the transition to coarse gravel and cobble substrate. The northernmost grab of the OF2-4 composite sample contained some gravel.

CHAPTER 4.
Sample Results

Complete TestAmerica laboratory data packages for chemical and conventional sediment analyses are provided in Appendix B, as well as a complete laboratory data package from Northwestern Aquatic Sciences for freshwater sediment toxicity bioassays.

4.1 Sediment Chemistry and Conventional Analyses

Tables 2 and 3 summarize the chemical and conventional sediment analysis results for samples from the Columbia River (near Outfall 001) and Camas Slough (near Outfall 002), respectively. Sediment Cleanup Objectives (SCOs) and Cleanup Screening Levels (CSLs), chemical criteria from the SMS, are also presented in Tables 2 and 3. Where sample results were assigned data qualifiers by the laboratory or during the quality assurance review, as explained in the laboratory data packages (Appendix B) and the quality assurance memorandum (Appendix C), these qualifiers are shown in Tables 2 and 3. Where re-extraction and re-analyses were necessary to achieve reporting limits sufficiently low for comparison to SCOs, the re-analysis results are reported in Tables 2 and 3.

None of the results from any of the Columbia River or Camas Slough sample analyses exceeded any of the SMS chemical criteria (Tables 2 and 3), and reporting limits for non-detected samples were also below the criteria. Ammonia and sulfide were not detected in any sample. Mercury and silver were not detected or below reporting limits in each sample, and most other metals were detected at concentrations one to two orders of magnitude below SMS criteria. Most organic compounds analyzed were not detected in samples, and a few were detected at trace concentrations below reporting limits. Total petroleum hydrocarbons (TPH) in the diesel range were not detected in any samples, and TPH in the residual range was either not detected in samples or detected at trace concentrations below the reporting limits. Total toxic equivalency values for dioxins and furans were calculated to range from 0.314 to 0.412 in sediment samples indicating that the combination of dioxins and dioxin-like compounds in the sediments may have a toxicity that is approximately 31 to 41% that of the most toxic dioxin compounds. In Camas Slough samples, all but the least toxic dioxin compounds were either not detected or detected at trace concentrations between the estimated detection limit and reportable detection limit. No dioxin or dioxin-like compounds were detected above the reportable detection limits in Columbia River samples.

TABLE 2
COLUMBIA RIVER FRESHWATER SEDIMENT RESULTS OF CHEMISTRY AND CONVENTIONAL ANALYSES

Chemical Parameter	OF1-1	OF1-2	OF1-3	OF1-4	Sediment Management Standards	
					Sediment Cleanup Objective	Cleanup Screening Level
Conventional Chemicals (mg/Kg)						
Ammonia	<63	<47	<62	<61	230	300
Sulfide	<13	<13	<13	<13	39	61
Total Organic Carbon	310 J H	280 J H	320 J H	250 J H	N/A	N/A
Conventional Chemicals (%)						
Total Solids	71	71	69	73	N/A	N/A
Metals (mg/Kg)						
Arsenic	1.7	1.8	1.8	2.1	14	120
Cadmium	0.096	0.095	0.11	0.12	2.1	5.4
Chromium	8.6	8.5	9.7	12 B	72	88
Copper	5.4	5.5	6.0	6.6	400	1200
Lead	2.8	3.1	3.6	3.6	360	>1300
Mercury	<0.030 F1	<0.032	<0.036	<0.040	0.66	0.8
Nickel	9.5	11	11	13	26	110
Selenium	0.57	1.48	0.54	0.49	11	>20
Silver	0.010 J	<0.059	0.011 J	0.015 J	0.57	1.7
Zinc	39	41	48	49	3200	>4200
Organics (µg/Kg)						
4-Methylphenol[1]	<52	<52	<50	<26 H	260	2000
Benzoic Acid	<650	<650	<630	<330 H	2900	3800
Beta-Hexachlorocyclohexane	<0.13 F1	<0.12	0.070 J	<0.13	7.2	11
Bis (2-ethylhexyl) phthalate	<160	<160	<150	<79 H	500	22000

Chemical Parameter	OF1-1	OF1-2	OF1-3	OF1-4	Sediment Management Standards	
					Sediment Cleanup Objective	Cleanup Screening Level
Carbazole	<39	<39	<38	<200	900	1100
Dibenzofuran	<39	<39	<38	<200	200	680
Dibutyltin	<16 H	<16 H	<16 H	<17 H	910	130000
Dieldrin	<0.26 F1	<0.25	<0.25 p	<0.26	4.9	9.3
Di-n-butyl phthalate	<130	<130	<130	<66 H	380	1000
Di-n-octyl phthalate	<26 H F2	<26 H	<25 H	<26 H	39	>1100
Endrin Ketone	0.019 J p	<0.25	<0.25	<0.26	8.5	>8.5
Monobutyltin	<9.9 H	<9.7 H	<9.6 H	<11 H	540	>4800
Pentachlorophenol	<100	<100	<100	<530	1200	>1200
Phenol	<39	<39	<38	<20 H	120	210
Tetrabutyltin	<49 H	<49 H	<48 H	<54 H	97	>97
Total PCB Aroclors	<1.4	<1.4	<1.4	<1.5	110	2500
Total DDDs	<0.26 p	<0.25	<0.25	<0.26	310	860
Total DDEs	0.021 J p	0.022 J p	0.019 J p	<0.26	21	33
Total DDTs	<0.26	<0.25	<0.25	<0.26	100	8100
Total PAHs	<200.5	<200.5	<193.1 F1 F2	<1016	17000	30000
Tributyltin	<8.6 H	<8.5 H	<8.4 H	<9.4 H	47	320
Bulk Petroleum Hydrocarbons (mg/Kg)						
Total Petroleum Hydrocarbon (TPH) – Diesel (C10-C24)	<63	<61	<63	<65	340	510
Total Petroleum Hydrocarbon (TPH) – Residual (>C24-C36)	16 J	17 J	12 J	<65	3600	4400

Chemical Parameter	OF1-1	OF1-2	OF1-3	OF1-4	Sediment Management Standards	
					Sediment Cleanup Objective	Cleanup Screening Level
Dioxins and Furans						
Total Toxic Equivalency CDD, CDF	0.325	0.332	0.344	0.351	N/A	N/A
Grain Size (%)						
Clay	0.10	0.10	0.20	0.10	N/A	N/A
Sand	100	99	99	99	N/A	N/A
Silt	0.30	0.70	0.50	0.40	N/A	N/A
Gravel	0.10	0.10	0.00	0.10	N/A	N/A
Cobble	0.00	0.00	0.00	0.00	N/A	N/A

QUALIFIERS:
B = Compound was found in the blank and sample.
F1 = MS and/or MSD Recovery is outside acceptance limits.
F2 = MS/MSD RPD exceeds control limits
H = Sample was prepped or analyzed beyond specific holding time.
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
p = The %RPD between the primary and confirmation column/detector is >40%. The lower value has been reported
* = LCS or LCSD is outside acceptance limits.
NOTE:
1 = The results for 4-Methylphenol are combined results for 3-Methylphenol and 4-Methylphenol because the analytical laboratory process was not able to provide separate quantitation of the compounds.
N/A = not applicable
CDD = Chloro Dibenzo-p-Dioxin
CDF = Chloro Dibenzo-p-Furan

TABLE 3
CAMAS SLOUGH FRESHWATER SEDIMENT RESULTS OF CHEMISTRY AND CONVENTIONAL ANALYSES

Chemical Parameter	OF2-1	OF2-2	OF2-3	OF2-4	OF2-5	OF2-5D	Sediment Management Standards	
							Sediment Cleanup Objective	Cleanup Screening Level
Conventional Chemicals (mg/Kg)								
Ammonia	<72	<46	<51	<63	<60	<72	230	300
Sulfide	<15	<14	<13	<13	<15	--	39	61
TOC	3500 H	2100 H	1500 J H	1200 J H	1600 J H	1700 J H	N/A	N/A
Conventional Chemicals (%)								
Total Solids	64	68	65	73	67	67	N/A	N/A
Metals (mg/Kg)								
Arsenic	7.7	7.2	6.5	7.7	8.9	7.9	14	120
Cadmium	0.26	0.16	0.16	0.12	0.20	0.17	2.1	5.4
Chromium	16	17	16	17 B F1	19 B	18 B	72	88
Copper	29	39	37	40 F1	47	43	400	1200
Lead	9.8	9.0	7.7	5.7	12	9.1	360	>1300
Mercury	0.026 J	0.021 J	0.042	0.011 J	0.024 J	0.026 J	0.66	0.8
Nickel	0.15	16	16	16	17	15	26	110
Selenium	0.66	0.62	0.52	0.86	0.97	0.95	11	>20
Silver	0.035 J	0.024 J	0.021 J	0.015 J	0.024 J	0.031 J	0.57	1.7
Zinc	85	75	65	73	94	88	3200	>4200
Organics (µg/Kg)								
4-Methylphenol[1]	<150	<130	<120	<250	<29 H	<29 H	260	2000
Benzoic Acid	<1900	<1600	<1500	<320 H	<360 H	<360 H	2900	3800
Beta-Hexachlorocyclohexane	<0.72	<0.69	<0.65	<0.64	<0.74	<0.71	7.2	11

Chemical Parameter	OF2-1	OF2-2	OF2-3	OF2-4	OF2-5	OF2-5D	Sediment Management Standards	
							Sediment Cleanup Objective	Cleanup Screening Level
Bis(2-ethylhexyl) phthalate	<450	<380	<360	20 J H F2	<86 H	<86 H	500	22000
Carbazole	<110	<95	<91	<190	<220	<210	900	1100
Dibenzofuran	<110	<95	<91	<190	<22 H	<22 H	200	680
Dibutyltin	<19 H	<17 H	<17 H	<16 H	<19 H	<18 H	910	130000
Dieldrin	<1.4	<1.4	<1.3	<1.3	<1.5	<1.4	4.9	9.3
Di-n-butyl phthalate	<370	<320	<300	<65 H	<72 H	<72 H	380	1000
Di-n-octyl phthalate	<30 H	<25 H	<24 H	<26 H	<29 H	<29 H	39	>1100
Endrin Ketone	<1.4	<1.4	<1.3	<1.3	<1.5	<1.4	8.5	>8.5
Monobutyltin	<12 H	<11 H	<10 H	<10 H F2	<11 H	<11 H	540	>4800
Pentachlorophenol	<300	<250	<240	<500	<590	<560	1200	>1200
Phenol	<110	<95	<91	<19 H	<22 H	<22 H	120	210
Tetrabutyltin	<59 H	<53 H	<51 H	<50 H F2	<57 H	<56 H	97	>97
Total PCB Aroclors	<1.6	<1.5	<1.3	<1.4	<1.7	<1.6	110	2500
Total DDDs	<1.4	<1.4	<1.3	<1.3	<1.5	<1.4	310	860
Total DDEs	<1.4	<1.4	<1.3	<1.3	<1.5	<1.4	21	33
Total DDTs	<1.4	<1.4	<1.3	<1.3	<1.5	<1.4	100	8100
Total PAHs	<572	45.4 J *	<460	<958 F2	<1124	<1076	17000	30000
Tributyltin	<10 H	<9.2 H	<9.0 H	<8.8 H	<10 H	<9.7 H	47	320
Bulk Petroleum Hydrocarbons (mg/Kg)								
Total Petroleum Hydrocarbon (TPH) – Diesel (C10-C24)	<71	<66	<62	<64	<69	<70	340	510
Total Petroleum Hydrocarbon (TPH) – Residual (>C24-C36)	70 J	60 J	30 J	23 J	23 J	38 J	3600	4400

Chemical Parameter	OF2-1	OF2-2	OF2-3	OF2-4	OF2-5	OF2-5D	Sediment Management Standards	
							Sediment Cleanup Objective	Cleanup Screening Level
Dioxins and Furans								
Total Toxic Equivalency CDD, CDF	0.350	0.347	0.314	0.376	0.412	--	N/A	N/A
Grain Size (%)								
Clay	1.0	0.50	0.50	0.20	0.50	0.50	N/A	N/A
Sand	87	91	91	70	95	95	N/A	N/A
Silt	9.5	4.6	4.6	1.3	3.4	3.4	N/A	N/A
Gravel	2.6	4.1	4.1	29	0.80	0.90	N/A	N/A
Cobble	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A

QUALIFIERS:
B = Compound was found in the blank and sample.
F1 = MS and/or MSD Recovery is outside acceptance limits.
F2 = MS/MSD RPD exceeds control limits
H = Sample was prepped or analyzed beyond specific holding time.
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
p = The %RPD between the primary and confirmation column/detector is >40%. The lower value has been reported
* = LCS or LCSD is outside acceptance limits.
NOTE:
1 = The results for 4-Methylphenol are combined results for 3-Methylphenol and 4-Methylphenol because the analytical laboratory process was not able to provide separate quantitation of the compounds.
N/A = not applicable
CDD = Chloro Dibenzo-p-Dioxin
CDF = Cloro Dibenzo-p-Furan

Exhibit 8 SHOR23-01

4.2 Sediment Biological Tests

The SMS includes SCO and CSL biological criteria to identify sediments that may have adverse effects on biological resources. The SCO establishes a no-adverse-effects level, including on acute or chronic adverse effects, to the benthic community. The CSL establishes a minor adverse effects level, including acute or chronic effects, to the benthic community. Table 4 presents the results of biological tests together with SCO and CSL criteria for each bioassay endpoint. No sediment sample mortality results from the *Hyalella* 10-day toxicity test were significantly higher than mortality in the control sediment. A few sediment sample mortality results from the *Chironomus* 20-day toxicity test were significantly higher than the control sediment toxicity; however, the percent mortality for all samples was 2.5 to 12.5% higher than control sediment mortality and thus did not exceed the SCO criterion of >25%. All but one sediment sample produced results from the *Chironomus* 20-day growth test that were significantly lower than growth in the control sediment, and growth in the OF1-3 sediment sample was 28.9% lower than growth in the control sediment. Because the difference in growth exceeded the 25% SCO criterion, this one result indicated a potential for chronic adverse effects to benthic organisms at the OF1-3 location could not be ruled out; however, the difference was well below the CSL level of 40% that would indicate a minor adverse chronic effect.

TABLE 4
COLUMBIA RIVER FRESHWATER SEDIMENT BIOLOGICAL TEST RESULTS

	Hyallela 10-day Toxicity Test			*Chironomus* 20-day Toxicity Test			*Chironomus* 20-day Toxicity Test		
Sample	**Percent Mortality (Mean ± SD)**	**Significantly Higher Than Control?**	**Percent Higher Than Control**	**Percent Mortality (Mean ± SD)**	**Significantly Higher Than Control?**	**Percent Higher Than Control**	**Avg. Ash-free Dry Wt/Midge (mg) (Mean ±SD)**	**Significantly Lower Than Control?**	**Percent Lower Than Control**
Control	1.3 ± 3.5	--	--	2.5 ± 4.6	--	--	1.63 ± 0.16	--	--
OF1-1	1.3 ± 3.5	No	0.0	15.0 ± 14.1	Yes	12.5	1.35 ± 0.14	Yes	17.5
OF1-2	0.0 ± 0.0	No	-1.3	11.3 ± 14.6	No	8.8	1.24 ± 0.16	Yes	23.9
OF1-3	2.5 ± 7.1	No	1.2	5.0 ± 7.6	No	2.5	1.17 ± 0.12	Yes	**28.9**
OF1-4	3.8 ± 7.4	No	2.5	12.5 ± 11.6	Yes	10.0	1.32 ± 0.20	Yes	19.1
OF2-1	3.8 ± 7.4	No	2.5	13.8 ± 13.0	Yes	11.3	1.51 ± 0.28	No	7.5
OF2-2	0.0 ± 0.0	No	-1.3	8.8 ± 8.3	No	6.3	1.35 ± 0.16	Yes	17.5
OF2-3	1.3 ± 3.5	No	0.0	7.1 ± 7.6	No	4.6	1.32 ± 0.11	Yes	19.3
OF2-4	0.0 ± 0.0	No	-1.3	8.8 ± 6.4	Yes	6.3	1.49 ± 0.14	Yes	9.0
OF2-5	1.3 ± 3.5	No	0.0	12.56 ± 12.8	Yes	10.0	1.43 ± 0.20	Yes	12.4
SCO	--	--	>15	--	--	>15	--	--	>25
CSL	--	--	>25	--	--	>25	--	--	>40

SD = Standard Deviation
SCO = Sediment Cleanup Objective (exceedance level shown)
CSL = Cleanup Screening Level (exceedance level shown)
Bold = Exceedance of the SCO criterion

CHAPTER 5.
References

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Appendix A
Field Notes and Sample Forms

1

Field Notes
- Supplement to Sample Forms
G-P Camas Mill Sediment Sampling

9-12-17 to 9-14-17

ESA

2

G-P Camas Mill Sediment Sampling - Day 1

Field Log 9/12/17

Crew: JV, CF

0940 - on station at OFZ-6; Shallow but accessible

Wx = Sunny, warm

Water - Calm (Camas Slough)

0945 - Equipment Decon. w/ Alconox / Distilled

Followed by DI Rinse

Rite in the Rain

1040 - Attempt to Sample OF2-6

- Pulled up Cobbles/gravel multiple Grabs (~6)
- No Fine sediment Retained
- Worked outward (Southward) from Station
- First sediment Retained ~150' South of OF2-6 Target

1120 - Call Jim G. to discuss Alternate Plan

- Clearly Rocky Along N. Shoreline @ Low tide
Photos Taken

~ Attempt to sample @ All Target Stations, then adjust as needed to find depositional areas

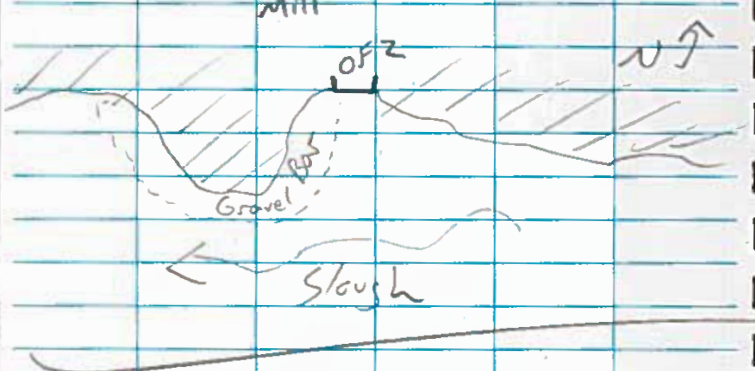
OF2-5 - 1130

Too Shallow to Access Target Coord.
- 2.5' water Depth Due South of Target by 95' - Cobble bed visible
- Attempt to sample ~4.5' W/ S. South of Target (OF2-5A) + Cobble

Rite in the Rain

5

OF2-4 - Can't Access -
Grounded short
of Target Coord.,
1145 on Cobble bed.
~20-25 South & East
of Target Coord.



OF2-3 - on station
~3 Water
1155 for Grab Attempts
- Cobbles & Twigs
-

6

OF2-2
1205 - Can't Access
Target, which
is on gravel bar;
Stopped 30' South by
Depth (Aground)
E/W Right on
Cobble bed visible
no Sample Attempted

OF-2-1
1215 Accessed Target
Coords; ~7.5' wtr
Depth;

Rite in the Rain

7

OFZ-1 Grab Attempt

1218 - 1228

-3 Grab Attempts

- 1st two Retrieved cobble - incomplete jaw closure

- 3rd Attempt - jaws closed; small amount of Gravel, cobble, sand, & Corbicula clams

~ Target Location is upstream of Large pipe crossing

8

- 1230 - 1300 - Lunch

1300 - Attempt to sample farther from shore, starting upstream of Outfall 2, on upstream side of pipeline crossing

OFZ-1 - Successfully retrieved sand sample South of Target 2-1 ~190° S.

OFZ-1-1
-2
-3

Time: 1345

OFZ-2 - Sample Retrieved on Downstream side of pipeline crossing, directly South of OFZ

Time: 1530

~ 190'

Rite in the Rain

9

OF2-3 Sample obtained
@ 140-200' Due
South of Target OF2-6

2-3-1
-2 Time: 1700
-3

Decontamination w/ Alconox/
Distilled Solution
performed prior to Sampling
each new station

The 3-station Sampling Covered
Same overall N/S extents
of Target Coords; w/ middle
of 3 at ~ same E/W
as outfall 2

10

- Leaving Site @ 1750
to Camas Marina

Rite in the Rain

11

GP Sediment Sampling
Day 2 9/13/17
crew: JV/CF WX= Mostly Sunny Light w. wind

- Obtained new Safe Work Permit at Camas Mill to start
- Loaded Boat & Departed Marina ~ 1015 AM
- on-site in Col. River near OF1 ~ 1030 AM
- Prepped Gear
- Calibration Verification of Rugked 45 & 56 pH/Temp. Meter at 1115 AM

Rite in the Rain

12

YSI pH Cal. Verification

Buffer	pH Read	Temp.
7	6.98	22.82°C
10	10.06	22.86°C

Good ✓

1200 – Sample Attempts @ outfall 2

OF1-1 – US of outfall

Grab A Collected at 1230

B Sand

C

13

1350 pH/Temp Readings @ OF1-1

YSI 558

@ wtr. surface (2' depth)

pH = 7.29

temp = 21.18°C

Wtr. Depth = ~~50~~ 53.0'

Sensor @ near bottom

29

- Lowered w/ Razor until bottom reached, then up ~ 3'

pH = 5.59

Temp = 21.22°C

Rite in the Rain

14

15/5 OF 1-2 pH

Wtr Depth = 59.0'

Sensor Depth = ~56'

pH = 5.84

Temp = 21.44°C

OF 1-2 – Grabs Collected A, B, C Sand

Time 1435-1505

15

OF 1-3 + 1620

First → Attempt & retrieved gravel incomplete jaw closure

↓ Successful Grabs A-D 1650-1825 Sand

1830 pH / Temp at OF 1-3

Wtr Depth = 59.5

Sensor Depth ~ 58.5

pH = 7.00 SU

Temp = 21.42° C

Rite in the Rain

16

1910 - Leaving Site for Marina

GP Sediment Sampling 17

Day 3 Wx: Partly Sunny Light E. wind

Crew: JV/CF

0715 - Arrive at Marina to begin boat prep.

0735 - To Camas Mill to meet Phil for Safe Work Permit

0845 - Boat loaded & leaving marina

0900 - On Site @ OF1 to prep. - Decon. Ponar & bowls & utensils

0940 - Anchored on OF1-6 to Attempt Sampling 3 Grabs attempted - NOT SUCCESSFUL - too much current

Rite in the Rain

0945 Pull Anchor to Attempt while drifting w/ current

Three Attempts Made while Drifting - Too much current; of Rock

Will Return to on incoming tide

1015 Leaving for slough sites

- Established OF 2-4 Between & slightly inshore of OUT OF 2-2 & OF 2-3

- Transition Point between

inshore gravels & offshore sands;

- Many Failed grabs due to incomplete jaw closure due to large sticks,
- Completed sample w/ 5 successful grabs A-E @ 1200

Rite in the Rain

OF2-4 cont'd 20

- Many Clams Removed by hand from sample
- pH/Temp
  Water Depth = 7.0'
  Sensor Depth = 6.0'
  pH = 8.32
  Temp = 21.0°C

OF2-5 offshore & slightly DS of OF2-4
Shallower Water
Enough Sample w/ 3 Grabs -
Duplicates for Chemistry

21

- pH/Temp @ OF2-5
  Water Depth = 3.8'
  Sensor Depth = 3.0'
  pH = 8.50
  Temp = 21.4°C
  Time = 1345

Leaving Camas Slough @ 1410 to try sampling around high tide (less current) at OF1

Rite in the Rain

22

1430 - on-site @ OF1
Bot starting w/
OF1-4

- Sample obtained w/ 3 successful grabs A-C ; Sand 1502-1655
- Several empty grabs returned as well
- Difficult sampling in deep water

1745 pH/Temp @ OF1-4
Wtr Dpth = 62'
Sensor Dpth = 18 m
pH = 6.46
Temp = 21.05°C

23

1800-1840
Attempted to sample OF1-5 ; Not successful
Multiple Grabs ; very small amount of sand 1st Grab ; Appears rocky on sonar imagery

OF1-6
1845-1900 Attempt Grabs, no sediment returned in sonar ; Bottom looks rocky in sonar ; Sonar stuck/caught in something on bottom while attempting grab, - can't pull in.

Rite in the Rain

OF 1-6 cont'd

- Ponar finally popped loose
- No further attempts made
  - hazardous in current

1900 - Leave site for marina

Rite in the Rain

ESA Field Sample Form

Project Name: G-P Camas Mill NPDES Permit Sediment Monitoring

ESA Project Number: D160430

Date: 9/12/17

Crew: JV/CF

Page 1 of 1

Site: Camas Slough; outfall 2

Station #	Grab ID	Time	Water Depth (FT)	Sediment Depth ~~(FT)~~ CM	Sediment Type	Color	Layering	% Wood waste	pH* (S.U.)	Temp.*	Notes (debris, odor, sheen, etc.)
OF2-1	1	1315	6.0	7	fine sand	brown	none	~~<1%~~ 5%	~~8.~~		no sheen; no odor
OF2-1	2	1333	5.5	4.5	fine sand	brown	none	5%			- corbicula clams
OF-2-1	3	1345	6.0	6.5	fine sand	brown	none	5%			removed; some twigs,
OF 2-1		1434	5.5						8.35	22.2°C	smaller nat. wood debris
OF 2-~~1~~2	1	1510	5.0	5	sand	brown	none	5%			no sheen; no odor
OF2-2	2	1520	5.0	8.5	sand	brown	none	5%			some clams; pine cone;
OF2-2	3	1530	~~5.0~~ 4.5	8.5	sand	brown	none	5%	8.30		small wood fragments;
		1550	5.0						~~8.29~~	22.2°C	sand is coarser than OF2-1
OF2-3	1	1635	4.7	8.5	sand	greyish brown	none	<5%			smaller nat. wood
OF2-3	2	1650	4.8	8.5	sand	greyish brown	none	<5%			debris; no sheen; no
OF2-3	3	1700	4.8	8.5	sand	greyish brown	none	<5%			odor; clams
		1715	4.7						8.39	22.2C	

*pH/Temp readings taken ~ 1' off bottom w/ YSI pH 100 w/ 4m cable

ESA Field Sample Form

Project Name: G-P Camas Mill NPDES Permit Sediment Monitoring

ESA Project Number: D160430

Date: 9/13/17

Crew: CF/JV

Page 1 of 1

Site: Columbia River; Outfall 1

Station #	Grab ID	Time	Water Depth (ft)	Sediment Depth (CM)	Sediment Type	Color	Layering	% Wood Waste	pH* (S.U.)	Temp.*	Notes (debris, odor, sheen, etc.)
OF 1-1	A	1230	53.7	8.5	sand	grey	none	NONE OBSERVED			no odor; no sheen;
OF 1-1	B	1245	54.5	8.0	sand	grey	none	↓			small twigs, wood frag-
OF 1-1	C	1300	54.2	8.0	sand	grey	none	↓			ments; no wood waste
~~OF 1-2~~	~~A~~	1350	53.0			grey			5.59	21.22°C	
OF 1-2	A	1435	59.0	6.0	sand	grey	none	NONE OBSERVED			no odor; No sheen
OF 1-2	B	1445	59.0	7.0	sand	grey	none	↓			Few carbicla clams;
OF 1-2	C	1505	59.5	6.0	sand	grey	none	↓			small wood fragments;
		1515	59.0			grey			5.84	21.44°C	Fir needles
OF 1-3	A	1650	59.5	5.5	sand	grey	none	NONE OBSERVED			No wood waste; no
OF 1-3	B	1715	59.2	3.0	sand	grey	none	↓			odor; no sheen
OF 1-3	C	1800	59.0	7.0	sand	grey	none	↓			
OF 1-3	D	1825	59.2	3.0	sand	grey	none	↓			
		1930	59.5			grey			7.00	21.42°C	

* pH/temp readings taken ~3' off bottom; sensor lowered w/ Ponar until bottom reached, then pulled up ~3'; YSI 556 w/ 20m' cable

ESA Field Sample Form

Project Name: G-P Camas Mill NPDES Permit Sediment Monitoring

ESA Project Number: D160430

Date: 9/14/17

Crew: CF/JV

Site: Camas Slough & Col. River; outfalls 1 & 2

Station #	Grab ID	Time	Water Depth (Ft)	Sediment Depth (Cm)	Sediment Type	Color	Layering	% Wood waste	pH* (S.U.)	Temp.*	Notes (debris, odor, sheen, etc.)
OF2-4	A	1055	6.0	6.0	sand	brown	none	~5%			clams, no odor, no sheen
OF2-4	B	1103	6.0	5.5	sand	brown	none	↑			
OF2-4	C	1115	6.7	5.0	sand	brown	none				CLAMS
OF2-4	D	1124	6.3	4.5	sand	brown	none				
OF2-4	E	1129	7.2	5.0	Coarse sand + small gravel	brown	none	↓			several clams
OF-2-4		1200	7.2	—	—	—	—		8.32	21.0°C	
OF2-5	A	1300	3.7	8.0	sand	brown	none	<1%			no odor; no sheen;
OF2-5	B	1315	4.0	7.0	sand	brown	none	↓			a few clams
OF2-5	C	1330	4.1	8.0	sand	brown	none				stick; wood fragments;
OF2-5		1345	3.8	—	—	—	—		8.50	21.4°C	black clams
OF1-4	A	1502	62.0	5.5	sand	grey	none	<1%			
OF1-4	B	1625	56.0	4.0	sand	grey	none	↓			
OF1-4	C	1655	62.0	5.0	sand	grey	none				
OF1-4		1745	62.0	—	—	—	—	—	6.46	21.05°C	
OF1-5	A	1820	58.0	5.0	sand	grey	none				Very small amount of sand in 1st grab - unable to obtain more in subsequent grabs

*pH/temp. @ OF2-4 & 2-5 taken w/ YSI pH100 ~1' off bottom

pH/temp @ OF1-4 taken 3' off bottom w/ YSI 556

Appendix B
Lab Results

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-71236-1
Client Project/Site: G-P Camas Freshwater Sediments
Revision: 2

For:
Environmental Science Associates (ESA)
5309 Shilshole Avenue NW, Suite 200
Seattle, Washington 98107

Attn: Jim Good

M. Elaine Walker

Authorized for release by:
12/29/2017 2:06:10 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

LINKS
Review your project results through TotalAccess
Have a Question? Ask The Expert
Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Definitions 5
Client Sample Results 6
QC Sample Results 18
Chronicle 29
Certification Summary 32
Sample Summary 33
Subcontract Data 34
Chain of Custody 58
Receipt Checklists 61

Case Narrative

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Job ID: 580-71236-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-71236-1

Revision 2: 12/29/2017
Per client request, the 8270D SVOCs were reanalyzed outside hold time undiluted. The samples were initially run at a 5x dilution, but the sample results exceeded tghe client action limits. The original and this reanalysis are reported here. The first reanalysis data have been turned off as they were also run at a 5x dilution and wer outside the required action level. Please note additional narrative comments below in **BOLD** type, added to the GC/MS Semi VOA section asssociated to the re-extraction / reanalysis

Revision 1: 12/19/2017
The client noted that the 8270D SVOC analysis did not follow the proper prep of 20g to 2ml to achieve low limits. The client requested that the sampled be re-extracted and reanalyted. Because the samples were not placed in the freezer after the initial analysis, the preparation and analysis was performed outisde hold time. .

Receipt
Three samples were received on 9/13/2017 12:50 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.3º C.

GC/MS Semi VOA
Method(s) 8270D: The laboratory control sample (LCS) for preparation batch 580-256990 and analytical batch 580-257097 recovered outside control limits for Di-n-octyl phthalate. This target was biased high in the LCS and not detected in the associated samples; therefore, the data have been reported.

Method(s) 8270D: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 580-256990 and analytical batch 580-257097 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected.

Method(s) 8270D: The following samples were diluted due to the nature of the sample matrix: OF2-1 (580-71236-1), OF2-2 (580-71236-2), OF2-3 (580-71236-3), (580-71266-F-3-D), (580-71266-F-3-E MS) and (580-71266-F-3-F MSD). Elevated reporting limits (RLs) are provided.

Method(s) 8270D: Pentachlorophenol recovered below control limits for the LCS associated with preparation batch 580-264022 and analytical batch 580-263999. This is not indicative of a systematic control problem because these were random marginal exceedances. Qualified results have been reported.

Method(s) Organotins: Monobutyltin and Tetra-n-butyltin recovered outside control limits for LCS associated with preparation batch 580-257308 and 580-257308 and analytical batch 580-257811. These analytes were outside the Marginal Exceedance Limits and were indicative of a systematic problem; therefore, re-extraction was performed. Out-of-hold re-extraction yielded acceptable LCS recovery and results for affected samples were corroborated; both sets of data are reported.

Method(s) Organotins: The matrix spike / matrix spike duplicate (MS/MSD) precision for preparation batch 580-257308 and 580-257308 and analytical batch 580-257811 was outside control limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA
Method(s) 8081B: In analytical batch 580-257614, the %RPD between the primary and confirmation column exceeded 40% for some analytes for the following sample(s): (580-71266-C-1-C). The lower value(s) has been reported in accordance with the laboratory's SOP.

Method(s) 8081B: The matrix spike duplicate (MSD) recoveries for preparation batch 580-256979 and analytical batch 580-257614 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the MS and associated laboratory control sample (LCS) recovery was within acceptance limits.

Method(s) 8081B: In analytical batch 580-257614, the following sample(s) required a copper clean-up to reduce matrix interferences caused by sulfur. The copper lot number is 615040-BB. The following samples are impacted: OF2-1 (580-71236-1), OF2-2 (580-71236-2), OF2-3 (580-71236-3), (LCS 580-256979/2-A), (MB 580-256979/1-A), (580-71266-C-1-C), (580-71266-C-1-D MS) and

Case Narrative

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Job ID: 580-71236-1 (Continued)

Laboratory: TestAmerica Seattle (Continued)

(580-71266-C-1-E MSD).

Method(s) 8081B: The following samples was diluted due to extract color: OF2-1 (580-71236-1), OF2-2 (580-71236-2) and OF2-3 (580-71236-3). Elevated reporting limits (RL) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals

Method(s) 7471A: The matrix spike (MS) recoveriyfor preparation batch 580-257821 and analytical batch 580-257853 were outside control limits for Mercury. Sample matrix interference and/or non-homogeneity are suspected because the MSD and associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

Method(s) 9060_PSEP: The following sample(s) were prepared outside of preparation holding time due to an instrument failure: OF2-1 (580-71236-1) and OF2-3 (580-71236-3). The soil TOC instrument broke down before the samples could be run. Client requested that the sample be run out of hold. The hold time for PSEP TOC is 14 days. The hold time for regular TOC analysis is 28 days.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Geotechnical

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
X	Surrogate is outside control limits
H	Sample was prepped or analyzed beyond the specified holding time
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
B	Compound was found in the blank and sample.
H	Sample was prepped or analyzed beyond the specified holding time
F3	Duplicate RPD exceeds the control limit
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-1
Date Collected: 09/12/17 13:45
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-1
Matrix: Solid
Percent Solids: 67.0

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND		22	3.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
2-Methylnaphthalene	ND		37	6.6	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
3 & 4 Methylphenol	ND		150	11	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Acenaphthene	ND		19	3.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Acenaphthylene	ND		19	3.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Anthracene	ND		19	3.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Benzo[a]anthracene	ND		19	3.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Benzo[a]pyrene	ND		45	9.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Benzo[g,h,i]perylene	ND		45	11	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Benzofluoranthene	ND		110	26	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Benzoic acid	ND		1900	790	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Bis(2-ethylhexyl) phthalate	ND		450	100	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Carbazole	ND		110	23	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Chrysene	ND		45	9.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Dibenz(a,h)anthracene	ND		37	8.9	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Dibenzofuran	ND		110	27	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Di-n-butyl phthalate	ND		370	42	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Di-n-octyl phthalate	ND	*	150	170	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Fluoranthene	ND		19	3.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Fluorene	ND		19	3.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Indeno[1,2,3-cd]pyrene	ND		30	3.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Naphthalene	ND		19	3.7	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Pentachlorophenol	ND		300	68	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Phenanthrene	ND		45	8.9	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Phenol	ND		110	28	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5
Pyrene	ND		45	11	ug/Kg	☼	09/22/17 09:53	09/23/17 17:34	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*90*		*10 - 126*	*09/22/17 09:53*	*09/23/17 17:34*	*5*
2-Fluorobiphenyl	*73*		*57 - 110*	*09/22/17 09:53*	*09/23/17 17:34*	*5*
2-Fluorophenol	*73*		*36 - 125*	*09/22/17 09:53*	*09/23/17 17:34*	*5*
Nitrobenzene-d5	*80*		*54 - 113*	*09/22/17 09:53*	*09/23/17 17:34*	*5*
Phenol-d5	*83*		*59 - 113*	*09/22/17 09:53*	*09/23/17 17:34*	*5*
Terphenyl-d14	*81*		*68 - 120*	*09/22/17 09:53*	*09/23/17 17:34*	*5*

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND	H	4.5	0.74	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
2-Methylnaphthalene	ND	H	7.4	1.3	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
3 & 4 Methylphenol	**5.8**	**J H**	30	2.2	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Acenaphthene	ND	H	3.7	0.74	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Acenaphthylene	ND	H	3.7	0.74	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Anthracene	ND	H	3.7	0.74	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Benzo[a]anthracene	ND	H	3.7	0.74	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Benzo[a]pyrene	ND	H	8.9	1.9	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Benzo[g,h,i]perylene	ND	H	8.9	2.2	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Benzofluoranthene	ND	H	22	5.2	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Benzoic acid	ND	H	370	160	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Bis(2-ethylhexyl) phthalate	ND	H	89	20	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Carbazole	ND	H	22	4.6	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-1
Date Collected: 09/12/17 13:45
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-1
Matrix: Solid
Percent Solids: 67.0

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chrysene	ND	H	8.9	1.9	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Dibenz(a,h)anthracene	ND	H	7.4	1.8	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Dibenzofuran	ND	H	22	5.4	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Di-n-butyl phthalate	ND	H	74	8.5	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Di-n-octyl phthalate	ND	H	30	33	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Fluoranthene	**2.4**	**J H**	3.7	0.74	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Fluorene	ND	H	3.7	0.74	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Indeno[1,2,3-cd]pyrene	ND	H	6.0	0.74	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Naphthalene	**0.94**	**J H**	3.7	0.74	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Pentachlorophenol	ND	H *	60	14	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Phenanthrene	ND	H	8.9	1.8	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Phenol	ND	H	22	5.7	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1
Pyrene	ND	H	8.9	2.2	ug/Kg	☼	09/22/17 09:53	12/21/17 19:08	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*85*		*10 - 126*	*09/22/17 09:53*	*12/21/17 19:08*	*1*
2-Fluorobiphenyl	*90*		*57 - 110*	*09/22/17 09:53*	*12/21/17 19:08*	*1*
2-Fluorophenol	*104*		*36 - 125*	*09/22/17 09:53*	*12/21/17 19:08*	*1*
Nitrobenzene-d5	*93*		*54 - 113*	*09/22/17 09:53*	*12/21/17 19:08*	*1*
Phenol-d5	*103*		*59 - 113*	*09/22/17 09:53*	*12/21/17 19:08*	*1*
Terphenyl-d14	*90*		*68 - 120*	*09/22/17 09:53*	*12/21/17 19:08*	*1*

Method: Organotins - Organotins, PSEP (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin	ND		19	4.4	ug/Kg	☼	09/26/17 13:24	10/02/17 14:49	1
Monobutyltin	ND	*	12	2.9	ug/Kg	☼	09/26/17 13:24	10/02/17 14:49	1
Tetra-n-butyltin	ND	*	58	17	ug/Kg	☼	09/26/17 13:24	10/02/17 14:49	1
Tributyltin	ND		10	2.2	ug/Kg	☼	09/26/17 13:24	10/02/17 14:49	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*9*	*X*	*10 - 113*	*09/26/17 13:24*	*10/02/17 14:49*	*1*

Method: Organotins - Organotins, PSEP (GC/MS) - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin	ND	H	19	4.5	ug/Kg	☼	10/04/17 16:32	10/05/17 19:31	1
Monobutyltin	ND	H	12	2.9	ug/Kg	☼	10/04/17 16:32	10/05/17 19:31	1
Tetra-n-butyltin	ND	H	59	17	ug/Kg	☼	10/04/17 16:32	10/05/17 19:31	1
Tributyltin	ND	H	10	2.3	ug/Kg	☼	10/04/17 16:32	10/05/17 19:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*34*		*10 - 113*	*10/04/17 16:32*	*10/05/17 19:31*	*1*

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4'-DDD	ND		1.4	0.22	ug/Kg	☼	09/22/17 08:46	09/29/17 13:03	5
2,4'-DDE	ND		1.4	0.22	ug/Kg	☼	09/22/17 08:46	09/29/17 13:03	5
2,4'-DDT	ND		1.4	0.12	ug/Kg	☼	09/22/17 08:46	09/29/17 13:03	5
4,4'-DDD	ND		1.4	0.053	ug/Kg	☼	09/22/17 08:46	09/29/17 13:03	5
4,4'-DDE	ND		1.4	0.10	ug/Kg	☼	09/22/17 08:46	09/29/17 13:03	5
4,4'-DDT	ND		1.4	0.11	ug/Kg	☼	09/22/17 08:46	09/29/17 13:03	5
beta-Hexachlorocyclohexane	ND		0.72	0.082	ug/Kg	☼	09/22/17 08:46	09/29/17 13:03	5

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-1
Date Collected: 09/12/17 13:45
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-1
Matrix: Solid
Percent Solids: 67.0

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dieldrin	ND		1.4	0.085	ug/Kg	☼	09/22/17 08:46	09/29/17 13:03	5
Endrin ketone	ND		1.4	0.087	ug/Kg	☼	09/22/17 08:46	09/29/17 13:03	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*56*		*16 - 123*	*09/22/17 08:46*	*09/29/17 13:03*	*5*
Tetrachloro-m-xylene	*80*		*38 - 121*	*09/22/17 08:46*	*09/29/17 13:03*	*5*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	ND		0.0014	0.000071	mg/Kg	☼	09/22/17 08:49	09/26/17 03:47	1
PCB-1221	ND		0.0016	0.00048	mg/Kg	☼	09/22/17 08:49	09/26/17 03:47	1
PCB-1232	ND		0.0016	0.00031	mg/Kg	☼	09/22/17 08:49	09/26/17 03:47	1
PCB-1242	ND		0.0014	0.00030	mg/Kg	☼	09/22/17 08:49	09/26/17 03:47	1
PCB-1248	ND		0.0016	0.00023	mg/Kg	☼	09/22/17 08:49	09/26/17 03:47	1
PCB-1254	ND		0.0014	0.00013	mg/Kg	☼	09/22/17 08:49	09/26/17 03:47	1
PCB-1260	ND		0.0014	0.00018	mg/Kg	☼	09/22/17 08:49	09/26/17 03:47	1
Polychlorinated biphenyls, Total	ND		0.0016	0.00048	mg/Kg	☼	09/22/17 08:49	09/26/17 03:47	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*56*		*25 - 149*	*09/22/17 08:49*	*09/26/17 03:47*	*1*
Tetrachloro-m-xylene	*60*		*35 - 130*	*09/22/17 08:49*	*09/26/17 03:47*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		71	17	mg/Kg	☼	09/20/17 11:56	09/22/17 16:00	1
Motor Oil (>C24-C36)	**70**	**J**	71	13	mg/Kg	☼	09/20/17 11:56	09/22/17 16:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*95*		*54 - 118*	*09/20/17 11:56*	*09/22/17 16:00*	*1*

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.7**		0.15	0.058	mg/Kg	☼	09/27/17 17:02	09/28/17 10:54	5
Cadmium	**0.26**		0.058	0.045	mg/Kg	☼	09/27/17 17:02	09/28/17 10:54	5
Chromium	**16**		0.15	0.037	mg/Kg	☼	09/27/17 17:02	09/28/17 10:54	5
Copper	**29**		0.29	0.13	mg/Kg	☼	09/27/17 17:02	09/28/17 10:54	5
Lead	**9.8**		0.15	0.028	mg/Kg	☼	09/27/17 17:02	09/28/17 10:54	5
Nickel	**15**		0.15	0.11	mg/Kg	☼	09/27/17 17:02	09/28/17 10:54	5
Selenium	**0.66**		0.29	0.13	mg/Kg	☼	09/27/17 17:02	09/28/17 10:54	5
Silver	**0.035**	**J**	0.058	0.012	mg/Kg	☼	09/27/17 17:02	09/28/17 10:54	5
Zinc	**85**		1.5	0.93	mg/Kg	☼	09/27/17 17:02	09/28/17 10:54	5

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.026**	**J**	0.038	0.012	mg/Kg	☼	10/02/17 12:02	10/02/17 14:39	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Volatile Solids	**1.9**		0.097	0.097	%			09/18/17 20:50	1
Sulfide	ND		15	3.6	mg/Kg	☼	09/17/17 19:15	09/18/17 00:05	1
Total Organic Carbon - Duplicates	**3500**	**H B**	2000	44	mg/Kg			10/05/17 09:47	1

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-1
Date Collected: 09/12/17 13:45
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-1
Matrix: Solid
Percent Solids: 67.0

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TOC Result 2	3500	H	2000	44	mg/Kg			10/05/17 09:47	1
TOC Result 1	3400	H B	2000	44	mg/Kg			10/05/17 09:47	1
Percent Solids	67.0		0.1	0.1	%			09/25/17 11:09	1
Percent Moisture	33.0		0.1	0.1	%			09/25/17 11:09	1
Total Solids	67.0		0.1	0.1	%			09/25/17 11:09	1
Total Solids	64		0.097	0.097	%			09/18/17 20:48	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND	F1	72	72	mg/Kg	☼		09/19/17 12:43	1

Method: PSEP Plumb 1981 - Grain Size (PSEP Plumb 1981)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Clay	1.0				%			09/20/17 09:05	1
Sand	87				%			09/20/17 09:05	1
Silt	9.5				%			09/20/17 09:05	1
Gravel	2.6				%			09/20/17 09:05	1
Cobbles	0.00				%			09/20/17 09:05	1

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-2

Date Collected: 09/12/17 15:30
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-2

Matrix: Solid
Percent Solids: 71.4

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND		19	3.2	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
2-Methylnaphthalene	ND		32	5.6	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
3 & 4 Methylphenol	ND		130	9.5	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Acenaphthene	ND		16	3.2	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Acenaphthylene	ND		16	3.2	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Anthracene	ND		16	3.2	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Benzo[a]anthracene	**7.7**	**J**	16	3.2	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Benzo[a]pyrene	ND		38	8.3	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Benzo[g,h,i]perylene	ND		38	9.5	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Benzofluoranthene	ND		95	22	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Benzoic acid	ND		1600	670	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Bis(2-ethylhexyl) phthalate	ND		380	86	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Carbazole	ND		95	20	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Chrysene	ND		38	8.3	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Dibenz(a,h)anthracene	ND		32	7.6	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Dibenzofuran	ND		95	23	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Di-n-butyl phthalate	ND		320	36	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Di-n-octyl phthalate	ND	*	130	140	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Fluoranthene	**16**		16	3.2	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Fluorene	ND		16	3.2	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Indeno[1,2,3-cd]pyrene	**6.7**	**J**	25	3.2	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Naphthalene	ND		16	3.2	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Pentachlorophenol	ND		250	58	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Phenanthrene	ND		38	7.6	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Phenol	ND		95	24	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5
Pyrene	**15**	**J**	38	9.5	ug/Kg	☼	09/22/17 09:53	09/23/17 18:00	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*89*		*10 - 126*	*09/22/17 09:53*	*09/23/17 18:00*	*5*
2-Fluorobiphenyl	*75*		*57 - 110*	*09/22/17 09:53*	*09/23/17 18:00*	*5*
2-Fluorophenol	*79*		*36 - 125*	*09/22/17 09:53*	*09/23/17 18:00*	*5*
Nitrobenzene-d5	*76*		*54 - 113*	*09/22/17 09:53*	*09/23/17 18:00*	*5*
Phenol-d5	*80*		*59 - 113*	*09/22/17 09:53*	*09/23/17 18:00*	*5*
Terphenyl-d14	*77*		*68 - 120*	*09/22/17 09:53*	*09/23/17 18:00*	*5*

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND	H	3.8	0.64	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
2-Methylnaphthalene	ND	H	6.4	1.1	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
3 & 4 Methylphenol	**4.6**	**J H**	25	1.9	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Acenaphthene	ND	H	3.2	0.64	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Acenaphthylene	ND	H	3.2	0.64	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Anthracene	ND	H	3.2	0.64	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Benzo[a]anthracene	**10**	**H**	3.2	0.64	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Benzo[a]pyrene	**8.9**	**H**	7.6	1.7	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Benzofluoranthene	**14**	**J H**	19	4.5	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Benzoic acid	ND	H	320	130	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Bis(2-ethylhexyl) phthalate	ND	H	76	17	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Carbazole	ND	H	19	3.9	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Chrysene	**8.1**	**H**	7.6	1.7	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-2

Date Collected: 09/12/17 15:30
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-2

Matrix: Solid
Percent Solids: 71.4

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibenz(a,h)anthracene	ND	H	6.4	1.5	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Dibenzofuran	ND	H	19	4.6	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Di-n-butyl phthalate	ND	H	64	7.2	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Di-n-octyl phthalate	ND	H	25	28	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Fluoranthene	**16**	**H**	3.2	0.64	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Fluorene	ND	H	3.2	0.64	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Naphthalene	**1.3**	**J H**	3.2	0.64	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Pentachlorophenol	ND	H *	51	12	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Phenanthrene	**3.1**	**J H**	7.6	1.5	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Phenol	ND	H	19	4.8	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1
Pyrene	**14**	**H**	7.6	1.9	ug/Kg	☼	09/22/17 09:53	12/21/17 19:33	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*83*		*10 - 126*	*09/22/17 09:53*	*12/21/17 19:33*	*1*
2-Fluorobiphenyl	*74*		*57 - 110*	*09/22/17 09:53*	*12/21/17 19:33*	*1*
2-Fluorophenol	*87*		*36 - 125*	*09/22/17 09:53*	*12/21/17 19:33*	*1*
Nitrobenzene-d5	*89*		*54 - 113*	*09/22/17 09:53*	*12/21/17 19:33*	*1*
Phenol-d5	*85*		*59 - 113*	*09/22/17 09:53*	*12/21/17 19:33*	*1*
Terphenyl-d14	*87*		*68 - 120*	*09/22/17 09:53*	*12/21/17 19:33*	*1*

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[g,h,i]perylene	**5.8**	**J H**	7.6	1.9	ug/Kg	☼	09/22/17 09:53	12/22/17 16:17	1
Indeno[1,2,3-cd]pyrene	**8.8**	**H**	5.1	0.64	ug/Kg	☼	09/22/17 09:53	12/22/17 16:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*79*		*10 - 126*	*09/22/17 09:53*	*12/22/17 16:17*	*1*
2-Fluorobiphenyl	*72*		*57 - 110*	*09/22/17 09:53*	*12/22/17 16:17*	*1*
2-Fluorophenol	*81*		*36 - 125*	*09/22/17 09:53*	*12/22/17 16:17*	*1*
Nitrobenzene-d5	*80*		*54 - 113*	*09/22/17 09:53*	*12/22/17 16:17*	*1*
Phenol-d5	*75*		*59 - 113*	*09/22/17 09:53*	*12/22/17 16:17*	*1*
Terphenyl-d14	*94*		*68 - 120*	*09/22/17 09:53*	*12/22/17 16:17*	*1*

Method: Organotins - Organotins, PSEP (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin	ND		18	4.1	ug/Kg	☼	09/26/17 13:24	10/02/17 15:15	1
Monobutyltin	ND	*	11	2.7	ug/Kg	☼	09/26/17 13:24	10/02/17 15:15	1
Tetra-n-butyltin	ND	*	55	16	ug/Kg	☼	09/26/17 13:24	10/02/17 15:15	1
Tributyltin	ND		9.6	2.1	ug/Kg	☼	09/26/17 13:24	10/02/17 15:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*30*		*10 - 113*	*09/26/17 13:24*	*10/02/17 15:15*	*1*

Method: Organotins - Organotins, PSEP (GC/MS) - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin	ND	H	17	4.0	ug/Kg	☼	10/04/17 16:32	10/05/17 19:57	1
Monobutyltin	ND	H	11	2.6	ug/Kg	☼	10/04/17 16:32	10/05/17 19:57	1
Tetra-n-butyltin	ND	H	53	15	ug/Kg	☼	10/04/17 16:32	10/05/17 19:57	1
Tributyltin	ND	H	9.2	2.0	ug/Kg	☼	10/04/17 16:32	10/05/17 19:57	1

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-2

Date Collected: 09/12/17 15:30
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-2

Matrix: Solid
Percent Solids: 71.4

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tripentyltin	*34*		*10 - 113*	*10/04/17 16:32*	*10/05/17 19:57*	*1*

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4'-DDD	ND		1.4	0.21	ug/Kg	☼	09/22/17 08:46	09/29/17 13:21	5
2,4'-DDE	ND		1.4	0.21	ug/Kg	☼	09/22/17 08:46	09/29/17 13:21	5
2,4'-DDT	ND		1.4	0.11	ug/Kg	☼	09/22/17 08:46	09/29/17 13:21	5
4,4'-DDD	ND		1.4	0.051	ug/Kg	☼	09/22/17 08:46	09/29/17 13:21	5
4,4'-DDE	ND		1.4	0.098	ug/Kg	☼	09/22/17 08:46	09/29/17 13:21	5
4,4'-DDT	ND		1.4	0.11	ug/Kg	☼	09/22/17 08:46	09/29/17 13:21	5
beta-Hexachlorocyclohexane	ND		0.69	0.079	ug/Kg	☼	09/22/17 08:46	09/29/17 13:21	5
Dieldrin	ND		1.4	0.082	ug/Kg	☼	09/22/17 08:46	09/29/17 13:21	5
Endrin ketone	ND		1.4	0.084	ug/Kg	☼	09/22/17 08:46	09/29/17 13:21	5

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	*52*		*16 - 123*	*09/22/17 08:46*	*09/29/17 13:21*	*5*
Tetrachloro-m-xylene	*66*		*38 - 121*	*09/22/17 08:46*	*09/29/17 13:21*	*5*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	ND		0.0013	0.000067	mg/Kg	☼	09/22/17 08:49	09/26/17 04:05	1
PCB-1221	ND		0.0015	0.00046	mg/Kg	☼	09/22/17 08:49	09/26/17 04:05	1
PCB-1232	ND		0.0015	0.00030	mg/Kg	☼	09/22/17 08:49	09/26/17 04:05	1
PCB-1242	ND		0.0013	0.00028	mg/Kg	☼	09/22/17 08:49	09/26/17 04:05	1
PCB-1248	ND		0.0015	0.00021	mg/Kg	☼	09/22/17 08:49	09/26/17 04:05	1
PCB-1254	ND		0.0013	0.00012	mg/Kg	☼	09/22/17 08:49	09/26/17 04:05	1
PCB-1260	ND		0.0013	0.00017	mg/Kg	☼	09/22/17 08:49	09/26/17 04:05	1
Polychlorinated biphenyls, Total	ND		0.0015	0.00046	mg/Kg	☼	09/22/17 08:49	09/26/17 04:05	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	*61*		*25 - 149*	*09/22/17 08:49*	*09/26/17 04:05*	*1*
Tetrachloro-m-xylene	*61*		*35 - 130*	*09/22/17 08:49*	*09/26/17 04:05*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		66	16	mg/Kg	☼	09/20/17 11:56	09/22/17 16:20	1
Motor Oil (>C24-C36)	**60**	**J**	66	12	mg/Kg	☼	09/20/17 11:56	09/22/17 16:20	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	*100*		*54 - 118*	*09/20/17 11:56*	*09/22/17 16:20*	*1*

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.2**		0.12	0.048	mg/Kg	☼	09/27/17 17:02	09/28/17 10:58	5
Cadmium	**0.16**		0.048	0.037	mg/Kg	☼	09/27/17 17:02	09/28/17 10:58	5
Chromium	**17**		0.12	0.030	mg/Kg	☼	09/27/17 17:02	09/28/17 10:58	5
Copper	**39**		0.24	0.11	mg/Kg	☼	09/27/17 17:02	09/28/17 10:58	5
Lead	**9.0**		0.12	0.023	mg/Kg	☼	09/27/17 17:02	09/28/17 10:58	5
Nickel	**16**		0.12	0.092	mg/Kg	☼	09/27/17 17:02	09/28/17 10:58	5
Selenium	**0.62**		0.24	0.10	mg/Kg	☼	09/27/17 17:02	09/28/17 10:58	5
Silver	**0.024**	**J**	0.048	0.0096	mg/Kg	☼	09/27/17 17:02	09/28/17 10:58	5
Zinc	**75**		1.2	0.77	mg/Kg	☼	09/27/17 17:02	09/28/17 10:58	5

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.021	J	0.038	0.011	mg/Kg	☼	10/02/17 12:02	10/02/17 14:41	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Volatile Solids	1.9		0.099	0.099	%			09/18/17 20:50	1
Sulfide	ND		14	3.4	mg/Kg	☼	09/17/17 19:15	09/18/17 00:05	1
Total Organic Carbon - Duplicates	2100	H B	2000	44	mg/Kg			10/05/17 11:17	1
TOC Result 2	2100	H	2000	44	mg/Kg			10/05/17 11:17	1
TOC Result 1	2100	H B	2000	44	mg/Kg			10/05/17 11:17	1
Percent Solids	71.4		0.1	0.1	%			09/25/17 11:09	1
Percent Moisture	28.6		0.1	0.1	%			09/25/17 11:09	1
Total Solids	71.4		0.1	0.1	%			09/25/17 11:09	1
Total Solids	68		0.099	0.099	%			09/18/17 20:48	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		46	46	mg/Kg	☼		09/19/17 12:43	1

Method: PSEP Plumb 1981 - Grain Size (PSEP Plumb 1981)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Clay	0.50				%			09/20/17 09:05	1
Sand	91				%			09/20/17 09:05	1
Silt	4.6				%			09/20/17 09:05	1
Gravel	4.1				%			09/20/17 09:05	1
Cobbles	0.00				%			09/20/17 09:05	1

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-3
Date Collected: 09/12/17 17:00
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-3
Matrix: Solid
Percent Solids: 76.5

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND		18	3.0	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
2-Methylnaphthalene	ND		30	5.4	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
3 & 4 Methylphenol	ND		120	9.1	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Acenaphthene	ND		15	3.0	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Acenaphthylene	ND		15	3.0	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Anthracene	ND		15	3.0	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Benzo[a]anthracene	ND		15	3.0	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Benzo[a]pyrene	ND		36	7.9	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Benzo[g,h,i]perylene	ND		36	9.1	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Benzofluoranthene	ND		91	21	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Benzoic acid	ND		1500	640	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Bis(2-ethylhexyl) phthalate	ND		360	83	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Carbazole	ND		91	19	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Chrysene	ND		36	7.9	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Dibenz(a,h)anthracene	ND		30	7.3	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Dibenzofuran	ND		91	22	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Di-n-butyl phthalate	ND		300	35	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Di-n-octyl phthalate	ND	*	120	140	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Fluoranthene	ND		15	3.0	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Fluorene	ND		15	3.0	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Indeno[1,2,3-cd]pyrene	ND		24	3.0	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Naphthalene	ND		15	3.0	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Pentachlorophenol	ND		240	55	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Phenanthrene	ND		36	7.3	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Phenol	ND		91	23	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5
Pyrene	ND		36	9.1	ug/Kg	☼	09/22/17 09:53	09/23/17 18:25	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*81*		*10 - 126*	*09/22/17 09:53*	*09/23/17 18:25*	*5*
2-Fluorobiphenyl	*70*		*57 - 110*	*09/22/17 09:53*	*09/23/17 18:25*	*5*
2-Fluorophenol	*75*		*36 - 125*	*09/22/17 09:53*	*09/23/17 18:25*	*5*
Nitrobenzene-d5	*75*		*54 - 113*	*09/22/17 09:53*	*09/23/17 18:25*	*5*
Phenol-d5	*81*		*59 - 113*	*09/22/17 09:53*	*09/23/17 18:25*	*5*
Terphenyl-d14	*76*		*68 - 120*	*09/22/17 09:53*	*09/23/17 18:25*	*5*

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND	H	3.6	0.61	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
2-Methylnaphthalene	ND	H	6.1	1.1	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
3 & 4 Methylphenol	**2.8**	**J H**	24	1.8	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Acenaphthene	ND	H	3.0	0.61	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Acenaphthylene	ND	H	3.0	0.61	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Anthracene	ND	H	3.0	0.61	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Benzo[a]anthracene	ND	H	3.0	0.61	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Benzo[a]pyrene	ND	H	7.3	1.6	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Benzo[g,h,i]perylene	ND	H	7.3	1.8	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Benzofluoranthene	ND	H	18	4.3	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Benzoic acid	ND	H	300	130	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Bis(2-ethylhexyl) phthalate	ND	H	73	17	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Carbazole	ND	H	18	3.8	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-3
Date Collected: 09/12/17 17:00
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-3
Matrix: Solid
Percent Solids: 76.5

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chrysene	ND	H	7.3	1.6	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Dibenz(a,h)anthracene	ND	H	6.1	1.5	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Dibenzofuran	ND	H	18	4.4	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Di-n-butyl phthalate	**8.0**	**J H**	61	6.9	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Di-n-octyl phthalate	ND	H	24	27	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Fluoranthene	ND	H	3.0	0.61	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Fluorene	ND	H	3.0	0.61	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Indeno[1,2,3-cd]pyrene	ND	H	4.9	0.61	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Naphthalene	**0.65**	**J H**	3.0	0.61	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Pentachlorophenol	ND	H *	49	11	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Phenanthrene	ND	H	7.3	1.5	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Phenol	ND	H	18	4.6	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1
Pyrene	ND	H	7.3	1.8	ug/Kg	☼	09/22/17 09:53	12/21/17 19:58	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*88*		*10 - 126*	*09/22/17 09:53*	*12/21/17 19:58*	*1*
2-Fluorobiphenyl	*80*		*57 - 110*	*09/22/17 09:53*	*12/21/17 19:58*	*1*
2-Fluorophenol	*89*		*36 - 125*	*09/22/17 09:53*	*12/21/17 19:58*	*1*
Nitrobenzene-d5	*84*		*54 - 113*	*09/22/17 09:53*	*12/21/17 19:58*	*1*
Phenol-d5	*91*		*59 - 113*	*09/22/17 09:53*	*12/21/17 19:58*	*1*
Terphenyl-d14	*96*		*68 - 120*	*09/22/17 09:53*	*12/21/17 19:58*	*1*

Method: Organotins - Organotins, PSEP (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin	ND		16	3.7	ug/Kg	☼	09/26/17 13:24	10/02/17 15:41	1
Monobutyltin	ND	*	9.8	2.4	ug/Kg	☼	09/26/17 13:24	10/02/17 15:41	1
Tetra-n-butyltin	ND	*	49	14	ug/Kg	☼	09/26/17 13:24	10/02/17 15:41	1
Tributyltin	ND		8.6	1.9	ug/Kg	☼	09/26/17 13:24	10/02/17 15:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*37*		*10 - 113*	*09/26/17 13:24*	*10/02/17 15:41*	*1*

Method: Organotins - Organotins, PSEP (GC/MS) - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin	ND	H	17	3.9	ug/Kg	☼	10/04/17 16:32	10/05/17 20:23	1
Monobutyltin	ND	H	10	2.6	ug/Kg	☼	10/04/17 16:32	10/05/17 20:23	1
Tetra-n-butyltin	ND	H	51	15	ug/Kg	☼	10/04/17 16:32	10/05/17 20:23	1
Tributyltin	ND	H	9.0	2.0	ug/Kg	☼	10/04/17 16:32	10/05/17 20:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*25*		*10 - 113*	*10/04/17 16:32*	*10/05/17 20:23*	*1*

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4'-DDD	ND		1.3	0.19	ug/Kg	☼	09/22/17 08:46	09/29/17 13:40	5
2,4'-DDE	ND		1.3	0.19	ug/Kg	☼	09/22/17 08:46	09/29/17 13:40	5
2,4'-DDT	ND		1.3	0.10	ug/Kg	☼	09/22/17 08:46	09/29/17 13:40	5
4,4'-DDD	ND		1.3	0.048	ug/Kg	☼	09/22/17 08:46	09/29/17 13:40	5
4,4'-DDE	ND		1.3	0.091	ug/Kg	☼	09/22/17 08:46	09/29/17 13:40	5
4,4'-DDT	ND		1.3	0.098	ug/Kg	☼	09/22/17 08:46	09/29/17 13:40	5
beta-Hexachlorocyclohexane	ND		0.65	0.074	ug/Kg	☼	09/22/17 08:46	09/29/17 13:40	5

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-3
Date Collected: 09/12/17 17:00
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-3
Matrix: Solid
Percent Solids: 76.5

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dieldrin	ND		1.3	0.076	ug/Kg	☼	09/22/17 08:46	09/29/17 13:40	5
Endrin ketone	ND		1.3	0.078	ug/Kg	☼	09/22/17 08:46	09/29/17 13:40	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*62*		*16 - 123*	*09/22/17 08:46*	*09/29/17 13:40*	*5*
Tetrachloro-m-xylene	*84*		*38 - 121*	*09/22/17 08:46*	*09/29/17 13:40*	*5*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	ND		0.0012	0.000060	mg/Kg	☼	09/22/17 08:49	09/26/17 04:22	1
PCB-1221	ND		0.0013	0.00041	mg/Kg	☼	09/22/17 08:49	09/26/17 04:22	1
PCB-1232	ND		0.0013	0.00026	mg/Kg	☼	09/22/17 08:49	09/26/17 04:22	1
PCB-1242	ND		0.0012	0.00025	mg/Kg	☼	09/22/17 08:49	09/26/17 04:22	1
PCB-1248	ND		0.0013	0.00019	mg/Kg	☼	09/22/17 08:49	09/26/17 04:22	1
PCB-1254	ND		0.0012	0.00011	mg/Kg	☼	09/22/17 08:49	09/26/17 04:22	1
PCB-1260	ND		0.0012	0.00016	mg/Kg	☼	09/22/17 08:49	09/26/17 04:22	1
Polychlorinated biphenyls, Total	ND		0.0013	0.00041	mg/Kg	☼	09/22/17 08:49	09/26/17 04:22	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*55*		*25 - 149*	*09/22/17 08:49*	*09/26/17 04:22*	*1*
Tetrachloro-m-xylene	*56*		*35 - 130*	*09/22/17 08:49*	*09/26/17 04:22*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		62	15	mg/Kg	☼	09/20/17 11:56	09/22/17 16:40	1
Motor Oil (>C24-C36)	**30**	**J**	62	11	mg/Kg	☼	09/20/17 11:56	09/22/17 16:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*97*		*54 - 118*	*09/20/17 11:56*	*09/22/17 16:40*	*1*

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**6.5**		0.16	0.063	mg/Kg	☼	09/27/17 17:02	09/28/17 11:02	5
Cadmium	**0.16**		0.063	0.049	mg/Kg	☼	09/27/17 17:02	09/28/17 11:02	5
Chromium	**16**		0.16	0.040	mg/Kg	☼	09/27/17 17:02	09/28/17 11:02	5
Copper	**37**		0.32	0.14	mg/Kg	☼	09/27/17 17:02	09/28/17 11:02	5
Lead	**7.7**		0.16	0.030	mg/Kg	☼	09/27/17 17:02	09/28/17 11:02	5
Nickel	**16**		0.16	0.12	mg/Kg	☼	09/27/17 17:02	09/28/17 11:02	5
Selenium	**0.52**		0.32	0.14	mg/Kg	☼	09/27/17 17:02	09/28/17 11:02	5
Silver	**0.021**	**J**	0.063	0.013	mg/Kg	☼	09/27/17 17:02	09/28/17 11:02	5
Zinc	**65**		1.6	1.0	mg/Kg	☼	09/27/17 17:02	09/28/17 11:02	5

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.042**		0.026	0.0078	mg/Kg	☼	10/02/17 12:02	10/02/17 14:43	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Volatile Solids	**2.4**		0.10	0.10	%			09/18/17 20:50	1
Sulfide	ND		13	3.1	mg/Kg	☼	09/17/17 19:15	09/18/17 00:05	1
Total Organic Carbon - Duplicates	**1600**	**J H B**	2000	44	mg/Kg			10/05/17 11:31	1

Client Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-3
Date Collected: 09/12/17 17:00
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-3
Matrix: Solid
Percent Solids: 76.5

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TOC Result 2	1500	J H	2000	44	mg/Kg			10/05/17 11:31	1
TOC Result 1	1600	J H B	2000	44	mg/Kg			10/05/17 11:31	1
Percent Solids	76.5		0.1	0.1	%			09/25/17 11:09	1
Percent Moisture	23.5		0.1	0.1	%			09/25/17 11:09	1
Total Solids	76.5		0.1	0.1	%			09/25/17 11:09	1
Total Solids	65		0.10	0.10	%			09/18/17 20:48	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		51	51	mg/Kg	☼		09/19/17 12:43	1

Method: PSEP Plumb 1981 - Grain Size (PSEP Plumb 1981)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Clay	0.40				%			09/20/17 09:05	1
Sand	83				%			09/20/17 09:05	1
Silt	2.8				%			09/20/17 09:05	1
Gravel	14				%			09/20/17 09:05	1
Cobbles	0.00				%			09/20/17 09:05	1

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-256990/1-A
Matrix: Solid
Analysis Batch: 257097

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256990

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND		3.0	0.50	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
2-Methylnaphthalene	ND		5.0	0.88	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
3 & 4 Methylphenol	ND		20	1.5	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Acenaphthene	ND		2.5	0.50	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Acenaphthylene	ND		2.5	0.50	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Anthracene	ND		2.5	0.50	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Benzo[a]anthracene	ND		2.5	0.50	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Benzo[a]pyrene	ND		6.0	1.3	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Benzo[g,h,i]perylene	ND		6.0	1.5	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Benzofluoranthene	ND		15	3.5	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Benzoic acid	ND		250	110	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Bis(2-ethylhexyl) phthalate	ND		60	14	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Carbazole	ND		15	3.1	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Chrysene	ND		6.0	1.3	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Dibenz(a,h)anthracene	ND		5.0	1.2	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Dibenzofuran	ND		15	3.6	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Di-n-butyl phthalate	ND		50	5.7	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Di-n-octyl phthalate	ND		20	22	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Fluoranthene	ND		2.5	0.50	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Fluorene	ND		2.5	0.50	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Indeno[1,2,3-cd]pyrene	ND		4.0	0.50	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Naphthalene	ND		2.5	0.50	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Pentachlorophenol	ND		40	9.1	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Phenanthrene	ND		6.0	1.2	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Phenol	ND		15	3.8	ug/Kg		09/22/17 09:53	09/23/17 12:53	1
Pyrene	ND		6.0	1.5	ug/Kg		09/22/17 09:53	09/23/17 12:53	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*62*		*10 - 126*	*09/22/17 09:53*	*09/23/17 12:53*	*1*
2-Fluorobiphenyl	*72*		*57 - 110*	*09/22/17 09:53*	*09/23/17 12:53*	*1*
2-Fluorophenol	*77*		*36 - 125*	*09/22/17 09:53*	*09/23/17 12:53*	*1*
Nitrobenzene-d5	*80*		*54 - 113*	*09/22/17 09:53*	*09/23/17 12:53*	*1*
Phenol-d5	*83*		*59 - 113*	*09/22/17 09:53*	*09/23/17 12:53*	*1*
Terphenyl-d14	*78*		*68 - 120*	*09/22/17 09:53*	*09/23/17 12:53*	*1*

Lab Sample ID: LCS 580-256990/2-A
Matrix: Solid
Analysis Batch: 257097

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256990

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1-Methylnaphthalene	100	99.8		ug/Kg		100	76 - 120
2-Methylnaphthalene	100	97.4		ug/Kg		97	71 - 120
3 & 4 Methylphenol	100	104		ug/Kg		104	70 - 120
Acenaphthene	100	91.1		ug/Kg		91	71 - 120
Acenaphthylene	100	92.3		ug/Kg		92	73 - 128
Anthracene	100	102		ug/Kg		102	74 - 120
Benzo[a]anthracene	100	106		ug/Kg		106	73 - 120
Benzo[a]pyrene	100	101		ug/Kg		101	72 - 121

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 580-256990/2-A
Matrix: Solid
Analysis Batch: 257097

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256990

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[g,h,i]perylene	100	103		ug/Kg		103	75 - 122
Benzofluoranthene	200	199		ug/Kg		99	71 - 120
Benzoic acid	200	ND		ug/Kg		13	10 - 141
Bis(2-ethylhexyl) phthalate	100	123		ug/Kg		123	66 - 130
Carbazole	100	105		ug/Kg		105	80 - 131
Chrysene	100	98.0		ug/Kg		98	71 - 120
Dibenz(a,h)anthracene	100	108		ug/Kg		108	71 - 120
Dibenzofuran	100	90.4		ug/Kg		90	77 - 120
Di-n-butyl phthalate	100	119		ug/Kg		119	68 - 129
Di-n-octyl phthalate	100	126	*	ug/Kg		126	68 - 124
Fluoranthene	100	94.8		ug/Kg		95	75 - 120
Fluorene	100	88.1		ug/Kg		88	68 - 121
Indeno[1,2,3-cd]pyrene	100	98.1		ug/Kg		98	75 - 120
Naphthalene	100	93.8		ug/Kg		94	75 - 120
Pentachlorophenol	200	74.2		ug/Kg		37	36 - 120
Phenanthrene	100	96.4		ug/Kg		96	73 - 120
Phenol	100	101		ug/Kg		101	65 - 120
Pyrene	100	95.9		ug/Kg		96	73 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2,4,6-Tribromophenol	*79*		*10 - 126*
2-Fluorobiphenyl	*81*		*57 - 110*
2-Fluorophenol	*93*		*36 - 125*
Nitrobenzene-d5	*101*		*54 - 113*
Phenol-d5	*100*		*59 - 113*
Terphenyl-d14	*88*		*68 - 120*

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA

Lab Sample ID: MB 580-264022/1-A
Matrix: Solid
Analysis Batch: 263999

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 264022

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene - RA	ND		3.0	0.50	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
2-Methylnaphthalene - RA	ND		5.0	0.88	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
3 & 4 Methylphenol - RA	ND		20	1.5	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Acenaphthene - RA	ND		2.5	0.50	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Acenaphthylene - RA	ND		2.5	0.50	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Anthracene - RA	ND		2.5	0.50	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Benzo[a]anthracene - RA	ND		2.5	0.50	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Benzo[a]pyrene - RA	ND		6.0	1.3	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Benzo[g,h,i]perylene - RA	ND		6.0	1.5	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Benzofluoranthene - RA	ND		15	3.5	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Benzoic acid - RA	ND		250	110	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Bis(2-ethylhexyl) phthalate - RA	ND		60	14	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Carbazole - RA	ND		15	3.1	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Chrysene - RA	ND		6.0	1.3	ug/Kg		09/22/17 09:53	12/21/17 18:18	1

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA (Continued)

Lab Sample ID: MB 580-264022/1-A
Matrix: Solid
Analysis Batch: 263999

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 264022

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibenz(a,h)anthracene - RA	ND		5.0	1.2	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Dibenzofuran - RA	ND		15	3.6	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Di-n-butyl phthalate - RA	ND		50	5.7	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Di-n-octyl phthalate - RA	ND		20	22	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Fluoranthene - RA	ND		2.5	0.50	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Fluorene - RA	ND		2.5	0.50	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Indeno[1,2,3-cd]pyrene - RA	ND		4.0	0.50	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Naphthalene - RA	ND		2.5	0.50	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Pentachlorophenol - RA	ND		40	9.1	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Phenanthrene - RA	ND		6.0	1.2	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Phenol - RA	ND		15	3.8	ug/Kg		09/22/17 09:53	12/21/17 18:18	1
Pyrene - RA	ND		6.0	1.5	ug/Kg		09/22/17 09:53	12/21/17 18:18	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol - RA	*41*		*10 - 126*	*09/22/17 09:53*	*12/21/17 18:18*	*1*
2-Fluorobiphenyl - RA	*82*		*57 - 110*	*09/22/17 09:53*	*12/21/17 18:18*	*1*
2-Fluorophenol - RA	*78*		*36 - 125*	*09/22/17 09:53*	*12/21/17 18:18*	*1*
Nitrobenzene-d5 - RA	*92*		*54 - 113*	*09/22/17 09:53*	*12/21/17 18:18*	*1*
Phenol-d5 - RA	*75*		*59 - 113*	*09/22/17 09:53*	*12/21/17 18:18*	*1*
Terphenyl-d14 - RA	*108*		*68 - 120*	*09/22/17 09:53*	*12/21/17 18:18*	*1*

Lab Sample ID: LCS 580-264022/2-A
Matrix: Solid
Analysis Batch: 263999

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 264022

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1-Methylnaphthalene - RA	100	82.7		ug/Kg		83	76 - 120
2-Methylnaphthalene - RA	100	85.9		ug/Kg		86	71 - 120
3 & 4 Methylphenol - RA	100	76.5		ug/Kg		77	70 - 120
Acenaphthene - RA	100	82.1		ug/Kg		82	71 - 120
Acenaphthylene - RA	100	87.0		ug/Kg		87	73 - 128
Anthracene - RA	100	89.1		ug/Kg		89	74 - 120
Benzo[a]anthracene - RA	100	102		ug/Kg		102	73 - 120
Benzo[a]pyrene - RA	100	84.2		ug/Kg		84	72 - 121
Benzo[g,h,i]perylene - RA	100	110		ug/Kg		110	75 - 122
Benzofluoranthene - RA	200	204		ug/Kg		102	71 - 120
Benzoic acid - RA	200	ND		ug/Kg		24	10 - 141
Bis(2-ethylhexyl) phthalate - RA	100	97.7		ug/Kg		98	66 - 130
Carbazole - RA	100	124		ug/Kg		124	80 - 131
Chrysene - RA	100	86.5		ug/Kg		86	71 - 120
Dibenz(a,h)anthracene - RA	100	115		ug/Kg		115	71 - 120
Dibenzofuran - RA	100	86.1		ug/Kg		86	77 - 120
Di-n-butyl phthalate - RA	100	92.6		ug/Kg		93	68 - 129
Di-n-octyl phthalate - RA	100	106		ug/Kg		106	68 - 124
Fluoranthene - RA	100	99.1		ug/Kg		99	75 - 120
Fluorene - RA	100	83.7		ug/Kg		84	68 - 121
Indeno[1,2,3-cd]pyrene - RA	100	118		ug/Kg		118	75 - 120
Naphthalene - RA	100	79.3		ug/Kg		79	75 - 120

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - RA (Continued)

Lab Sample ID: LCS 580-264022/2-A
Matrix: Solid
Analysis Batch: 263999

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 264022

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Pentachlorophenol - RA	200	28.5	J *	ug/Kg		14	36 - 120
Phenanthrene - RA	100	91.9		ug/Kg		92	73 - 120
Phenol - RA	100	80.1		ug/Kg		80	65 - 120
Pyrene - RA	100	94.1		ug/Kg		94	73 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2,4,6-Tribromophenol - RA	*72*		*10 - 126*
2-Fluorobiphenyl - RA	*80*		*57 - 110*
2-Fluorophenol - RA	*89*		*36 - 125*
Nitrobenzene-d5 - RA	*97*		*54 - 113*
Phenol-d5 - RA	*98*		*59 - 113*
Terphenyl-d14 - RA	*106*		*68 - 120*

Method: Organotins - Organotins, PSEP (GC/MS)

Lab Sample ID: MB 580-257308/1-A
Matrix: Solid
Analysis Batch: 257811

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257308

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin	ND		13	3.0	ug/Kg		09/26/17 13:24	10/02/17 13:58	1
Monobutyltin	ND		8.0	2.0	ug/Kg		09/26/17 13:24	10/02/17 13:58	1
Tetra-n-butyltin	ND		40	12	ug/Kg		09/26/17 13:24	10/02/17 13:58	1
Tributyltin	ND		7.0	1.5	ug/Kg		09/26/17 13:24	10/02/17 13:58	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*651*	*X*	*10 - 113*	*09/26/17 13:24*	*10/02/17 13:58*	*1*

Lab Sample ID: LCS 580-257308/2-A
Matrix: Solid
Analysis Batch: 257811

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 257308

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dibutyltin	61.9	15.8		ug/Kg		26	15 - 141
Monobutyltin	50.2	2.36	J *	ug/Kg		5	10 - 140
Tetra-n-butyltin	80.6	ND	*	ug/Kg		0	10 - 110
Tributyltin	71.8	30.4		ug/Kg		42	14 - 150

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Tripentyltin	*6400*	*X*	*10 - 113*

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: Organotins - Organotins, PSEP (GC/MS) - RE

Lab Sample ID: MB 580-258108/1-A
Matrix: Solid
Analysis Batch: 258166

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 258108

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin - RE	ND		13	3.0	ug/Kg		10/04/17 16:32	10/05/17 15:35	1
Monobutyltin - RE	ND		8.0	2.0	ug/Kg		10/04/17 16:32	10/05/17 15:35	1
Tetra-n-butyltin - RE	ND		40	12	ug/Kg		10/04/17 16:32	10/05/17 15:35	1
Tributyltin - RE	ND		7.0	1.5	ug/Kg		10/04/17 16:32	10/05/17 15:35	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin - RE	*53*		*10 - 113*	*10/04/17 16:32*	*10/05/17 15:35*	*1*

Lab Sample ID: LCS 580-258108/2-A
Matrix: Solid
Analysis Batch: 258166

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 258108

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dibutyltin - RE	61.9	36.0		ug/Kg		58	15 - 141
Monobutyltin - RE	50.2	17.8		ug/Kg		36	10 - 140
Tetra-n-butyltin - RE	80.6	28.8	J	ug/Kg		36	10 - 110
Tributyltin - RE	71.8	40.1		ug/Kg		56	14 - 150

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Tripentyltin - RE	*56*		*10 - 113*

Method: 8081B - Organochlorine Pesticides (GC)

Lab Sample ID: MB 580-256979/1-A
Matrix: Solid
Analysis Batch: 257614

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256979

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4'-DDD	ND		0.20	0.030	ug/Kg		09/22/17 08:46	09/29/17 08:21	1
2,4'-DDE	ND		0.20	0.030	ug/Kg		09/22/17 08:46	09/29/17 08:21	1
2,4'-DDT	ND		0.20	0.016	ug/Kg		09/22/17 08:46	09/29/17 08:21	1
4,4'-DDD	ND		0.20	0.0074	ug/Kg		09/22/17 08:46	09/29/17 08:21	1
4,4'-DDE	ND		0.20	0.014	ug/Kg		09/22/17 08:46	09/29/17 08:21	1
4,4'-DDT	ND		0.20	0.015	ug/Kg		09/22/17 08:46	09/29/17 08:21	1
beta-Hexachlorocyclohexane	ND		0.10	0.011	ug/Kg		09/22/17 08:46	09/29/17 08:21	1
Dieldrin	ND		0.20	0.012	ug/Kg		09/22/17 08:46	09/29/17 08:21	1
Endrin ketone	ND		0.20	0.012	ug/Kg		09/22/17 08:46	09/29/17 08:21	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*56*		*16 - 123*	*09/22/17 08:46*	*09/29/17 08:21*	*1*
Tetrachloro-m-xylene	*75*		*38 - 121*	*09/22/17 08:46*	*09/29/17 08:21*	*1*

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Lab Sample ID: LCS 580-256979/2-A
Matrix: Solid
Analysis Batch: 257614

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256979

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
4,4'-DDD	2.50	1.88		ug/Kg		75	68 - 122
4,4'-DDE	2.50	1.64		ug/Kg		65	64 - 121
4,4'-DDT	2.50	2.03		ug/Kg		81	49 - 137
beta-Hexachlorocyclohexane	2.50	1.58		ug/Kg		63	62 - 112
Dieldrin	2.50	1.62		ug/Kg		65	63 - 121
Endrin ketone	2.50	1.76		ug/Kg		70	56 - 128

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
DCB Decachlorobiphenyl	*58*		*16 - 123*
Tetrachloro-m-xylene	*76*		*38 - 121*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 580-256982/1-A
Matrix: Solid
Analysis Batch: 257244

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256982

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	ND		0.0010	0.000050	mg/Kg		09/22/17 08:49	09/26/17 03:12	1
PCB-1221	ND		0.0011	0.00034	mg/Kg		09/22/17 08:49	09/26/17 03:12	1
PCB-1232	ND		0.0011	0.00022	mg/Kg		09/22/17 08:49	09/26/17 03:12	1
PCB-1242	ND		0.0010	0.00021	mg/Kg		09/22/17 08:49	09/26/17 03:12	1
PCB-1248	ND		0.0011	0.00016	mg/Kg		09/22/17 08:49	09/26/17 03:12	1
PCB-1254	ND		0.0010	0.000090	mg/Kg		09/22/17 08:49	09/26/17 03:12	1
PCB-1260	ND		0.0010	0.00013	mg/Kg		09/22/17 08:49	09/26/17 03:12	1
Polychlorinated biphenyls, Total	ND		0.0011	0.00034	mg/Kg		09/22/17 08:49	09/26/17 03:12	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*85*		*25 - 149*	*09/22/17 08:49*	*09/26/17 03:12*	*1*
Tetrachloro-m-xylene	*67*		*35 - 130*	*09/22/17 08:49*	*09/26/17 03:12*	*1*

Lab Sample ID: LCS 580-256982/2-A
Matrix: Solid
Analysis Batch: 257244

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256982

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
PCB-1016	0.0125	0.00929		mg/Kg		74	69 - 126
PCB-1260	0.0125	0.00959		mg/Kg		77	68 - 136

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
DCB Decachlorobiphenyl	*80*		*25 - 149*
Tetrachloro-m-xylene	*63*		*35 - 130*

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-256713/1-A
Matrix: Solid
Analysis Batch: 257001

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256713

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		50	12	mg/Kg		09/20/17 11:56	09/22/17 14:39	1
Motor Oil (>C24-C36)	ND		50	9.1	mg/Kg		09/20/17 11:56	09/22/17 14:39	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*106*		*54 - 118*	*09/20/17 11:56*	*09/22/17 14:39*	*1*

Lab Sample ID: LCS 580-256713/2-A
Matrix: Solid
Analysis Batch: 257001

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256713

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
#2 Diesel (C10-C24)			500	500		mg/Kg		100	70 - 125		
Motor Oil (>C24-C36)			500	544		mg/Kg		109	70 - 119		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*84*		*54 - 118*

Lab Sample ID: LCSD 580-256713/3-A
Matrix: Solid
Analysis Batch: 257001

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 256713

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)			500	500		mg/Kg		100	70 - 125	0	16
Motor Oil (>C24-C36)			500	529		mg/Kg		106	70 - 119	3	16

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*93*		*54 - 118*

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 580-257478/18-A
Matrix: Solid
Analysis Batch: 257540

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257478

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.13	0.050	mg/Kg		09/27/17 17:02	09/28/17 09:46	5
Cadmium	ND		0.050	0.039	mg/Kg		09/27/17 17:02	09/28/17 09:46	5
Chromium	ND		0.13	0.032	mg/Kg		09/27/17 17:02	09/28/17 09:46	5
Copper	ND		0.25	0.11	mg/Kg		09/27/17 17:02	09/28/17 09:46	5
Lead	ND		0.13	0.024	mg/Kg		09/27/17 17:02	09/28/17 09:46	5
Nickel	ND		0.13	0.097	mg/Kg		09/27/17 17:02	09/28/17 09:46	5
Selenium	ND		0.25	0.11	mg/Kg		09/27/17 17:02	09/28/17 09:46	5
Silver	ND		0.050	0.010	mg/Kg		09/27/17 17:02	09/28/17 09:46	5
Zinc	ND		1.3	0.81	mg/Kg		09/27/17 17:02	09/28/17 09:46	5

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 580-257478/19-A
Matrix: Solid
Analysis Batch: 257540

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 257478

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	200	212		mg/Kg		106	80 - 120
Cadmium	5.00	5.31		mg/Kg		106	80 - 120
Chromium	20.0	21.2		mg/Kg		106	80 - 120
Copper	25.0	26.6		mg/Kg		106	80 - 120
Lead	50.0	53.1		mg/Kg		106	80 - 120
Nickel	50.0	52.2		mg/Kg		104	80 - 120
Selenium	200	213		mg/Kg		107	80 - 120
Silver	30.0	31.8		mg/Kg		106	80 - 120
Zinc	200	209		mg/Kg		105	80 - 120

Lab Sample ID: LCSD 580-257478/20-A
Matrix: Solid
Analysis Batch: 257540

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 257478

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	200	205		mg/Kg		103	80 - 120	3	20
Cadmium	5.00	5.12		mg/Kg		102	80 - 120	4	20
Chromium	20.0	20.3		mg/Kg		102	80 - 120	4	20
Copper	25.0	26.2		mg/Kg		105	80 - 120	1	20
Lead	50.0	51.4		mg/Kg		103	80 - 120	3	20
Nickel	50.0	50.8		mg/Kg		102	80 - 120	3	20
Selenium	200	206		mg/Kg		103	80 - 120	3	20
Silver	30.0	30.8		mg/Kg		103	80 - 120	3	20
Zinc	200	203		mg/Kg		101	80 - 120	3	20

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 580-257808/22-A
Matrix: Solid
Analysis Batch: 257835

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257808

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.030	0.0090	mg/Kg		10/02/17 12:02	10/02/17 13:42	1

Lab Sample ID: LCS 580-257808/23-A
Matrix: Solid
Analysis Batch: 257835

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 257808

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.167	0.186		mg/Kg		111	80 - 120

Lab Sample ID: LCSD 580-257808/24-A
Matrix: Solid
Analysis Batch: 257835

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 257808

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.167	0.176		mg/Kg		106	80 - 120	5	20

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 160.4 - Solids, Volatile and Fixed (VS)

Lab Sample ID: MB 280-388058/1
Matrix: Solid
Analysis Batch: 388058

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Volatile Solids	ND		0.10	0.10	%			09/18/17 20:50	1

Method: 350.1/Plumb - Nitrogen, Ammonia

Lab Sample ID: MB 580-256544/1-A
Matrix: Solid
Analysis Batch: 256588

Client Sample ID: Method Blank
Prep Type: Soluble

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		50	50	mg/Kg			09/19/17 12:43	1

Lab Sample ID: LCS 580-256544/2-A
Matrix: Solid
Analysis Batch: 256588

Client Sample ID: Lab Control Sample
Prep Type: Soluble

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Ammonia			500	467		mg/Kg		93	90 - 110		

Lab Sample ID: 580-71236-1 MS
Matrix: Solid
Analysis Batch: 256588

Client Sample ID: OF2-1
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Ammonia	ND	F1	718	636	F1	mg/Kg	☼	89	90 - 110		

Lab Sample ID: 580-71236-1 MSD
Matrix: Solid
Analysis Batch: 256588

Client Sample ID: OF2-1
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ammonia	ND	F1	638	561	F1	mg/Kg	☼	88	90 - 110	13	20

Lab Sample ID: 580-71236-1 DU
Matrix: Solid
Analysis Batch: 256588

Client Sample ID: OF2-1
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Ammonia	ND	F1		ND		mg/Kg	☼			NC	20

Method: 9034 - Sulfide, Acid Soluble and Insoluble (Titrimetric)

Lab Sample ID: MB 280-387926/1-A
Matrix: Solid
Analysis Batch: 387927

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 387926

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		10	2.4	mg/Kg		09/17/17 19:15	09/18/17 00:05	1

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 9034 - Sulfide, Acid Soluble and Insoluble (Titrimetric) (Continued)

Lab Sample ID: LCS 280-387926/2-A
Matrix: Solid
Analysis Batch: 387927

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 387926

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	103	84.0		mg/Kg		81	38 - 104

Method: 9060_PSEP - TOC (Puget Sound)

Lab Sample ID: MB 580-258182/3
Matrix: Solid
Analysis Batch: 258182

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon - Duplicates	118	J	2000	44	mg/Kg			10/05/17 09:26	1
TOC Result 1	118	J	2000	44	mg/Kg			10/05/17 09:26	1

Lab Sample ID: LCS 580-258182/4
Matrix: Solid
Analysis Batch: 258182

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon - Duplicates	4620	5290		mg/Kg		114	68 - 149

Lab Sample ID: LCSD 580-258182/5
Matrix: Solid
Analysis Batch: 258182

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Organic Carbon - Duplicates	4620	5370		mg/Kg		116	68 - 149	2	32

Lab Sample ID: 580-71236-1 MS
Matrix: Solid
Analysis Batch: 258182

Client Sample ID: OF2-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon - Duplicates	3500	H B	120000	112000		mg/Kg		91	68 - 149

Lab Sample ID: 580-71236-1 MSD
Matrix: Solid
Analysis Batch: 258182

Client Sample ID: OF2-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Organic Carbon - Duplicates	3500	H B	120000	113000		mg/Kg		91	68 - 149	1	32

QC Sample Results

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Method: 9060_PSEP - TOC (Puget Sound) (Continued)

Lab Sample ID: 580-71236-1 DU
Matrix: Solid
Analysis Batch: 258182

Client Sample ID: OF2-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Organic Carbon - Duplicates	3500	H B		2660		mg/Kg				26	50
TOC Result 2	3500	H		2370		mg/Kg				39	
TOC Result 1	3400	H B		2950		mg/Kg				14	

Lab Sample ID: 580-71236-2 DU
Matrix: Solid
Analysis Batch: 258182

Client Sample ID: OF2-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Organic Carbon - Duplicates	2100	H B		5530	F3	mg/Kg				90	50
TOC Result 2	2100	H		6880		mg/Kg				106	
TOC Result 1	2100	H B		4180		mg/Kg				68	

Lab Sample ID: 580-71236-2 TRL
Matrix: Solid
Analysis Batch: 258182

Client Sample ID: OF2-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		TRL Result	TRL Qualifier	Unit	D			RSD	RSD Limit
Total Organic Carbon - Duplicates	2100	H B		3650		mg/Kg				46	
TOC Result 2	2100	H		5450		mg/Kg				51	
TOC Result 1	2100	H B		1850	J	mg/Kg				48	

Method: SM 2540B - Solids, Total

Lab Sample ID: MB 280-388057/1
Matrix: Solid
Analysis Batch: 388057

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Solids	ND		0.10	0.10	%			09/18/17 20:48	1

Lab Chronicle

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-1

Lab Sample ID: 580-71236-1

Date Collected: 09/12/17 13:45

Matrix: Solid

Date Received: 09/13/17 12:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	160.4		1	388058	09/18/17 20:50	SVC	TAL DEN
Total/NA	Analysis	9060_PSEP		1	258182	10/05/17 09:47	J1Y	TAL SEA
Total/NA	Analysis	D 2216		1	257164	09/25/17 11:09	APR	TAL SEA
Total/NA	Analysis	SM 2540B		1	388057	09/18/17 20:48	SVC	TAL DEN
Total/NA	Analysis	PSEP Plumb 1981		1	256674	09/20/17 09:05	HJM	TAL SEA

Client Sample ID: OF2-1

Lab Sample ID: 580-71236-1

Date Collected: 09/12/17 13:45

Matrix: Solid

Date Received: 09/13/17 12:50

Percent Solids: 67.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550B	RA		264022	09/22/17 09:53	APR	TAL SEA
Total/NA	Analysis	8270D	RA	1	263999	12/21/17 19:08	W1T	TAL SEA
Total/NA	Prep	3550B			256990	09/22/17 09:53	JWL	TAL SEA
Total/NA	Analysis	8270D		5	257097	09/23/17 17:34	ERB	TAL SEA
Total/NA	Prep	Organotin Prep			257308	09/26/17 13:24	TTN	TAL SEA
Total/NA	Analysis	Organotins		1	257811	10/02/17 14:49	ERB	TAL SEA
Total/NA	Prep	Organotin Prep	RE		258108	10/04/17 16:32	ERZ	TAL SEA
Total/NA	Analysis	Organotins	RE	1	258166	10/05/17 19:31	ERB	TAL SEA
Total/NA	Prep	3550B			256979	09/22/17 08:46	JWL	TAL SEA
Total/NA	Analysis	8081B		5	257614	09/29/17 13:03	TL1	TAL SEA
Total/NA	Prep	3550B			256982	09/22/17 08:49	JWL	TAL SEA
Total/NA	Analysis	8082A		1	257244	09/26/17 03:47	JCP	TAL SEA
Total/NA	Prep	3546			256713	09/20/17 11:56	TTN	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	257001	09/22/17 16:00	T1W	TAL SEA
Total/NA	Prep	3050B			257478	09/27/17 17:02	PAB	TAL SEA
Total/NA	Analysis	6020A		5	257540	09/28/17 10:54	FCW	TAL SEA
Total/NA	Prep	7471A			257808	10/02/17 12:02	PAB	TAL SEA
Total/NA	Analysis	7471A		1	257835	10/02/17 14:39	FCW	TAL SEA
Soluble	Leach	DI Leach/Plumb			256544	09/19/17 09:31	EMM	TAL SEA
Soluble	Analysis	350.1/Plumb		1	256588	09/19/17 12:43	EMM	TAL SEA
Total/NA	Prep	9030B			387926	09/17/17 19:15	ALS	TAL DEN
Total/NA	Analysis	9034		1	387927	09/18/17 00:05	ALS	TAL DEN

Client Sample ID: OF2-2

Lab Sample ID: 580-71236-2

Date Collected: 09/12/17 15:30

Matrix: Solid

Date Received: 09/13/17 12:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	160.4		1	388058	09/18/17 20:50	SVC	TAL DEN
Total/NA	Analysis	9060_PSEP		1	258182	10/05/17 11:17	J1Y	TAL SEA
Total/NA	Analysis	D 2216		1	257164	09/25/17 11:09	APR	TAL SEA

Lab Chronicle

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-2
Date Collected: 09/12/17 15:30
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540B		1	388057	09/18/17 20:48	SVC	TAL DEN
Total/NA	Analysis	PSEP Plumb 1981		1	256674	09/20/17 09:05	HJM	TAL SEA

Client Sample ID: OF2-2
Date Collected: 09/12/17 15:30
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-2
Matrix: Solid
Percent Solids: 71.4

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550B	RA		264022	09/22/17 09:53	APR	TAL SEA
Total/NA	Analysis	8270D	RA	1	263999	12/21/17 19:33	W1T	TAL SEA
Total/NA	Prep	3550B	RA2		264022	09/22/17 09:53	APR	TAL SEA
Total/NA	Analysis	8270D	RA2	1	264060	12/22/17 16:17	TL1	TAL SEA
Total/NA	Prep	3550B			256990	09/22/17 09:53	JWL	TAL SEA
Total/NA	Analysis	8270D		5	257097	09/23/17 18:00	ERB	TAL SEA
Total/NA	Prep	Organotin Prep			257308	09/26/17 13:24	TTN	TAL SEA
Total/NA	Analysis	Organotins		1	257811	10/02/17 15:15	ERB	TAL SEA
Total/NA	Prep	Organotin Prep	RE		258108	10/04/17 16:32	ERZ	TAL SEA
Total/NA	Analysis	Organotins	RE	1	258166	10/05/17 19:57	ERB	TAL SEA
Total/NA	Prep	3550B			256979	09/22/17 08:46	JWL	TAL SEA
Total/NA	Analysis	8081B		5	257614	09/29/17 13:21	TL1	TAL SEA
Total/NA	Prep	3550B			256982	09/22/17 08:49	JWL	TAL SEA
Total/NA	Analysis	8082A		1	257244	09/26/17 04:05	JCP	TAL SEA
Total/NA	Prep	3546			256713	09/20/17 11:56	TTN	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	257001	09/22/17 16:20	T1W	TAL SEA
Total/NA	Prep	3050B			257478	09/27/17 17:02	PAB	TAL SEA
Total/NA	Analysis	6020A		5	257540	09/28/17 10:58	FCW	TAL SEA
Total/NA	Prep	7471A			257808	10/02/17 12:02	PAB	TAL SEA
Total/NA	Analysis	7471A		1	257835	10/02/17 14:41	FCW	TAL SEA
Soluble	Leach	DI Leach/Plumb			256544	09/19/17 09:31	EMM	TAL SEA
Soluble	Analysis	350.1/Plumb		1	256588	09/19/17 12:43	EMM	TAL SEA
Total/NA	Prep	9030B			387926	09/17/17 19:15	ALS	TAL DEN
Total/NA	Analysis	9034		1	387927	09/18/17 00:05	ALS	TAL DEN

Client Sample ID: OF2-3
Date Collected: 09/12/17 17:00
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	160.4		1	388058	09/18/17 20:50	SVC	TAL DEN
Total/NA	Analysis	9060_PSEP		1	258182	10/05/17 11:31	J1Y	TAL SEA
Total/NA	Analysis	D 2216		1	257164	09/25/17 11:09	APR	TAL SEA
Total/NA	Analysis	SM 2540B		1	388057	09/18/17 20:48	SVC	TAL DEN
Total/NA	Analysis	PSEP Plumb 1981		1	256674	09/20/17 09:05	HJM	TAL SEA

Lab Chronicle

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Client Sample ID: OF2-3

Date Collected: 09/12/17 17:00
Date Received: 09/13/17 12:50

Lab Sample ID: 580-71236-3

Matrix: Solid
Percent Solids: 76.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550B	RA		264022	09/22/17 09:53	APR	TAL SEA
Total/NA	Analysis	8270D	RA	1	263999	12/21/17 19:58	W1T	TAL SEA
Total/NA	Prep	3550B			256990	09/22/17 09:53	JWL	TAL SEA
Total/NA	Analysis	8270D		5	257097	09/23/17 18:25	ERB	TAL SEA
Total/NA	Prep	Organotin Prep			257308	09/26/17 13:24	TTN	TAL SEA
Total/NA	Analysis	Organotins		1	257811	10/02/17 15:41	ERB	TAL SEA
Total/NA	Prep	Organotin Prep	RE		258108	10/04/17 16:32	ERZ	TAL SEA
Total/NA	Analysis	Organotins	RE	1	258166	10/05/17 20:23	ERB	TAL SEA
Total/NA	Prep	3550B			256979	09/22/17 08:46	JWL	TAL SEA
Total/NA	Analysis	8081B		5	257614	09/29/17 13:40	TL1	TAL SEA
Total/NA	Prep	3550B			256982	09/22/17 08:49	JWL	TAL SEA
Total/NA	Analysis	8082A		1	257244	09/26/17 04:22	JCP	TAL SEA
Total/NA	Prep	3546			256713	09/20/17 11:56	TTN	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	257001	09/22/17 16:40	T1W	TAL SEA
Total/NA	Prep	3050B			257478	09/27/17 17:02	PAB	TAL SEA
Total/NA	Analysis	6020A		5	257540	09/28/17 11:02	FCW	TAL SEA
Total/NA	Prep	7471A			257808	10/02/17 12:02	PAB	TAL SEA
Total/NA	Analysis	7471A		1	257835	10/02/17 14:43	FCW	TAL SEA
Soluble	Leach	DI Leach/Plumb			256544	09/19/17 09:31	EMM	TAL SEA
Soluble	Analysis	350.1/Plumb		1	256588	09/19/17 12:43	EMM	TAL SEA
Total/NA	Prep	9030B			387926	09/17/17 19:15	ALS	TAL DEN
Total/NA	Analysis	9034		1	387927	09/18/17 00:05	ALS	TAL DEN

Laboratory References:

Maxxam = Maxxam Analytics Inc., PO BOX 57437, Postal Station A, Toronto, Ontario M5W 5M5
TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100
TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: Environmental Science Associates (ESA) TestAmerica Job ID: 580-71236-1
Project/Site: G-P Camas Freshwater Sediments

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Laboratory: TestAmerica Denver

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-19 *
A2LA	ISO/IEC 17025		2907.01	10-31-19
Alabama	State Program	4	40730	09-30-12 *
Alaska (UST)	State Program	10	UST-30	04-05-18
Arizona	State Program	9	AZ0713	12-20-17
Arkansas DEQ	State Program	6	88-0687	06-01-18
California	State Program	9	2513	01-08-18
Connecticut	State Program	1	PH-0686	09-30-18
Florida	NELAP	4	E87667	06-30-18
Georgia	State Program	4	N/A	01-08-18
Illinois	NELAP	5	200017	04-30-18
Iowa	State Program	7	370	12-01-18
Kansas	NELAP	7	E-10166	04-30-18
Louisiana	NELAP	6	02096	06-30-18
Maine	State Program	1	CO0002	03-03-19
Minnesota	NELAP	5	8-999-405	12-31-17
Nevada	State Program	9	CO0026	07-31-18
New Hampshire	NELAP	1	205310	04-28-18
New Jersey	NELAP	2	CO004	06-30-18
New York	NELAP	2	11964	04-01-18
North Carolina (WW/SW)	State Program	4	358	12-31-17
North Dakota	State Program	8	R-034	01-09-18
Oklahoma	State Program	6	8614	08-31-18
Oregon	NELAP	10	4025	01-08-18
Pennsylvania	NELAP	3	68-00664	07-31-18
South Carolina	State Program	4	72002001	01-08-18
Texas	NELAP	6	T104704183-17-14	09-30-18
USDA	Federal		P330-16-00397	12-15-19
Utah	NELAP	8	CO00026	07-31-18
Virginia	NELAP	3	460232	06-14-18
Washington	State Program	10	C583	08-03-18
West Virginia DEP	State Program	3	354	12-31-17 *
Wisconsin	State Program	5	999615430	08-31-18
Wyoming (UST)	A2LA	8	2907.01	10-31-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: Environmental Science Associates (ESA)
Project/Site: G-P Camas Freshwater Sediments

TestAmerica Job ID: 580-71236-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-71236-1	OF2-1	Solid	09/12/17 13:45	09/13/17 12:50
580-71236-2	OF2-2	Solid	09/12/17 15:30	09/13/17 12:50
580-71236-3	OF2-3	Solid	09/12/17 17:00	09/13/17 12:50

Confirmation of Sample Receipt

Maxxam Job Number: B7K1281
Job Received: 2017/09/15 11:03
Final Report Due: 2017/10/05 18:00

Invoice Information

Attn: Elaine Walker
TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA, 92614
Email to:
elaine.walker@testamericainc.com

Report Information

Attn: Elaine Walker
TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA, 92614
Email to:
elaine.walker@testamericainc.com

Project Information

Quote #: B75761
PO/AFE#:
Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS
Sampled By:

Analytical Summary

A: Due On 2017/10/05 18:00

Lab ID	Client Sample ID	Sampling Date/Time	Matrix	Dioxins and Furans by 1613
COC# 580-49672.1				
FCZ298	OF2-1(580-71236-1)	2017/09/12 13:45	SED	A
FCZ299	OF2-2(580-71236-2)	2017/09/12 15:30	SED	A
FCZ300	OF2-3(580-71236-3)	2017/09/12 17:00	SED	A

Include Criteria on CofA: No

Sample Inspection Observations & Comments

# of Samples Received: 3

Details: Sample(s) received in good condition.

Average Temperature: Package 1: 3.8 °C

Additional Notes

- Unless special storage arrangements are made, all samples will be disposed 30 days after receipt. Additional fees may be applied for extended storage.
- Additional fees may be applied for the disposal of hazardous samples.

The contents of this report are subject to change. For up to date information, please refer to the Customer Portal.

Maxxam
A Bureau Veritas Group Company

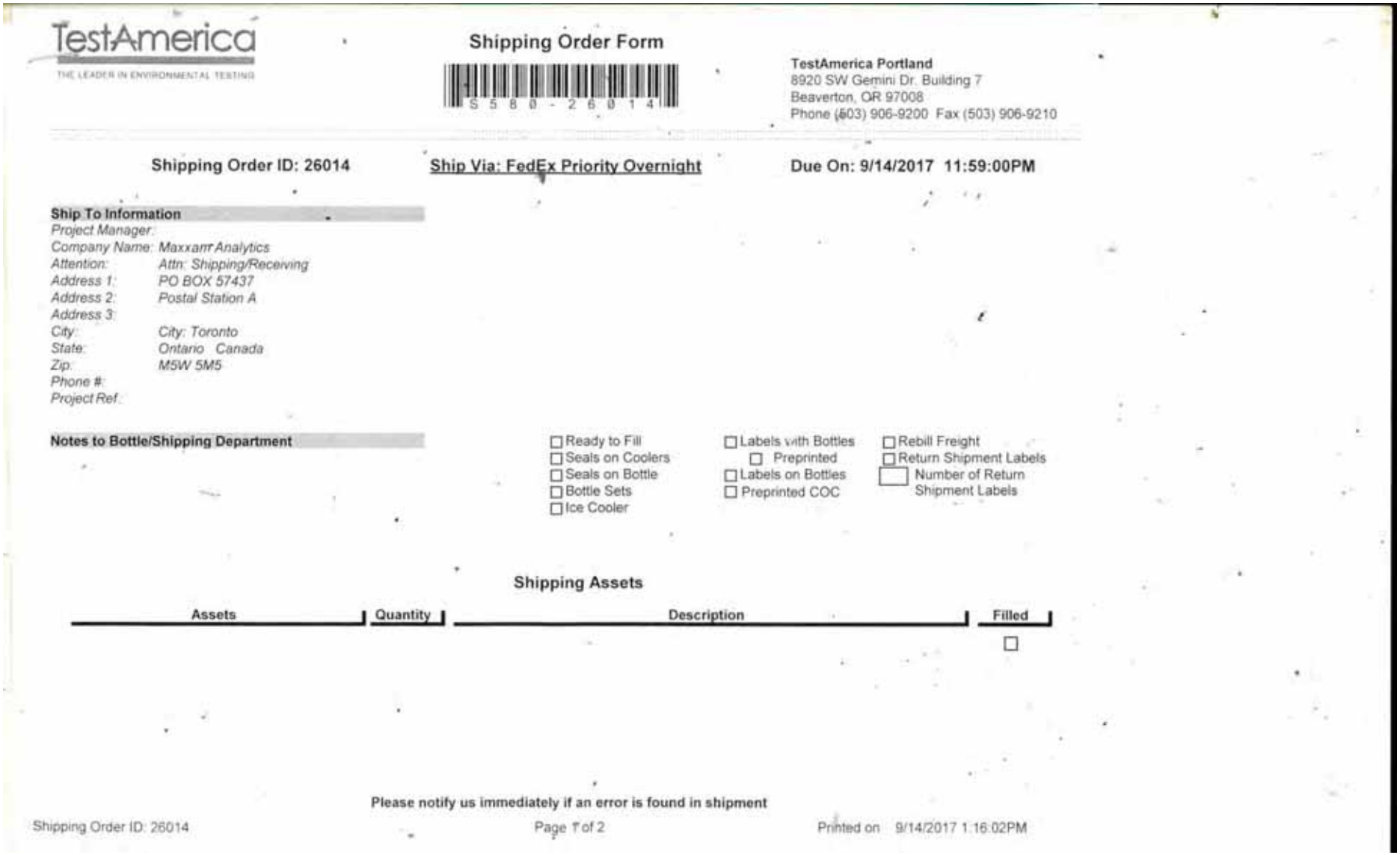
Confirmation of Sample Receipt

Maxxam Job Number: B7K1281
Job Received: 2017/09/15 11:03
Final Report Due: 2017/10/05 18:00

Parameter Summary

Package/Test	Parameter	RDL *	Unit	Samples
Dioxins and Furans by 1613	Confirmation 2,3,7,8-Tetra CDF	0.1	pg/g	All
	2,3,7,8-Tetra CDD	10	pg/g	All
	1,2,3,7,8-Penta CDD	50	pg/g	All
	1,2,3,4,7,8-Hexa CDD	50	pg/g	All
	1,2,3,6,7,8-Hexa CDD	50	pg/g	All
	1,2,3,7,8,9-Hexa CDD	50	pg/g	All
	1,2,3,4,6,7,8-Hepta CDD	50	pg/g	All
	Octa CDD	100	pg/g	All
	Total Tetra CDD	10	pg/g	All
	Total Penta CDD	50	pg/g	All
	Total Hexa CDD	50	pg/g	All
	Total Hepta CDD	50	pg/g	All
	2,3,7,8-Tetra CDF	10	pg/g	All
	1,2,3,7,8-Penta CDF	50	pg/g	All
	2,3,4,7,8-Penta CDF	50	pg/g	All
	1,2,3,4,7,8-Hexa CDF	50	pg/g	All
	1,2,3,6,7,8-Hexa CDF	50	pg/g	All
	2,3,4,6,7,8-Hexa CDF	50	pg/g	All
	1,2,3,7,8,9-Hexa CDF	50	pg/g	All
	1,2,3,4,6,7,8-Hepta CDF	50	pg/g	All
	1,2,3,4,7,8,9-Hepta CDF	50	pg/g	All
	Octa CDF	100	pg/g	All
	Total Tetra CDF	10	pg/g	All
	Total Penta CDF	50	pg/g	All
	Total Hexa CDF	50	pg/g	All
	Total Hepta CDF	50	pg/g	All
	Moisture	1	%	All

**RDLs are subject to change based on interferences present at the time of analysis.*



TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Shipping Order Form

S580-26014

TestAmerica Portland
8920 SW Gemini Dr. Building 7
Beaverton, OR 97008
Phone (503) 906-9200 Fax (503) 906-9210

Shipping Order ID: 26014 | **Ship Via: FedEx Priority Overnight** | **Due On: 9/14/2017 11:59:00PM**

Ship To Information

Project Manager:
Company Name: Maxxam Analytics
Attention: Attn: Shipping/Receiving
Address 1: PO BOX 57437
Address 2: Postal Station A
Address 3:
City: City: Toronto
State: Ontario Canada
Zip: M5W 5M5
Phone #:
Project Ref:

Notes to Bottle/Shipping Department

- ☐ Ready to Fill
- ☐ Seals on Coolers
- ☐ Seals on Bottle
- ☐ Bottle Sets
- ☐ Ice Cooler
- ☐ Labels with Bottles
  - ☐ Preprinted
- ☐ Labels on Bottles
- ☐ Preprinted COC
- ☐ Rebill Freight
- ☐ Return Shipment Labels
- ☐ Number of Return Shipment Labels

Shipping Assets

Assets	Quantity	Description	Filled
			☐

Please notify us immediately if an error is found in shipment

Shipping Order ID: 26014 Page 1 of 2 Printed on 9/14/2017 1:16:02PM

Bottle Order Information

Bottle Order:
Bottle Order #:
Request From Client: 9/14/2017
Date Order Posted:
Order Status: Ready To Process
Prepared By:
Deliver By Date: ***9/14/2017 11:59:00PM***
Lab Project Number:

Order Completion Information

Creator: Steve Gonzales
Filled by:
Sent Date:
Sent Via:
Tracking #:

Sets	Bottles/Set	Qty	Bottle Type Description	Preservative	Method	Matrix	Sample Type	Comments	Lot #

Notes to Field Staff:

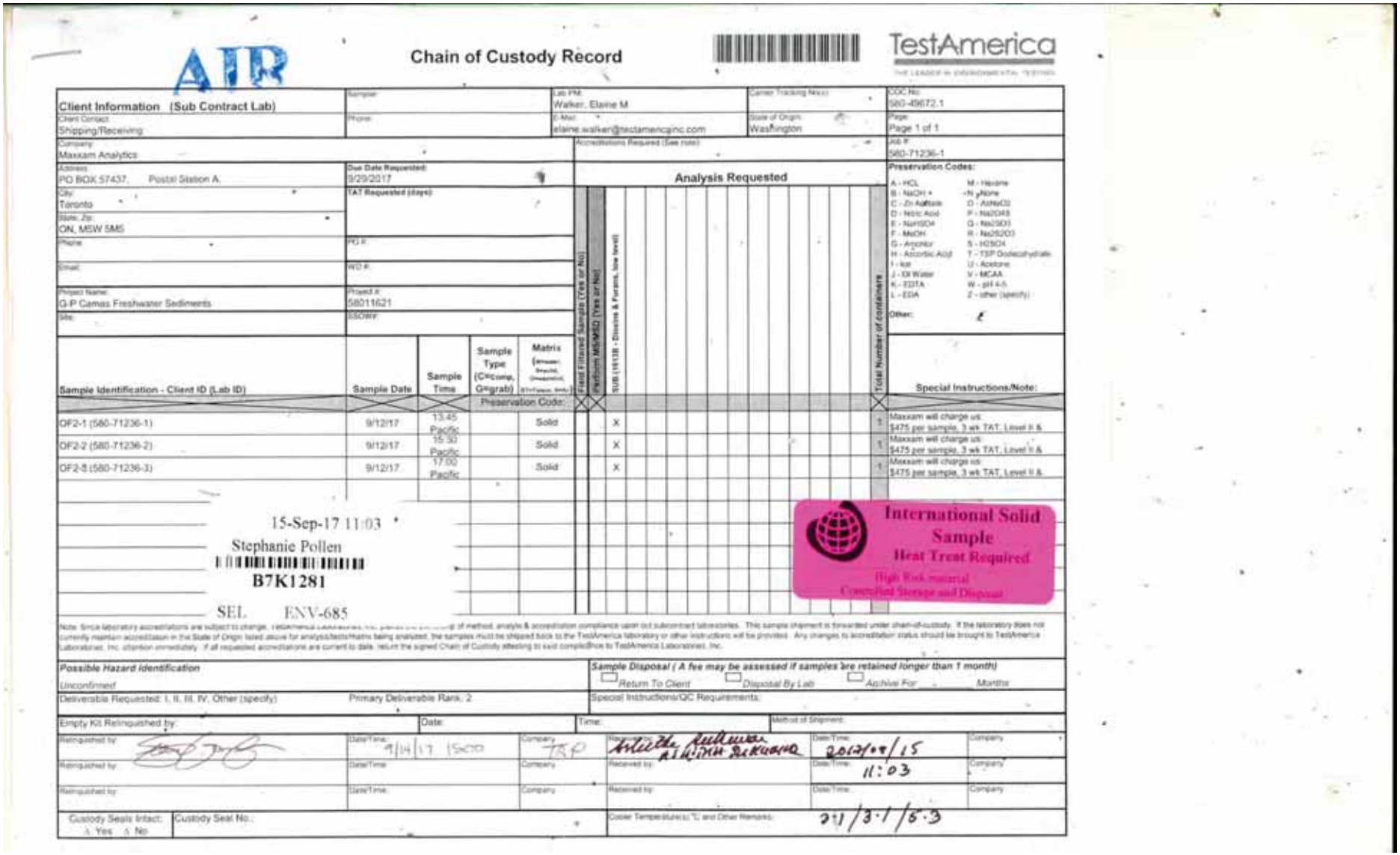
Health and Safety Notes:

Preservative | Comment

Relinquished By	Company	Date	Time	Received By	Company	Seal # / Seal # / Seal #
Relinquished By	Company	Date	Time	Received By	Company	Seal # / Seal # / Seal #

Please notify us immediately if an error is found in shipment

Shipping Order ID: 26014 Page 2 of 2 Printed on 9/14/2017 1:16:02PM



AIR

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Walker, Elaine M	Carrier Tracking No(s):	COC No: 580-49672.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: elaine.walker@testamericainc.com	State of Origin: Washington	Page: Page 1 of 1
Company: Maxxam Analytics		Accreditations Required (See note):		Job #: 580-71236-1
Address: PO BOX 57437, Postal Station A	Due Date Requested: 9/29/2017	**Analysis Requested**		Preservation Codes:
City: Toronto	TAT Requested (days):			A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
State, Zip: ON, M5W 5M5				
Phone:	PO #:			
Email:	WO #:			Other:
Project Name: Q-P Camas Freshwater Sediments	Project #: 58011621			
Site:	SSOW#:			

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUB (1613B - Dioxins & Furans, low level)	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
OF2-1 (580-71236-1)	9/12/17	13:45 Pacific		Solid			X	1	Maxxam will charge us $475 per sample, 3 wk TAT, Level II &
OF2-2 (580-71236-2)	9/12/17	15:30 Pacific		Solid			X	1	Maxxam will charge us $475 per sample, 3 wk TAT, Level II &
OF2-3 (580-71236-3)	9/12/17	17:00 Pacific		Solid			X	1	Maxxam will charge us $475 per sample, 3 wk TAT, Level II &

15-Sep-17 11:03
Stephanie Pollen
B7K1281
SEL ENV-685

International Solid Sample
Heat Treat Required
High Risk material
Controlled Storage and Disposal

Note: Since laboratory accreditations are subject to change, [illegible] of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

Possible Hazard Identification Unconfirmed	**Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)** ☐ Return To Client ☐ Disposal By Lab ☐ Archive For Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:				
Relinquished by:	Date/Time: 9/14/17 1500	Company: TSP	Received by: Michelle Kellerman & Kristen DeRouard	Date/Time: 2017/09/15 11:03	Company		
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company		
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company		
Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 2.1/3.1/6.3				

Maxxam
A Bureau Veritas Group Company

Your Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS
Your C.O.C. #: 580-49672.1

Attention:Elaine Walker

TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA
USA 92614

Report Date: 2017/10/06
Report #: R4764548
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7K1281
Received: 2017/09/15, 11:03

Sample Matrix: SEDIMENT
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Dioxins/Furans in Soil (1613B) (1)	1	2017/09/18	2017/09/21	BRL SOP-00410	EPA 1613B m
Dioxins/Furans in Soil (1613B) (1)	2	2017/09/18	2017/09/22	BRL SOP-00410	EPA 1613B m
Moisture	3	N/A	2017/09/19	CAM SOP-00445	Carter 2nd ed 51.2 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.
E = Analyte concentration exceeds the maximum concentration level.
K = Estimated maximum possible concentration due to ion abundance ratio failure.

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Your Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS
Your C.O.C. #: 580-49672.1

Attention:Elaine Walker

TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA
USA 92614

Report Date: 2017/10/06
Report #: R4764548
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7K1281
Received: 2017/09/15, 11:03

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Stephanie Pollen, Project Manager
Email: SPollen@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

RESULTS OF ANALYSES OF SEDIMENT

Maxxam ID		FCZ298		FCZ299	FCZ300			
Sampling Date		2017/09/12 13:45		2017/09/12 15:30	2017/09/12 17:00			
COC Number		580-49672.1		580-49672.1	580-49672.1			
	UNITS	OF2-1(580-71236-1)	QC Batch	OF2-2(580-71236-2)	OF2-3(580-71236-3)	RDL	MDL	QC Batch
Moisture	%	30	5170637	28	27	1.0	0.50	5170704

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		FCZ298							
Sampling Date		2017/09/12 13:45							
COC Number		580-49672.1				TOXIC EQUIVALENCY		# of	
	UNITS	OF2-1(580-71236-1)	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.0742 U	0.0742	0.200	0.400	1.00	0.0742	N/A	5176098
1,2,3,7,8-Penta CDD *	pg/g	0.0957 U	0.0957	1.00	0.400	1.00	0.0957	N/A	5176098
1,2,3,4,7,8-Hexa CDD *	pg/g	0.112 U (1)	0.112	1.00	0.400	0.100	0.0112	N/A	5176098
1,2,3,6,7,8-Hexa CDD *	pg/g	0.207 J	0.0843	1.00	0.400	0.100	0.0207	N/A	5176098
1,2,3,7,8,9-Hexa CDD *	pg/g	0.241 J	0.0823	1.00	0.400	0.100	0.0241	N/A	5176098
1,2,3,4,6,7,8-Hepta CDD *	pg/g	2.41	0.0677	1.00	0.400	0.0100	0.0241	N/A	5176098
Octa CDD *	pg/g	15.3	0.105	2.00	0.800	0.000300	0.00459	N/A	5176098
Total Tetra CDD *	pg/g	0.0742 U	0.0742	0.200	0.400	N/A	N/A	0	5176098
Total Penta CDD *	pg/g	0.0957 U	0.0957	1.00	0.400	N/A	N/A	0	5176098
Total Hexa CDD *	pg/g	0.756 J	0.0831	1.00	0.400	N/A	N/A	3	5176098
Total Hepta CDD *	pg/g	4.89	0.0677	1.00	0.400	N/A	N/A	2	5176098
2,3,7,8-Tetra CDF **	pg/g	0.0795 U	0.0795	0.200	0.400	0.100	0.00795	N/A	5176098
1,2,3,7,8-Penta CDF **	pg/g	0.104 U	0.104	1.00	0.400	0.0300	0.00312	N/A	5176098
2,3,4,7,8-Penta CDF **	pg/g	0.101 U	0.101	1.00	0.400	0.300	0.0303	N/A	5176098
1,2,3,4,7,8-Hexa CDF **	pg/g	0.104 J	0.0760	1.00	0.400	0.100	0.0104	N/A	5176098
1,2,3,6,7,8-Hexa CDF **	pg/g	0.127 J	0.0772	1.00	0.400	0.100	0.0127	N/A	5176098
2,3,4,6,7,8-Hexa CDF **	pg/g	0.108 J	0.0719	1.00	0.400	0.100	0.0108	N/A	5176098
1,2,3,7,8,9-Hexa CDF **	pg/g	0.145 J	0.0768	1.00	0.400	0.100	0.0145	N/A	5176098
1,2,3,4,6,7,8-Hepta CDF **	pg/g	0.388 J	0.0747	1.00	0.400	0.0100	0.00388	N/A	5176098
1,2,3,4,7,8,9-Hepta CDF **	pg/g	0.138 J	0.0748	1.00	0.400	0.0100	0.00138	N/A	5176098
Octa CDF **	pg/g	0.900 J	0.0984	2.00	0.800	0.000300	0.000270	N/A	5176098
Total Tetra CDF **	pg/g	0.0795 U	0.0795	0.200	0.400	N/A	N/A	0	5176098
Total Penta CDF **	pg/g	0.103 U	0.103	1.00	0.400	N/A	N/A	0	5176098
Total Hexa CDF **	pg/g	0.589 J	0.0754	1.00	0.400	N/A	N/A	5	5176098
Total Hepta CDF **	pg/g	1.04	0.0747	1.00	0.400	N/A	N/A	3	5176098
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	0.350	N/A	N/A

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		FCZ298							
Sampling Date		2017/09/12 13:45							
COC Number		580-49672.1				TOXIC EQUIVALENCY		# of	
	UNITS	OF2-1(580-71236-1)	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	123	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234678 HeptaCDD *	%	80	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234678 HeptaCDF **	%	70	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123478 HexaCDD *	%	82	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123478 HexaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234789 HeptaCDF **	%	79	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123678 HexaCDD *	%	96	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123678 HexaCDF **	%	77	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-12378 PentaCDD *	%	99	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-12378 PentaCDF **	%	84	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123789 HexaCDF **	%	99	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-234678 HexaCDF **	%	90	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-23478 PentaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-2378 TetraCDD *	%	100	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-2378 TetraCDF **	%	88	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-OCDD *	%	92	N/A	N/A	N/A	N/A	N/A	N/A	5176098

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

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* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		FCZ299							
Sampling Date		2017/09/12 15:30							
COC Number		580-49672.1				TOXIC EQUIVALENCY		# of	
	UNITS	OF2-2(580-71236-2)	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.0904 U	0.0904	0.200	0.400	1.00	0.0904	N/A	5176098
1,2,3,7,8-Penta CDD *	pg/g	0.115 U	0.115	1.00	0.400	1.00	0.115	N/A	5176098
1,2,3,4,7,8-Hexa CDD *	pg/g	0.144 J	0.0960	1.00	0.400	0.100	0.0144	N/A	5176098
1,2,3,6,7,8-Hexa CDD *	pg/g	0.121 J	0.0984	1.00	0.400	0.100	0.0121	N/A	5176098
1,2,3,7,8,9-Hexa CDD *	pg/g	0.201 U (1)	0.201	1.00	0.400	0.100	0.0201	N/A	5176098
1,2,3,4,6,7,8-Hepta CDD *	pg/g	1.17	0.113	1.00	0.400	0.0100	0.0117	N/A	5176098
Octa CDD *	pg/g	6.08	0.127	2.00	0.800	0.000300	0.00182	N/A	5176098
Total Tetra CDD *	pg/g	0.0904 U	0.0904	0.200	0.400	N/A	N/A	0	5176098
Total Penta CDD *	pg/g	0.115 U	0.115	1.00	0.400	N/A	N/A	0	5176098
Total Hexa CDD *	pg/g	0.450 J	0.0971	1.00	0.400	N/A	N/A	3	5176098
Total Hepta CDD *	pg/g	1.99	0.113	1.00	0.400	N/A	N/A	2	5176098
2,3,7,8-Tetra CDF **	pg/g	0.0744 U	0.0744	0.200	0.400	0.100	0.00744	N/A	5176098
1,2,3,7,8-Penta CDF **	pg/g	0.108 U	0.108	1.00	0.400	0.0300	0.00324	N/A	5176098
2,3,4,7,8-Penta CDF **	pg/g	0.105 U	0.105	1.00	0.400	0.300	0.0315	N/A	5176098
1,2,3,4,7,8-Hexa CDF **	pg/g	0.0897 U	0.0897	1.00	0.400	0.100	0.00897	N/A	5176098
1,2,3,6,7,8-Hexa CDF **	pg/g	0.0912 U	0.0912	1.00	0.400	0.100	0.00912	N/A	5176098
2,3,4,6,7,8-Hexa CDF **	pg/g	0.0849 U	0.0849	1.00	0.400	0.100	0.00849	N/A	5176098
1,2,3,7,8,9-Hexa CDF **	pg/g	0.0948 J	0.0907	1.00	0.400	0.100	0.00948	N/A	5176098
1,2,3,4,6,7,8-Hepta CDF **	pg/g	0.230 U (1)	0.230	1.00	0.400	0.0100	0.00230	N/A	5176098
1,2,3,4,7,8,9-Hepta CDF **	pg/g	0.0703 U (1)	0.0703	1.00	0.400	0.0100	0.000703	N/A	5176098
Octa CDF **	pg/g	0.444 J	0.119	2.00	0.800	0.000300	0.000133	N/A	5176098
Total Tetra CDF **	pg/g	0.0744 U	0.0744	0.200	0.400	N/A	N/A	0	5176098
Total Penta CDF **	pg/g	0.107 U	0.107	1.00	0.400	N/A	N/A	0	5176098
Total Hexa CDF **	pg/g	0.0948 J	0.0890	1.00	0.400	N/A	N/A	1	5176098
Total Hepta CDF **	pg/g	0.137 J	0.0681	1.00	0.400	N/A	N/A	1	5176098
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	0.347	N/A	N/A

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

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(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		FCZ299							
Sampling Date		2017/09/12 15:30							
COC Number		580-49672.1				TOXIC EQUIVALENCY		# of	
	UNITS	OF2-2(580-71236-2)	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	125	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234678 HeptaCDD *	%	64	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234678 HeptaCDF **	%	36	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123478 HexaCDD *	%	46	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123478 HexaCDF **	%	35	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234789 HeptaCDF **	%	74	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123678 HexaCDD *	%	63	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123678 HexaCDF **	%	44	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-12378 PentaCDD *	%	101	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-12378 PentaCDF **	%	85	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123789 HexaCDF **	%	97	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-234678 HexaCDF **	%	84	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-23478 PentaCDF **	%	75	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-2378 TetraCDD *	%	102	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-2378 TetraCDF **	%	85	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-OCDD *	%	69	N/A	N/A	N/A	N/A	N/A	N/A	5176098

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The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

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QC Batch = Quality Control Batch

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DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		FCZ299							
Sampling Date		2017/09/12 15:30							
COC Number		580-49672.1				TOXIC EQUIVALENCY		# of	
	UNITS	OF2-2(580-71236-2) Lab-Dup	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.0784 U	0.0784	0.200	0.400	1.00	0.0784	N/A	5176098
1,2,3,7,8-Penta CDD *	pg/g	0.103 U	0.103	0.999	0.400	1.00	0.103	N/A	5176098
1,2,3,4,7,8-Hexa CDD *	pg/g	0.0921 U	0.0921	0.999	0.400	0.100	0.00921	N/A	5176098
1,2,3,6,7,8-Hexa CDD *	pg/g	0.110 J	0.0944	0.999	0.400	0.100	0.0110	N/A	5176098
1,2,3,7,8,9-Hexa CDD *	pg/g	0.151 J	0.0922	0.999	0.400	0.100	0.0151	N/A	5176098
1,2,3,4,6,7,8-Hepta CDD *	pg/g	1.38	0.105	0.999	0.400	0.0100	0.0138	N/A	5176098
Octa CDD *	pg/g	11.3 (1)	0.122	2.00	0.800	0.000300	0.00339	N/A	5176098
Total Tetra CDD *	pg/g	0.0784 U	0.0784	0.200	0.400	N/A	N/A	0	5176098
Total Penta CDD *	pg/g	0.103 U	0.103	0.999	0.400	N/A	N/A	0	5176098
Total Hexa CDD *	pg/g	0.665 J	0.0932	0.999	0.400	N/A	N/A	4	5176098
Total Hepta CDD *	pg/g	3.55	0.105	0.999	0.400	N/A	N/A	2	5176098
2,3,7,8-Tetra CDF **	pg/g	0.0879 U	0.0879	0.200	0.400	0.100	0.00879	N/A	5176098
1,2,3,7,8-Penta CDF **	pg/g	0.0975 U	0.0975	0.999	0.400	0.0300	0.00293	N/A	5176098
2,3,4,7,8-Penta CDF **	pg/g	0.0947 U	0.0947	0.999	0.400	0.300	0.0284	N/A	5176098
1,2,3,4,7,8-Hexa CDF **	pg/g	0.0674 U	0.0674	0.999	0.400	0.100	0.00674	N/A	5176098
1,2,3,6,7,8-Hexa CDF **	pg/g	0.0685 U	0.0685	0.999	0.400	0.100	0.00685	N/A	5176098
2,3,4,6,7,8-Hexa CDF **	pg/g	0.0638 U	0.0638	0.999	0.400	0.100	0.00638	N/A	5176098
1,2,3,7,8,9-Hexa CDF **	pg/g	0.102 J	0.0681	0.999	0.400	0.100	0.0102	N/A	5176098
1,2,3,4,6,7,8-Hepta CDF **	pg/g	0.191 J	0.0811	0.999	0.400	0.0100	0.00191	N/A	5176098
1,2,3,4,7,8,9-Hepta CDF **	pg/g	0.0812 U	0.0812	0.999	0.400	0.0100	0.000812	N/A	5176098
Octa CDF **	pg/g	0.481 J	0.0987	2.00	0.800	0.000300	0.000144	N/A	5176098
Total Tetra CDF **	pg/g	0.0879 U	0.0879	0.200	0.400	N/A	N/A	0	5176098
Total Penta CDF **	pg/g	0.0961 U	0.0961	0.999	0.400	N/A	N/A	0	5176098
Total Hexa CDF **	pg/g	0.102 J	0.0669	0.999	0.400	N/A	N/A	1	5176098
Total Hepta CDF **	pg/g	0.427 J	0.0812	0.999	0.400	N/A	N/A	2	5176098
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	0.307	N/A	N/A

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) Duplicate results exceeded RPD acceptance criteria. This may be due to sample heterogeneity.

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		FCZ299							
Sampling Date		2017/09/12 15:30							
COC Number		580-49672.1				TOXIC EQUIVALENCY		# of	
	UNITS	OF2-2(580-71236-2) Lab-Dup	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	122	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234678 HeptaCDD *	%	76	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234678 HeptaCDF **	%	61	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123478 HexaCDD *	%	72	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123478 HexaCDF **	%	63	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234789 HeptaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123678 HexaCDD *	%	84	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123678 HexaCDF **	%	69	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-12378 PentaCDD *	%	95	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-12378 PentaCDF **	%	80	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123789 HexaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-234678 HexaCDF **	%	83	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-23478 PentaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-2378 TetraCDD *	%	98	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-2378 TetraCDF **	%	77	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-OCDD *	%	81	N/A	N/A	N/A	N/A	N/A	N/A	5176098

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		FCZ300							
Sampling Date		2017/09/12 17:00							
COC Number		580-49672.1				TOXIC EQUIVALENCY		# of	
	UNITS	OF2-3(580-71236-3)	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.0915 U	0.0915	0.200	0.400	1.00	0.0915	N/A	5176098
1,2,3,7,8-Penta CDD *	pg/g	0.106 U	0.106	1.00	0.400	1.00	0.106	N/A	5176098
1,2,3,4,7,8-Hexa CDD *	pg/g	0.0914 U	0.0914	1.00	0.400	0.100	0.00914	N/A	5176098
1,2,3,6,7,8-Hexa CDD *	pg/g	0.0937 U	0.0937	1.00	0.400	0.100	0.00937	N/A	5176098
1,2,3,7,8,9-Hexa CDD *	pg/g	0.107 J	0.0915	1.00	0.400	0.100	0.0107	N/A	5176098
1,2,3,4,6,7,8-Hepta CDD *	pg/g	1.11	0.0800	1.00	0.400	0.0100	0.0111	N/A	5176098
Octa CDD *	pg/g	6.86	0.111	2.00	0.800	0.000300	0.00206	N/A	5176098
Total Tetra CDD *	pg/g	0.0915 U	0.0915	0.200	0.400	N/A	N/A	0	5176098
Total Penta CDD *	pg/g	0.106 U	0.106	1.00	0.400	N/A	N/A	0	5176098
Total Hexa CDD *	pg/g	0.491 J	0.0925	1.00	0.400	N/A	N/A	3	5176098
Total Hepta CDD *	pg/g	2.31	0.0800	1.00	0.400	N/A	N/A	2	5176098
2,3,7,8-Tetra CDF **	pg/g	0.0923 U	0.0923	0.200	0.400	0.100	0.00923	N/A	5176098
1,2,3,7,8-Penta CDF **	pg/g	0.0915 U	0.0915	1.00	0.400	0.0300	0.00275	N/A	5176098
2,3,4,7,8-Penta CDF **	pg/g	0.0888 U	0.0888	1.00	0.400	0.300	0.0266	N/A	5176098
1,2,3,4,7,8-Hexa CDF **	pg/g	0.0819 U	0.0819	1.00	0.400	0.100	0.00819	N/A	5176098
1,2,3,6,7,8-Hexa CDF **	pg/g	0.0833 U	0.0833	1.00	0.400	0.100	0.00833	N/A	5176098
2,3,4,6,7,8-Hexa CDF **	pg/g	0.0775 U	0.0775	1.00	0.400	0.100	0.00775	N/A	5176098
1,2,3,7,8,9-Hexa CDF **	pg/g	0.0828 U	0.0828	1.00	0.400	0.100	0.00828	N/A	5176098
1,2,3,4,6,7,8-Hepta CDF **	pg/g	0.143 U (1)	0.143	1.00	0.400	0.0100	0.00143	N/A	5176098
1,2,3,4,7,8,9-Hepta CDF **	pg/g	0.101 U	0.101	1.00	0.400	0.0100	0.00101	N/A	5176098
Octa CDF **	pg/g	0.394 J	0.0972	2.00	0.800	0.000300	0.000118	N/A	5176098
Total Tetra CDF **	pg/g	0.0923 U	0.0923	0.200	0.400	N/A	N/A	0	5176098
Total Penta CDF **	pg/g	0.0901 U	0.0901	1.00	0.400	N/A	N/A	0	5176098
Total Hexa CDF **	pg/g	0.0813 U	0.0813	1.00	0.400	N/A	N/A	0	5176098
Total Hepta CDF **	pg/g	0.182 J	0.101	1.00	0.400	N/A	N/A	1	5176098
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	0.314	N/A	N/A

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		FCZ300							
Sampling Date		2017/09/12 17:00							
COC Number		580-49672.1				TOXIC EQUIVALENCY		# of	
	UNITS	OF2-3(580-71236-3)	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	103	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234678 HeptaCDD *	%	65	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234678 HeptaCDF **	%	61	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123478 HexaCDD *	%	62	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123478 HexaCDF **	%	57	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-1234789 HeptaCDF **	%	70	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123678 HexaCDD *	%	74	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123678 HexaCDF **	%	60	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-12378 PentaCDD *	%	83	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-12378 PentaCDF **	%	64	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-123789 HexaCDF **	%	79	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-234678 HexaCDF **	%	71	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-23478 PentaCDF **	%	69	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-2378 TetraCDD *	%	82	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-2378 TetraCDF **	%	65	N/A	N/A	N/A	N/A	N/A	N/A	5176098
C13-OCDD *	%	73	N/A	N/A	N/A	N/A	N/A	N/A	5176098

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

TEST SUMMARY

Maxxam ID: FCZ298
Sample ID: OF2-1(580-71236-1)
Matrix: SEDIMENT

Collected: 2017/09/12
Shipped:
Received: 2017/09/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	5176098	2017/09/18	2017/09/21	Owen Cosby
Moisture	BAL	5170637	N/A	2017/09/19	Min Yang

Maxxam ID: FCZ299
Sample ID: OF2-2(580-71236-2)
Matrix: SEDIMENT

Collected: 2017/09/12
Shipped:
Received: 2017/09/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	5176098	2017/09/18	2017/09/22	Owen Cosby
Moisture	BAL	5170704	N/A	2017/09/19	Nimarta Singh

Maxxam ID: FCZ299 Dup
Sample ID: OF2-2(580-71236-2)
Matrix: SEDIMENT

Collected: 2017/09/12
Shipped:
Received: 2017/09/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	5176098	2017/09/18	2017/09/22	Owen Cosby

Maxxam ID: FCZ300
Sample ID: OF2-3(580-71236-3)
Matrix: SEDIMENT

Collected: 2017/09/12
Shipped:
Received: 2017/09/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	5176098	2017/09/18	2017/09/22	Owen Cosby
Moisture	BAL	5170704	N/A	2017/09/19	Nimarta Singh

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Site Location: G-P CAMAS FRESHWATER SEDIMENTS

GENERAL COMMENTS

Results relate only to the items tested.

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TestAmerica
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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
5170637	CYN	RPD - Sample/Sample Dup	Moisture	2017/09/19	4.4		%	20
5170704	CYN	RPD - Sample/Sample Dup	Moisture	2017/09/19	0.90		%	20
5176098	OBC	Matrix Spike(FCZ298)	37CL4 2378 Tetra CDD	2017/09/22		103	%	35 - 197
			C13-1234678 HeptaCDD	2017/09/22		70	%	23 - 140
			C13-1234678 HeptaCDF	2017/09/22		57	%	28 - 143
			C13-123478 HexaCDD	2017/09/22		69	%	32 - 141
			C13-123478 HexaCDF	2017/09/22		58	%	26 - 152
			C13-1234789 HeptaCDF	2017/09/22		67	%	26 - 138
			C13-123678 HexaCDD	2017/09/22		75	%	28 - 130
			C13-123678 HexaCDF	2017/09/22		67	%	26 - 123
			C13-12378 PentaCDD	2017/09/22		90	%	25 - 181
			C13-12378 PentaCDF	2017/09/22		79	%	24 - 185
			C13-123789 HexaCDF	2017/09/22		83	%	29 - 147
			C13-234678 HexaCDF	2017/09/22		77	%	28 - 136
			C13-23478 PentaCDF	2017/09/22		80	%	21 - 178
			C13-2378 TetraCDD	2017/09/22		94	%	25 - 164
			C13-2378 TetraCDF	2017/09/22		78	%	24 - 169
			C13-OCDD	2017/09/22		78	%	17 - 157
			2,3,7,8-Tetra CDD	2017/09/22		90	%	67 - 158
			1,2,3,7,8-Penta CDD	2017/09/22		96	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2017/09/22		106	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2017/09/22		107	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2017/09/22		116	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2017/09/22		103	%	70 - 140
			Octa CDD	2017/09/22		101	%	78 - 144
			2,3,7,8-Tetra CDF	2017/09/22		100	%	75 - 158
			1,2,3,7,8-Penta CDF	2017/09/22		93	%	80 - 134
			2,3,4,7,8-Penta CDF	2017/09/22		107	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2017/09/22		107	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2017/09/22		102	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2017/09/22		91	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2017/09/22		105	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2017/09/22		96	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2017/09/22		112	%	78 - 138
			Octa CDF	2017/09/22		96	%	63 - 170
5176098	OBC	Spiked Blank	37CL4 2378 Tetra CDD	2017/09/21		119	%	35 - 197
			C13-1234678 HeptaCDD	2017/09/21		83	%	23 - 140
			C13-1234678 HeptaCDF	2017/09/21		61	%	28 - 143
			C13-123478 HexaCDD	2017/09/21		80	%	32 - 141
			C13-123478 HexaCDF	2017/09/21		63	%	26 - 152
			C13-1234789 HeptaCDF	2017/09/21		81	%	26 - 138
			C13-123678 HexaCDD	2017/09/21		92	%	28 - 130
			C13-123678 HexaCDF	2017/09/21		76	%	26 - 123
			C13-12378 PentaCDD	2017/09/21		107	%	25 - 181
			C13-12378 PentaCDF	2017/09/21		87	%	24 - 185
			C13-123789 HexaCDF	2017/09/21		102	%	29 - 147
			C13-234678 HexaCDF	2017/09/21		97	%	28 - 136
			C13-23478 PentaCDF	2017/09/21		87	%	21 - 178
			C13-2378 TetraCDD	2017/09/21		103	%	25 - 164
			C13-2378 TetraCDF	2017/09/21		88	%	24 - 169
			C13-OCDD	2017/09/21		91	%	17 - 157
			2,3,7,8-Tetra CDD	2017/09/21		97	%	67 - 158
			1,2,3,7,8-Penta CDD	2017/09/21		88	%	25 - 181

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,4,7,8-Hexa CDD	2017/09/21		105	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2017/09/21		102	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2017/09/21		119	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2017/09/21		106	%	70 - 140
			Octa CDD	2017/09/21		104	%	78 - 144
			2,3,7,8-Tetra CDF	2017/09/21		103	%	75 - 158
			1,2,3,7,8-Penta CDF	2017/09/21		95	%	80 - 134
			2,3,4,7,8-Penta CDF	2017/09/21		110	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2017/09/21		110	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2017/09/21		111	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2017/09/21		91	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2017/09/21		96	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2017/09/21		100	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2017/09/21		96	%	78 - 138
			Octa CDF	2017/09/21		93	%	63 - 170
5176098	OBC	Spiked Blank DUP	37CL4 2378 Tetra CDD	2017/09/21		122	%	35 - 197
			C13-1234678 HeptaCDD	2017/09/21		86	%	23 - 140
			C13-1234678 HeptaCDF	2017/09/21		73	%	28 - 143
			C13-123478 HexaCDD	2017/09/21		84	%	32 - 141
			C13-123478 HexaCDF	2017/09/21		76	%	26 - 152
			C13-1234789 HeptaCDF	2017/09/21		79	%	26 - 138
			C13-123678 HexaCDD	2017/09/21		95	%	28 - 130
			C13-123678 HexaCDF	2017/09/21		77	%	26 - 123
			C13-12378 PentaCDD	2017/09/21		105	%	25 - 181
			C13-12378 PentaCDF	2017/09/21		86	%	24 - 185
			C13-123789 HexaCDF	2017/09/21		100	%	29 - 147
			C13-234678 HexaCDF	2017/09/21		91	%	28 - 136
			C13-23478 PentaCDF	2017/09/21		89	%	21 - 178
			C13-2378 TetraCDD	2017/09/21		104	%	25 - 164
			C13-2378 TetraCDF	2017/09/21		80	%	24 - 169
			C13-OCDD	2017/09/21		92	%	17 - 157
			2,3,7,8-Tetra CDD	2017/09/21		89	%	67 - 158
			1,2,3,7,8-Penta CDD	2017/09/21		90	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2017/09/21		104	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2017/09/21		105	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2017/09/21		114	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2017/09/21		99	%	70 - 140
			Octa CDD	2017/09/21		103	%	78 - 144
			2,3,7,8-Tetra CDF	2017/09/21		105	%	75 - 158
			1,2,3,7,8-Penta CDF	2017/09/21		95	%	80 - 134
			2,3,4,7,8-Penta CDF	2017/09/21		107	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2017/09/21		106	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2017/09/21		110	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2017/09/21		89	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2017/09/21		87	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2017/09/21		94	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2017/09/21		97	%	78 - 138
			Octa CDF	2017/09/21		97	%	63 - 170
5176098	OBC	RPD	2,3,7,8-Tetra CDD	2017/09/21	8.6		%	25
			1,2,3,7,8-Penta CDD	2017/09/21	2.2		%	25
			1,2,3,4,7,8-Hexa CDD	2017/09/21	0.96		%	25
			1,2,3,6,7,8-Hexa CDD	2017/09/21	2.9		%	25
			1,2,3,7,8,9-Hexa CDD	2017/09/21	4.3		%	25

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,4,6,7,8-Hepta CDD	2017/09/21	6.8		%	25
			Octa CDD	2017/09/21	0.97		%	25
			2,3,7,8-Tetra CDF	2017/09/21	1.9		%	25
			1,2,3,7,8-Penta CDF	2017/09/21	0		%	25
			2,3,4,7,8-Penta CDF	2017/09/21	2.8		%	25
			1,2,3,4,7,8-Hexa CDF	2017/09/21	3.7		%	25
			1,2,3,6,7,8-Hexa CDF	2017/09/21	0.90		%	25
			2,3,4,6,7,8-Hexa CDF	2017/09/21	2.2		%	25
			1,2,3,7,8,9-Hexa CDF	2017/09/21	9.8		%	25
			1,2,3,4,6,7,8-Hepta CDF	2017/09/21	6.2		%	25
			1,2,3,4,7,8,9-Hepta CDF	2017/09/21	1.0		%	25
			Octa CDF	2017/09/21	4.2		%	25
5176098	OBC	Method Blank	37CL4 2378 Tetra CDD	2017/09/21		125	%	35 - 197
			C13-1234678 HeptaCDD	2017/09/21		84	%	23 - 140
			C13-1234678 HeptaCDF	2017/09/21		66	%	28 - 143
			C13-123478 HexaCDD	2017/09/21		74	%	32 - 141
			C13-123478 HexaCDF	2017/09/21		66	%	26 - 152
			C13-1234789 HeptaCDF	2017/09/21		88	%	26 - 138
			C13-123678 HexaCDD	2017/09/21		90	%	28 - 130
			C13-123678 HexaCDF	2017/09/21		71	%	26 - 123
			C13-12378 PentaCDD	2017/09/21		105	%	25 - 181
			C13-12378 PentaCDF	2017/09/21		87	%	24 - 185
			C13-123789 HexaCDF	2017/09/21		96	%	29 - 147
			C13-234678 HexaCDF	2017/09/21		91	%	28 - 136
			C13-23478 PentaCDF	2017/09/21		90	%	21 - 178
			C13-2378 TetraCDD	2017/09/21		106	%	25 - 164
			C13-2378 TetraCDF	2017/09/21		85	%	24 - 169
			C13-OCDD	2017/09/21		85	%	17 - 157
			2,3,7,8-Tetra CDD	2017/09/21	0.0765 U, EDL=0.0765		pg/g	
			1,2,3,7,8-Penta CDD	2017/09/21	0.112 U, EDL=0.112		pg/g	
			1,2,3,4,7,8-Hexa CDD	2017/09/21	0.194 J, EDL=0.0809		pg/g	
			1,2,3,6,7,8-Hexa CDD	2017/09/21	0.141 U, EDL=0.141 (1)		pg/g	
			1,2,3,7,8,9-Hexa CDD	2017/09/21	0.175 U, EDL=0.175 (1)		pg/g	
			1,2,3,4,6,7,8-Hepta CDD	2017/09/21	0.254 J, EDL=0.0956		pg/g	
			Octa CDD	2017/09/21	0.823 J, EDL=0.102		pg/g	
			Total Tetra CDD	2017/09/21	0.0765 U, EDL=0.0765		pg/g	
			Total Penta CDD	2017/09/21	0.112 U, EDL=0.112		pg/g	
			Total Hexa CDD	2017/09/21	0.194 J, EDL=0.0818		pg/g	
			Total Hepta CDD	2017/09/21	0.369 J, EDL=0.0956		pg/g	
			2,3,7,8-Tetra CDF	2017/09/21	0.0952 U, EDL=0.0952		pg/g	

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,7,8-Penta CDF	2017/09/21	0.107 U, EDL=0.107		pg/g	
			2,3,4,7,8-Penta CDF	2017/09/21	0.134 J, EDL=0.103		pg/g	
			1,2,3,4,7,8-Hexa CDF	2017/09/21	0.163 U, EDL=0.163 (1)		pg/g	
			1,2,3,6,7,8-Hexa CDF	2017/09/21	0.173 J, EDL=0.0761		pg/g	
			2,3,4,6,7,8-Hexa CDF	2017/09/21	0.168 J, EDL=0.0708		pg/g	
			1,2,3,7,8,9-Hexa CDF	2017/09/21	0.227 J, EDL=0.0757		pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2017/09/21	0.198 J, EDL=0.0734		pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2017/09/21	0.184 J, EDL=0.0735		pg/g	
			Octa CDF	2017/09/21	0.418 J, EDL=0.102		pg/g	
			Total Tetra CDF	2017/09/21	0.0952 U, EDL=0.0952		pg/g	
			Total Penta CDF	2017/09/21	0.134 J, EDL=0.105		pg/g	
			Total Hexa CDF	2017/09/21	0.567 J, EDL=0.0743		pg/g	
			Total Hepta CDF	2017/09/21	0.381 J, EDL=0.0735		pg/g	
5176098	OBC	RPD - Sample/Sample Dup	2,3,7,8-Tetra CDD	2017/09/22	NC		%	25
			1,2,3,7,8-Penta CDD	2017/09/22	NC		%	25
			1,2,3,4,7,8-Hexa CDD	2017/09/22	NC		%	25
			1,2,3,6,7,8-Hexa CDD	2017/09/22	NC		%	25
			1,2,3,7,8,9-Hexa CDD	2017/09/22	NC		%	25
			1,2,3,4,6,7,8-Hepta CDD	2017/09/22	16		%	25
			Octa CDD	2017/09/22	60 (2)		%	25
			Total Tetra CDD	2017/09/22	NC		%	25
			Total Penta CDD	2017/09/22	NC		%	25
			Total Hexa CDD	2017/09/22	NC		%	25
			Total Hepta CDD	2017/09/22	NC		%	25
			2,3,7,8-Tetra CDF	2017/09/22	NC		%	25
			1,2,3,7,8-Penta CDF	2017/09/22	NC		%	25
			2,3,4,7,8-Penta CDF	2017/09/22	NC		%	25
			1,2,3,4,7,8-Hexa CDF	2017/09/22	NC		%	25
			1,2,3,6,7,8-Hexa CDF	2017/09/22	NC		%	25
			2,3,4,6,7,8-Hexa CDF	2017/09/22	NC		%	25
			1,2,3,7,8,9-Hexa CDF	2017/09/22	NC		%	25
			1,2,3,4,6,7,8-Hepta CDF	2017/09/22	NC		%	25
			1,2,3,4,7,8,9-Hepta CDF	2017/09/22	NC		%	25
			Octa CDF	2017/09/22	NC		%	25
			Total Tetra CDF	2017/09/22	NC		%	25
			Total Penta CDF	2017/09/22	NC		%	25
			Total Hexa CDF	2017/09/22	NC		%	25

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Maxxam Job #: B7K1281
Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Total Hepta CDF	2017/09/22	NC		%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

(2) Duplicate results exceeded RPD acceptance criteria. This may be due to sample heterogeneity.

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Report Date: 2017/10/06

TestAmerica
Client Project #: 58011621
Site Location: G-P CAMAS FRESHWATER SEDIMENTS

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Branko Vrzic, A.SC.T., Senior Analyst, HRMS Services

Cristina Carriere, Scientific Service Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

Chain of Custody Record

580-71236 Chain of Custody

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information
Client Contact: Jim Good
Company: Environmental Science Associates (ESA)
Address: 5309 Shilshole Avenue NW, Suite 200
City: Seattle
State, Zip: WA, 98107
Phone: 206-204-6960(Tel)
Email: JGood@esassoc.com
Project Name: G-P Camas Freshwater Sediments
Site:

Sampler: J. Vlaftelicia, C. French
Phone: 503-830-5693
Lab PM: Walker, Elaine M
E-Mail: elaine.walker@testamericainc.com
Due Date Requested:
TAT Requested (days):
PO #: D160430.00, Task 2
WO #: D160430.00, Task 2
Project #: 58011621
SSOW#:

COC No: 580-25858-8523.2
Page: Page 2 of 2
Job #:

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	350.1 - Ammonia	6020A_LL - As,Cd,Cr,Cu,Pb,Se,Ag,Ni,Zn 7471A - Mercury	8081B - Pesticides, Low Level	8082A - PCBs, Low Level	8070D Semivolatiles, Low Level	9060 - TOC	NWTPH-Dx	Organotins	160.4 - Total Volatile Solids	9034 - Sulfide	SM2540B - Total Solids	Grain Size	1613B - Dioxins & Furans (Maxxam Analytical)	Total Number of containers	Special Instructions/Note:
Preservation Code:							N	N	N	N	N	N	N	N	N	N	N	N	N		
OF2-1	9/12/17	1345	C	S			X	X	X	X	X	X	X	X	X		X	X	X	6	
OF2-1	9/12/17	1345	G	S												X				1	Zn. Acetate Preserv.
OF2-2	9/12/17	1530	C	S			X	X	X	X	X	X	X	X	X		X	X	X	6	
OF2-2	9/12/17	1530	G	S												X				1	Zn. Acetate Preserv.
OF2-3	9/12/17	1700	C	S			X	X	X	X	X	X	X	X	X		X	X	X	6	
OF2-3	9/12/17	1700	G	S												X				1	Zn. Acetate Preserv.

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)
Special Instructions/QC Requirements:

Empty Kit Relinquished by: Date: Time: Method of Shipment:

	Date/Time	Company		Date/Time	Company
Relinquished by:	9/13/17 0705	ESA	Received by: Jessica Nyr	9/13/17 1110	ESS
Relinquished by: Jessica Nyr	9/13/17 1250	ESS	Received by:	9/13/17 1250	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks: 2.3

CHAIN OF CUSTODY RECORD

Loc: 580
71236

Northwestern Aquatic Sciences
3814 Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365
Tel: 541-265-7225, Fax: 541-265-2799, www.nwaquatic.com

Client Name	Project No.	Shipping Information
TestAmerica		Carrier: FedEx
Address	Phone No.	Airbill No.
5755 8th Street East	253.248.4972	8112 7869 9953
City, State, Zip code	Report Attention	
Tacoma, WA 98424	M. Elaine Walker	

Lab Sample No.	Date Sampled	Time Sampled	Sampled by / Sample Description	Number of Containers	Testing Required	Comments
	9/12/17	1345	OF2-1	1		
	9/12/17	1530	OF2-2	1		
	9/12/17	1700	OF2-3	1		

580-71236 Chain of Custody

Therm. ID A2 Cor 1.2 Unc 2.1
Cooler Dsc Lg Blue @Lab
Wet/Packs Packing Other
Fed Ex Custody Seal: Yes X No

Signature	Print Name	Company	Date	Time	
Relinquished by: Gerald Irissarri	Gerald Irissarri	Northwestern Aquatic Sciences	12/11/17	0830	Custody Seal: Present / Not Present Cooler: Intact / Not Intact
Received by: Tom Blankinship	Blankinship	TA-Sea	12/12/17	0925	
Relinquished by					Internal Cooler Temperature Upon Lab Receipt (°C)
Received by laboratory					

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Walker, Elaine M	Carrier Tracking No(s):	COC No: 580-49668.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: elaine.walker@testamericainc.com	State of Origin: Washington	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 580-71236-1
Address: 4955 Yarrow Street, ,	Due Date Requested: 9/29/2017			
City: Arvada	TAT Requested (days):			
State, Zip: CO, 80002				
Phone: 303-736-0100(Tel) 303-431-7171(Fax)	PO #:			
Email:	WO #:			
Project Name: G-P Camas Freshwater Sediments	Project #: 58011621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (Wastewater, Sample, Groundwater, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SM2540B	160.4_VS	9034/9030B	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
OF2-1 (580-71236-1)	9/12/17	13:45 Pacific		Solid			X	X	X	2	, Total Sulfide by PSEP - requires special narrative comment (ask Seattle)
OF2-2 (580-71236-2)	9/12/17	15:30 Pacific		Solid			X	X	X	2	, Total Sulfide by PSEP - requires special narrative comment (ask Seattle)
OF2-3 (580-71236-3)	9/12/17	17:00 Pacific		Solid			X	X	X	2	, Total Sulfide by PSEP - requires special narrative comment (ask Seattle)

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		9/14/17 1500	TAP		9/16-17 0840	TAP
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 0.2 Fed 7 +0.1 Transfer RP 9-16-17

Login Sample Receipt Checklist

Client: Environmental Science Associates (ESA)

Job Number: 580-71236-1

Login Number: 71236
List Number: 1
Creator: Gonzales, Steve

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Environmental Science Associates (ESA)

Job Number: 580-71236-1

Login Number: 71236
List Number: 3
Creator: Gall, Brandon A

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	Not requested on COC.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Environmental Science Associates (ESA)

Job Number: 580-71236-1

Login Number: 71236
List Number: 2
Creator: Pottruff, Reed W

List Source: TestAmerica Denver
List Creation: 09/16/17 10:38 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

REPORT

of

TEST NO. 885-1 & 2

Toxicity of Freshwater Sediments Using Sediment Bioassays as Part of the Remedial Investigation at the Georgia-Pacific mill site in Camas, Washington

Submitted to

Environmental Science Associates
5309 Shilshole Ave. NW, Suite 200
Seattle, WA 98107

Submitted by

Northwestern Aquatic Sciences
3814 Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

October 31, 2017

EXECUTIVE SUMMARY OF SEDIMENT BIOASSAYS

Two freshwater sediment bioassays, a 10-day *Hyalella* amphipod survival test and a 20-day *Chironomus dilutus* midge survival and growth test were conducted for Environmental Science Associates (ESA) as part of the Remedial Investigation at the Georgia-Pacific mill site in Camas, Washington. Nine test sediments were compared to the control sediment to assess sediment toxicity and to interpret organism response under the Washington State *Sediment Management Standards* (Chapter 173-204 WAC, Last Update: 2/25/13). The test and control sediments tested are listed in Table 1.

TEST AND CONTROL SEDIMENT INFORMATION

The test sediments were provided to Northwestern Aquatic Sciences (NAS) by ESA personnel. The negative control sediment was collected by NAS personnel from an area approximately one mile east of the Highway 101 bridge at Beaver Creek, approximately eight miles south of Newport, Oregon. All sediments were stored at 4°C in the dark until used. Sample identification and collection information is as follows:

Table 1. Sample identification and collection dates.

Sample description	Hart Crowser Sample Identification	NAS Sample Identification	Collection Date	Receipt Date
Beaver Creek Control*	Control	5989G	9-13-17	9-13-17
Test sediment	OF1-1	5994G	9-13-17	9-15-17
Test sediment	OF1-2	5995G	9-13-17	9-15-17
Test sediment	OF1-3	5996G	9-13-17	9-15-17
Test sediment	OF1-4	5999G	9-14-17	9-15-17
Test sediment	OF2-1	5991G	9-12-17	9-15-17
Test sediment	OF2-2	5992G	9-12-17	9-15-17
Test sediment	OF2-3	5993G	9-12-17	9-15-17
Test sediment	OF2-4	5997G	9-14-17	9-15-17
Test sediment	OF2-5	5998G	9-14-17	9-15-17

*Control used for data interpretation.

BIOASSAY INTERPRETATION CRITERIA

Biological test interpretation for freshwater sediments, as presented in the *Sediment Management Standards* (SMS), uses biological criteria to identify sediments that have no adverse effects on biological resources, and correspond to no significant health risk to humans. The SMS includes Sediment Cleanup Objective (SCO) and Cleanup Screening Level (CSL) biological criteria. The Sediment Cleanup Objectives establish a no adverse effects level, including no acute or chronic adverse effect, to the benthic community. The Cleanup Screening Levels establish a minor adverse effects level, including acute or chronic effects, to the benthic community. The SCO biological criteria are exceeded when one of the biological test results is above the SCO for that bioassay endpoint. The CSL biological criteria are exceeded when 1) any two bioassay test results are above the SCO, or 2) when one of the bioassay test results is above the CSL.

Sediment Cleanup Objective Criteria

When any one of the biological test results shows a test sediment response that exceeds the bioassay-specific response guidelines presented below, and that response is statistically different ($p \leq 0.05$) from the control, the test sediment is judged to have exceeded the SCO.

In accordance with the SMS, the bioassay-specific response guidelines for evaluating an exceedance under the SCO criteria are as follows:

Amphipod 10-day Survival Bioassay. Mean mortality in the test sediment is greater than 15 percent over the mean control and statistically different from the control ($p \leq 0.05$).

Midge 20-Day Survival/Growth Bioassay. Mean mortality in the test sediment is 15 percent over the control mortality and statistically different from control ($p \leq 0.05$). For the growth endpoint, a mean reduction in

biomass that is greater than 25 percent compared to the control and statistically different from the control ($p \leq 0.05$).

Cleanup Screening Levels Criteria

When any two biological test results show test sediment responses that are above the SCO listed above, OR when any one of the biological test results is above the Cleanup Screening Level criteria listed below, that sediment is judged to have exceeded the CSL.

In accordance with the SMS, the bioassay-specific response guidelines for evaluating an exceedance under the CSL criteria are as follows:

Amphipod 10-day Survival/Growth Bioassay. Mean mortality in the test sediment is greater than 25 percent over the mean control and statistically different from the control ($p \leq 0.05$).

Midge 20-Day Survival/Growth Bioassay. Mean mortality in the test sediment is 25 percent over the control mortality and statistically different from the control ($p \leq 0.05$). For the growth endpoint, a mean reduction in biomass that is greater than 40 percent from the control sediment response and statistically different from the control ($p \leq 0.05$).

RESULTS OF AMPHIPOD, *HYALELLA AZTECA* 10-DAY SURVIVAL TEST (885-1)

All water quality observations were within the protocol specified ranges (Table 1, Section A). The test met applicable test acceptability criteria. Although the reference toxicant (positive control) LC50 result (0.48 g/L KCl) was slightly outside the laboratory's control chart action limits (0.29 – 0.46 g/L KCl), it was within the control chart action limits (0.25 – 0.52 g/L KCl). A review of test organisms and test conditions and procedures indicated that there was no evidence that these organisms were unusual in any way and there were no unusual circumstances that may have affected the test results. Control chart warning limits of ± 2 SD will be exceeded 5% of the time by chance alone. (Section A).

The control sediment exhibited a mean mortality of 1.3% (Table 1). None of the test sediments resulted in an exceedance for mortality under either the SCO or the CSL of the SMS guidelines in the *Hyalella* bioassay.

RESULTS OF MIDGE, *CHIRONOMUS DILUTUS*, 20-DAY SURVIVAL AND GROWTH TEST (885-2)

All water quality observations were within the protocol specified ranges (Table 1, Section B). The test met all other applicable acceptability criteria including positive control performance (Section B).

The mean mortality in the control sediment in the *Chironomid* test was 2.5% (Table 2). Five of the test sediments resulted in mortality that was statistically significantly higher than that in the control sediment, but none of the test sediments were more than either 15% or 25% over the control mortality. Therefore, none of the sediments exceeded the SCO or CSL criteria for mortality. The control average individual ash-free dry weight was 1.63 mg (Table 3). Eight of the test sediments resulted in growth that was statistically significantly lower than control growth. Only one test sediment, OF1-3, was statistically significantly lower than the control and exceeded limits under the SCO guidelines with an ash-free dry weight of 1.17 mg/individual. No sediment exceeded the CSL criteria for growth.

SUMMARY OF SEDIMENT BIOASSAY RESULTS

The *Sediment Management Standards* include Sediment Cleanup Objectives (SCO) and Cleanup Screening Levels (CSL) biological criteria to identify sediments that have adverse effects on biological resources. The SCO establishes a no adverse effects level, including no acute or chronic adverse effect, to the benthic community. The CSL establishes a minor adverse effects level, including acute or chronic effects, to the benthic community.

The SCO biological criteria are exceeded when one of the biological tests results is above the SCO for that bioassay endpoint. One test sediment, OF1-3, resulted in an exceedance under the SCO guidelines for growth in the *Chironomus* bioassay.

The CSL biological criteria is exceeded when 1) any two bioassay test results are above the SCO criteria; or 2) when one of the bioassay test results is above the CSL criteria. None of the test sediments exceeded the CSL criteria by resulting in either one test result that was a CSL exceedance or two test results that were SCO exceedances (Table 4).

STUDY APPROVAL

Assistant Laboratory Director — Date: 10-31-17
For Linda Nemoth

Project Manager — Date: 10-30-17

Table 1. Mortality results of *Hyalella* 10-day toxicity test and data interpretation using guidelines from the Washington State SMS (2013).

Sample description	Percent mortality (Mean ± SD)	Significantly higher than control sediment at α=0.05?	Percent higher (absolute) than control sediment	Exceedance under SCO? [1]	Exceedance under one-test criteria for CSL? [2]
Control (NAS# 5989G)	1.3 ± 3.5	---	---	---	---
OF1-1 (NAS# 5994G)	1.3 ± 3.5	No	0.0	No	No
OF1-2 (NAS# 5995G)	0.0 ± 0.0	No	-1.3	No	No
OF1-3 (NAS# 5996G)	2.5 ± 7.1	No	1.2	No	No
OF1-4 (NAS# 5999G)	3.8 ± 7.4	No	2.5	No	No
OF2-1 (NAS# 5991G)	3.8 ± 7.4	No	2.5	No	No
OF2-2 (NAS# 5992G)	0.0 ± 0.0	No	-1.3	No	No
OF2-3 (NAS# 5993G)	1.3 ± 3.5	No	0.0	No	No
OF2-4 (NAS# 5997G)	0.0 ± 0.0	No	-1.3	No	No
OF2-5 (NAS# 5998G)	1.3 ± 3.5	No	0.0	No	No

[1] Sediment Cleanup Objectives (SCO) exceedance if the test sediment mean mortality is significantly higher (1-tailed t-test at P≤0.05) than the control sediment mean mortality and the absolute difference is >15%.
[2] Cleanup Screening Levels (CSL) exceedance if the test sediment mean mortality is significantly higher (1-tailed t-test at P≤0.05) than the control sediment mean mortality and the absolute difference is >25%.

Table 2. Mortality results of *Chironomus* 20-day toxicity test and data interpretation using guidelines from the Washington State SMS (2013).

Sample description	Percent mortality (Mean ± SD)	Significantly higher than control sediment at α=0.05?	Percent higher (absolute) than control sediment	Exceedance under SCO? [1]	Exceedance under one-test criteria for CSL? [2]
Control (NAS# 5989G)	2.5 ± 4.6	---	---	---	---
OF1-1 (NAS# 5994G)	15.0 ± 14.1	Yes	12.5	No	No
OF1-2 (NAS# 5995G)	11.3 ± 14.6	No	8.8	No	No
OF1-3 (NAS# 5996G)	5.0 ± 7.6	No	2.5	No	No
OF1-4 (NAS# 5999G)	12.5 ± 11.6	Yes	10.0	No	No
OF2-1 (NAS# 5991G)	13.8 ± 13.0	Yes	11.3	No	No
OF2-2 (NAS# 5992G)	8.8 ± 8.3	No	6.3	No	No
OF2-3 (NAS# 5993G)	7.1 ± 7.6	No	4.6	No	No
OF2-4 (NAS# 5997G)	8.8 ± 6.4	Yes	6.3	No	No
OF2-5 (NAS# 5998G)	12.5 ± 12.8	Yes	10.0	No	No

[1] Sediment Cleanup Objectives (SCO) exceedance if the test sediment mean mortality is significantly higher (1-tailed t-test at P≤0.05) than the control sediment mean mortality and the absolute difference is >15%.
[2] Cleanup Screening Levels (CSL) exceedance if the test sediment mean mortality is significantly higher (1-tailed t-test at P≤0.05) than the control sediment mean mortality and the absolute difference is >25%.

Table 3. Growth results of *Chironomus* 20-day toxicity test and data interpretation using guidelines from the Washington State SMS (2013).

Sample description	Average ash-free dry wt/midge (mg)* (Mean ± SD)	Statistically significantly lower than control sediment at α=0.05?	Percent lower than control sediment	Exceedance under SCO?[1] (MIG_C-MIG_T/MIG_C>0.25)	Exceedance under one-test criteria for CSL?[2] (MIG_C-MIG_T/MIG_C>0.40)
Control (NAS# 5989G)	1.63 ± 0.16	---	---	---	---
OF1-1 (NAS# 5994G)	1.35 ± 0.14	Yes	17.5	No	No
OF1-2 (NAS# 5995G)	1.24 ± 0.16	Yes	23.9	No	No
OF1-3 (NAS# 5996G)	1.17 ± 0.12	Yes	28.9	Yes	No
OF1-4 (NAS# 5999G)	1.32 ± 0.20	Yes	19.1	No	No
OF2-1 (NAS# 5991G)	1.51 ± 0.28	No	7.5	No	No
OF2-2 (NAS# 5992G)	1.35 ± 0.16	Yes	17.5	No	No
OF2-3 (NAS# 5993G)	1.32 ± 0.11	Yes	19.3	No	No
OF2-4 (NAS# 5997G)	1.49 ± 0.14	Yes	9.0	No	No
OF2-5 (NAS# 5998G)	1.43 ± 0.20	Yes	12.4	No	No

* Pupae were not included in the sample to estimate ash-free dry weight (as per EPA/600/R-99/064, p. 59, section 12.3.8.2)
[1] Sediment Cleanup Objectives (SCO) exceedance if the test sediment mean growth is significantly lower (1-tailed t-test at P≤0.05) than the control sediment mean growth, and the difference is >25%.
[2] Cleanup Screening Levels (CSL) exceedance (one-test criteria) if the test sediment mean individual growth in significantly lower (1-tailed t-test at P≤0.05) than the control sediment mean growth, and the difference is >40%.

Table 4. Interpretation of bioassay test results for Georgia-Pacific mill site based on Washington State Sediment Management Standards - Sediment Cleanup Objectives (SCO) and Cleanup Screening Level (CSL) criteria.

Sample Description	SCO Exceedance / CSL Exceedance[1]			CSL Exceedance by two SCO Exceedances[2]
	Test No. 885-1 *Hyalella* 10-day Survival	Test No. 885-2 *Chironomus* 20-day Survival	Test No. 885-2 *Chironomus* 20-day Growth	
	SCO / CSL	SCO / CSL	SCO / CSL	CSL
Control (NAS# 5989G)	---	---	---	---
OF1-1 (NAS# 5994G)	No / No	No / No	No / No	No
OF1-2 (NAS# 5995G)	No / No	No / No	No / No	No
OF1-3 (NAS# 5996G)	No / No	No / No	**YES** / No	No
OF1-4 (NAS# 5999G)	No / No	No / No	No / No	No
OF2-1 (NAS# 5991G)	No / No	No / No	No / No	No
OF2-2 (NAS# 5992G)	No / No	No / No	No / No	No
OF2-3 (NAS# 5993G)	No / No	No / No	No / No	No
OF2-4 (NAS# 5997G)	No / No	No / No	No / No	No
OF2-5 (NAS# 5998G)	No / No	No / No	No / No	No

[1]One test result must exceed an SCO or a CSO criterion. Two test sediments exceeded the SCO criterion for *Chironomus* growth. No other single criterion exceedances occurred under either SCO or CSO criteria.
[2]Two test results must exceed the SCO criteria to exceed the CSL under this interpretation. No test sediments exceeded the CSL by having two SCO exceedances.

SECTION A

Amphipod (*Hyalella azteca*) 10-day sediment bioassay 885-1 data report

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 885-1

Title: Toxicity of freshwater sediments using a 10-day amphipod, *Hyalella azteca*, sediment bioassay as part of the remedial investigation at the Georgia-Pacific mill site in Camas, Washington.

Protocol No.: NAS-XXX-HA4b, April 7, 1998. Revision 1 (10-27-03). Based on ASTM 2001 (Standard test methods for measuring the toxicity of sediment-associated contaminants with fresh water invertebrates, E1706-00), Am. Soc. Test. Mat., Phila., PA, and EPA Method 100.1 (Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates, EPA/600/R-99/064). Washington State Sediment Management Standards (SMS) (Chapter 173-204 WAC, Last Update: 2/25/13).

STUDY MANAGEMENT

Study Sponsor: Environmental Science Associates, 5309 Shilshole Ave. NW, Suite 200, Seattle, WA 98107.

Sponsor's Study Monitor: Mr. Jim Good

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365

Test Location: Newport laboratory

Laboratory's Study Personnel: G.J. Irissarri, B.S., Proj. Mngr./ Study Dir.; L.K. Nemeth, B.A., M.B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; J.B. Brown, B.S., D.V.M, Assoc. Aq. Toxicol.; Y. Nakahama, Sr. Tech.

Study Schedule:

Test Beginning: 9-22-17, 1045 hrs.

Test Ending: 10-2-17, 1030 hrs.

Disposition of Study Records: All raw data, reports, and other study records are stored at Northwestern Aquatic Sciences, 3814 Yaquina Bay Rd., Newport, OR 97365.

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Test Sediments: Freshwater test sediments collected as part of the remedial investigation at the Georgia-Pacific mill site in Camas, Washington. Details are as follows:

NAS Sample No.	5991G	5992G	5993G	5994G	5995G
Description	OF2-1	OF2-2	OF2-3	OF1-1	OF1-2
Collection Date	9/12/17	9/12/17	9/12/17	9/13/17	9/13/17
Receipt Date	9/15/17	9/15/17	9/15/17	9/15/17	9/15/17

NAS Sample No.	5996G	5997G	5998G	5999G
Description	OF1-3	OF2-4	OF2-5	OF1-4
Collection Date	9/13/17	9/14/17	9/14/17	9/14/17
Receipt Date	9/15/17	9/15/17	9/15/17	9/15/17

Control Sediment: The negative control sediment (NAS#5989G) was collected on 9-13-17 from an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.

Treatments: Homogenized at test set up by mixing using stainless steel implements.

Storage: All test and control sediments were stored at 4°C in the dark in sealed containers until used.

TEST WATER

Source: Dechlorinated municipal tap water.

Dates of Preparation: 9-19-17

Water Quality:

pH: 7.6

conductivity: 102µmhos/cm

hardness: 26 mg/L as $CaCO_3$
alkalinity: 30 mg/L as $CaCO_3$.
total chlorine: <0.02 mg/L
Pretreatment: Dechlorinated and aerated ≥24 hr.

TEST ORGANISMS

Species: *Hyalella azteca,* amphipod.
Age/Size: 7-8 days old
Source: Chesapeake Cultures, Hayes, VA; received 9-21-17
Acclimation: Holding conditions prior to testing averaged: Temperature, 22.2 °C; dissolved oxygen, 11.0 mg/L; pH, 7.8; conductivity, 702 µmhos/cm; hardness, 171 mg/L as $CaCO_3$; and alkalinity, 190 mg/L as $CaCO_3$. Photoperiod, 16:8, L:D. Half of the water was replaced daily with test water, dechlorinated municipal tap water, during holding. Animals were fed YTC during holding.

TEST PROCEDURES AND CONDITIONS

The following is an abbreviated statement of the test procedures and a statement of the test conditions actually employed. See the test protocol (Appendix I) for a more detailed description of the test procedures used in this study.

Test Chambers: 300 ml high-form glass beakers
Test Volumes: 100 ml sediment layer; 175 ml test water.
Replicates/Treatment: 8
Organisms/Treatment: 80
Water Volume Changes: 2 water volumes per day
Aeration: None.
Feeding: Animals are fed 1.0 ml of YTC suspension per beaker daily.
Acceptance Criteria: Results are valid if mean control mortality does not exceed 20%.
Effects Criteria: survival after 10 days. Death is defined as no visible movement or response to tactile stimulation. Missing organisms were considered to be dead.
Water Quality and Other Test Conditions: The temperature, dissolved oxygen, conductivity, pH, hardness, alkalinity, and ammonia-nitrogen were measured in the overlying water of one replicate test container per treatment on days 0 and 10 of the test. Temperature and dissolved oxygen were measured daily in the overlying water of one replicate test container per treatment. Hardness and alkalinity were measured with titrimetric methods. Ammonia-N was measured using Hach reagents based on the salicylate (Clin. Chim. Acta 14:403, 1996) colorimetric method; samples were not distilled prior to analysis. The photoperiod was 16:8, L:D.

DATA ANALYSIS METHODS

Percent survival and percent mortality were calculated for each replicate as follows:

percent survival = 100 x (number surviving/initial number tested)
percent mortality = 100 x (number dead/initial number tested)

Means and standard deviations for the biological endpoints described above, and for water quality data, were computed using Microsoft Excel 2010. Mean percent mortality of each test sediment was statistically compared to the control sediment. Where appropriate, an arcsine square root transformation was performed on percent mortality data before analysis. Following determination of normality and homogeneity of variances, a one-tailed Student T-test, Mann-Whitney or Approximate T test was conducted at the 0.05 level of significance. The statistical software used was BioStat (version Feb 9, 2006 (EXCEL)) bioassay software developed by the U.S. Army Corps of Engineers, Seattle District.

PROTOCOL DEVIATIONS

None

REFERENCE TOXICANT TEST

The reference toxicant test is a multi-concentration toxicity test using potassium chloride, to evaluate the performance of the test organisms used in the sediment toxicity test. The performance is evaluated by comparing the results of this test with historical results obtained at the laboratory. A summary of the reference toxicant test result is given below. The reference toxicant test raw data are found in Appendix III.

Test No.: 999-3712
Reference Toxicant and Source: Potassium Chloride (KCl), Fisher Lot #147960.
Test Date: 9-22-17.
Dilution Water Used: Moderately hard synthetic water prepared from Milli-Q® deionized water.
Result: 96-hr LC50, 0.48 g/L. This result is slightly outside the laboratory's control chart warning limits (0.29 – 0.46 g/L). A review of test organisms and test conditions and procedures indicated that there were no unusual circumstances that may have affected the test results. Control chart warning limits of ± 2 SD will be exceeded 5% of the time by chance alone, and there was no evidence that these organisms were unusual in any way.

TEST RESULTS

Observations of water quality in the overlying water throughout the test are summarized in Table 1. A detailed tabulation of the water quality results by sample and test day can be found in Appendix II. The means and standard deviations of percent mortality of *Hyalella* exposed for 10 days to sediments are summarized in Table 2. Detailed data organized by sample and replicate, and summary statistics for these observations, are given in Appendix II.

All water quality observations of overlying water temperature and dissolved oxygen were within the protocol specified ranges. Ammonia-N in the overlying water ranged between <0.1 and 0.1 mg/L for all day 0 and day 10 measurements.

The test met the acceptability criteria specified in the SMS with 1.3 % mean control mortality (≤20% required). The reference toxicant (positive control) LC50 result was slightly outside the laboratory's control chart action limits (0.48 g/L; control chart mean ± 2 S.D. = 0.36 ± 0.08). A review of test conditions and procedures did not detect any unusual circumstances.

Interpretation was based on guidelines from the Washington State Sediment Management Standards (SMS) (Chapter 173-204 WAC, Last Update: 2/25/13). The SMS include Sediment Cleanup Objectives (SCO) and Cleanup Screening Levels (CSL) biological criteria. The Sediment Cleanup Objectives establish a no adverse effects level, including no acute or chronic adverse effect, to the benthic community. The Cleanup Screening Levels establish a minor adverse effects level, including acute or chronic effects, to the benthic community. To exceed the SCO for mortality, the mean mortality in the test sediment must be greater than 15 percent over the mean control and statistically different from the control ($p \leq 0.05$). To exceed the CSL criterion, mean mortality in the test sediment must be greater than 25 percent over the mean control and statistically different from the control ($p \leq 0.05$).

None of the test sediments resulted in an exceedance for mortality under either the SCO or the CSL of the SMS guidelines.

STUDY APPROVAL

Project Manager/Study Director — Date: 10-30-17

Quality Assurance Unit — Date: 10-31-17
For Julie Fiore

Assistant Laboratory Director — Date: 10-31-17
For Linda Nemeth

Table 1. Summary of water quality conditions during tests of the amphipod, *Hyalella azteca*, exposed to freshwater sediments.

Water Quality Parameter	Mean ± S.D.	Minimum	Maximum	N
Temperature (°C)	22.9 ± 0.4	22.0	23.8	110
Dissolved oxygen (mg/L)	7.7 ± 0.3	6.9	8.3	110
Conductivity (µmhos/cm)	116 ± 6.6	108	138	20
pH	7.4 ± 0.2	7.0	8.0	20
Hardness (mg/L as $CaCO_3$)	20 ± 5	17	34	20
Alkalinity (mg/L as $CaCO_3$)	33 ± 5	30	40	20
Total ammonia (mg/L)	---	<0.1	0.1	20

Table 2. Mortality results of *Hyalella* 10-day toxicity test and data interpretation using guidelines from the Washington State SMS (2013).

Sample description	Percent mortality (Mean ± SD)	Significantly higher than the control sediment at α=0.05?	Percent higher (absolute) than control sediment	Exceedance under SCO?[1]	Exceedance under one-test criteria for CSL[2]
Control (NAS# 5989G)	1.3 ± 3.5	---	---	---	---
OF1-1 (NAS# 5994G)	1.3 ± 3.5	No	0.0	No	No
OF1-2 (NAS# 5995G)	0.0 ± 0.0	No	-1.3	No	No
OF1-3 (NAS# 5996G)	2.5 ± 7.1	No	1.2	No	No
OF1-4 (NAS# 5999G)	3.8 ± 7.4	No	2.5	No	No
OF2-1 (NAS# 5991G)	3.8 ± 7.4	No	2.5	No	No
OF2-2 (NAS# 5992G)	0.0 ± 0.0	No	-1.3	No	No
OF2-3 (NAS# 5993G)	1.3 ± 3.5	No	0.0	No	No
OF2-4 (NAS# 5997G)	0.0 ± 0.0	No	-1.3	No	No
OF2-5 (NAS# 5998G)	1.3 ± 3.5	No	0.0	No	No

[1] Sediment Cleanup Objectives (SCO) exceedance if the test sediment mean mortality is significantly higher (1-tailed t-test at P≤0.05) than the control sediment mean mortality and the absolute difference is >15%.

[2] Cleanup Screening Levels (CSL) exceedance if the test sediment mean mortality is significantly higher (1-tailed t-test at P≤0.05) than the control sediment mean mortality and the absolute difference is >25%.

APPENDIX I

PROTOCOL

TEST PROTOCOL

FRESHWATER AMPHIPOD, *HYALELLA AZTECA*, 10-DAY SEDIMENT TOXICITY TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this study is to characterize the toxicity of freshwater sediments based on survival and, optionally, growth using the amphipod, *Hyalella azteca.*

1.2 Referenced Method: This protocol is based on EPA Method 100.1 (EPA/600/R-99/064) and ASTM Method E 1706-00 (ASTM 2001).

1.3 Summary of Method: A summary of test conditions for the amphipod 10-day sediment toxicity test is tabulated below. The 10-day sediment toxicity test with *Hyalella azteca* is conducted at 23 ± 1°C with a 16L:8D photoperiod at an illuminance of about 100 to 1000 lux. Test chambers are 300-mL high-form lipless beakers containing 100 mL of sediment and 175 mL of overlying water. Ten 7-14 day old amphipods (1 to 2 day range in age) are used in each replicate. The number of replicates/treatment depends on the objective of the test. Eight replicates are recommended for routine testing. Amphipods in each test chamber are fed 1.0 mL of a YCT food daily. Each chamber receives two volume additions per day of overlying water. Overlying water can be culture water, well water, surface water, site water, or reconstituted water. Test endpoints include survival and/or growth.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
3814 Yaquina Bay Road, P.O. Box 1437
Newport, OR 97365.

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Study Director: _____
Quality Assurance Unit: _____
Aquatic Toxicologist: _____
Aquatic Toxicologist: _____

2.6 Proposed Testing Schedule: Tests are to begin within 14 days of sample collection unless otherwise specified. Reference toxicant test to be run concurrently.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).

3. TEST MATERIAL

The test materials are freshwater sediments. The control, reference, and test sediments are placed in solvent cleaned 1 L glass jars fitted with PTFE-lined screw caps. At the laboratory the samples are stored at 4°C in the dark. The original sealed containers may be stored for up to 14 days prior to testing. If jars are not not full when received or if sediment is removed for testing, headspaces should be filled with nitrogen to retard deterioration. A negative control sediment is collected from a clean site. In addition, a reference sediment, a clean sediment with physical characteristics similar to the test sediments, may be employed as a comparison station.

4. TEST WATER

Test water (overlying water) at NAS is normally moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals. Test water may also be well water, surface water or site water, depending on the study design.

5. TEST ORGANISMS

5.1 Species: amphipod, *Hyalella azteca*.

5.2 Source: Cultured at NAS or purchased from a reputable commercial supplier.

5.3 Age: 7-14 days old at start of test; with 1 to 2 day range in age.

5.4 Acclimation and Pretest Observation: Test organisms must be cultured and tested at 23°C . Ideally they should be cultured in the same water that will be the test water. However, acclimation to test water is not required. Isolated young should be held similarly to mass cultures for at least two days (eliminate the feeding instructions) before starting the test to eliminate animals injured during handling

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers used in the toxicity test are 300-mL high-form lipless glass beakers. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath or by placement in a temperature-controlled room. Aeration is not employed unless dissolved oxygen drops below 2.5 mg/L. The test is conducted under an illuminance of 100 to 1000 lx with a 16L:8D photoperiod.

6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in EPA/600/4-90/027F. New glassware and test systems are soaked 15 minutes in tap water and scrubbed with detergent (or cleaned in automatic dishwasher); rinsed twice with tap water; carefully rinsed once with fresh, dilute (10%, V:V) hydrochloric or nitric acid to remove scale, metals, and bases; rinsed twice with deionized water; rinsed once with acetone to remove organic compounds (using a fume hood or canopy); and rinsed three times with deionized water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of amphipods to test, control, and reference sediments. The sediments are placed on the bottom of the test containers and are overlain with test water. The test exposure is for 10 days. The renewal of overlying water consists of two volume additions per day, either continuous or

intermittent. Each treatment consists of eight replicate test containers, each containing 10 organisms. Test chamber positions are completely randomized. Test organisms are randomly distributed to the test chambers. Blind testing is normally used.

7.2 Setup of Test Containers: Sediments are homogenized and placed in test chambers on the day before addition of test organisms. Sediment (100 ml) is placed into each of eight replicate beakers. After addition of the sediment, 175 ml of test water is gently added to each beaker in a manner to prevent resuspension. The overlying water is replaced twice daily. The test begins when amphipods are introduced to the test chambers. Initial water quality measurements are taken prior to the addition of test organisms.

7.3 Effect Criterion: The effect criterion used in the amphipod bioassay is mortality, defined as the lack of movement of body or appendages on response to tactile stimulation. The optional sublethal effect criterion is growth which is determined by using dry weight measurements or body length measurements.

7.4 Test Conditions: No aeration is employed unless dissoved oxygen falls below 2.5 mg/L. The test temperature employed is 23 ± 1°C. A 16:8, L:D photoperiod is used. Illumination is supplied by daylight fluorescent lamps at 100 to 1000 lux. The overlying water is replaced twice daily.

7.5 Beginning the Test: On the day the test begins, amphipods are impartially counted into small containers of test water (10/container). The test is begun by rinsing test organisms into the equilibrated test containers. If the optional growth endpoint is to be used. Twenty organisms are archived for length determination or 80 organisms for dry weight.

7.6 Feeding: Amphipods are fed 1.0 mL of YCT daily per test chamber. A feeding may be skipped if there is a build up of excess food. However, all beakers must be treated similarly.

7.7 Test Duration, Type and Frequency of Observations, and Methods: The duration of the acute toxicity test is 10 days. The type and frequency of observations to be made are summarized as follows:

TYPE OF OBSERVATION	TIMES OF OBSERVATION
BIOLOGICAL DATA	
Survival, growth	Day 10
PHYSICAL AND CHEMICAL DATA	
Hardness, alkalinity, ammonia-N, conductivity, pH, dissolved oxygen, and temperature	Beginning and end of test in overlying water of one replicate beaker from each treatment.
Dissolved oxygen, temperature	Daily in overlying water of one replicate beaker from each treatment.

Dissolved oxygen is measured using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is measured using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using titrometric methods. Ammonia-nitrogen is measured using the salicylate colerimetric method (Clin. Chim. Acta 14:403, 1996).

Overlying water should be sampled just before water renewal from about 1 to 2 cm above the sediment surface using a pipet. It may be necessay to pool water samples from individual replicates. The pipet should be checked to make sure no organisms are removed during sampling of overlying water.

7.8 Growth Measurement: Growth is measured as average dry weight of animals in a test replicate at the end of the test on day 10 or average total length of preserved animals. Pooled animals from each test replicate are rinsed with deionized water and placed into tared aluminum weigh pans. The pans are dried at 60-90°C to constant weight. The dried amphipods are placed into a dessicator and weighed as soon as possible to the nearest 0.01 mg (desirable

to use 0.001 mg). The total weight of the dried amphipods in each pan is divided by the number of amphipods weighed to obtain an average dry weight per surviving amphipod per replicate.

If the length growth endpoint is to be used, either in place of or along with the weight endpoint, amphipods from each replicate are pooled and preserved in vials. Later, the preserved amphipods from one vial are carefully stretched out on a glass microscope slide and quickly measured using a dissecting microscope fitted with a calibrated ocular micrometer. Then, if weight is to be determined, the animals are quickly transferred to tared aluminum foil cups. Fine-tipped forceps or fine brushes are required for these handling operations.

If both measurements are to be used, total length measurements are taken first, then the animals are transferred to tared aluminum foil cups for weighing.

8. CRITERIA OF TEST ACCEPTANCE

The test results are acceptable if the minimum survival of organisms in the control treatment at the end of the test is at least 80%. For the growth endpoint, the test results are acceptable if there is measureable growth of test organisms in the control sediment.

9. DATA ANALYSIS

The endpoints of the toxicity test are survival and growth (optional). Survival is obtained as a direct count of living organisms in each test container at the end of the test. Average amphipod dry weight, also measured at the end of the test, may be used to compare growth between treatment sediments and the control or reference sediment. Body length may be used instead of dry weight. Ordinarily the following data analysis is performed. Due to special requirements, alternative methods may be used. The means and standard deviations are calculated for each treatment level. Identification of toxic sediments is established by statistical comparison of test endpoints between test and control or reference sediments. Between treatment comparisons may be made using a Student's t-test or Wilcoxon's Two-Sample test, where each treatment is compared to the control or the reference sediment. An arcsine-square root transformation of proportional data, and tests for normality and heterogeneity of variances, are performed prior to statistical comparisons.

10. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; date and time of test beginning and end; information on the test material; information on the source and quality of the overlying/test water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including feeding, if any, and water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses and a summary table of endpoints; a description of the statistical methods used; any unusual information about the test or deviations from procedures; reference toxicant testing information.

11. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

12. REFERENCE TOXICANT

The reference toxicant test is a standard multi-concentration toxicity test using a specified chemical toxicant to evaluate the performance of test organisms used in the study. Reference toxicant tests are 96-hour, water only exposures, not 10-day sediment exposures. The reference toxicant test is run concurrently. Performance is evaluated by comparing the results of the reference toxicant test with historical results (e.g., control charts) obtained at the laboratory.

13. REFERENCED GUIDELINES

ASTM. 2001. Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates. ASTM Standard Method No. E 1706-00. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. EPA. 2000. Section 11, Test Method 100.1, *Hyalella azteca* 10-d Survival and Growth Test for Sediments, pp. 47-54 In: Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates (Second Edition). EPA/600/R-99/064.

Weber, C.I. (Ed.) 1993. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fourth Edition). EPA/600/4-90/027F.

14. APPROVALS

_____ for _____
Name Date

_____ for **Northwestern Aquatic Sciences**
Name Date

Appendix A
Test Conditions Summary

1. Test type	whole sediment toxicity test with renewal of overlying water
2. Test duration	10 days
3. Temperature	23 ± 1°C
4. Light quality	daylight flourescent light
5. Illuminance	100 - 1000 lux
6. Photoperiod	16L:8D
7. Test chamber size	300-mL high-form lipless beakers, (Pyrex® 1040 or equivalent)
8. Sediment volume	100 mL
9. Overlying water volume	175 mL
10. Renewal overlying water	2 volume additions/day (continuous or intermittent)
11. Age of test organisms	7-14 days old at test initiation (1 to 2 day range in age)
12. Organisms per test chamber	10
13. Replicates per treatment	8 recommended for routine testing (depends on design)
14. Organisms per treatment	80
15. Feeding regime	YCT food, fed 1.0 mL daily/chamber
16. Cleaning	if screens are used, clean as needed
17. Aeration	None, unless DO falls below 2.5 mg/L
18. Overlying (test) water	Culture water, well water, surface water, site water or reconstituted water
19. Water quality	Hardness, alkalinity, conductivity, pH, ammonia-N beginning and end; temperature and dissolved oxygen daily
20. Endpoints	Survival (optional, growth by dry weight or length)
21. Test acceptability criteria	Minimum control survival of 80%
22. Sample holding	14 days at 4°C in the dark
23. Sample volume required	1L (800 mL per sediment)
24. Reference toxicant	Concurrent testing required

APPENDIX II

RAW DATA

RAW DATA DIVIDER PAGE
Test No. 885-1

TEST DESCRIPTION, MONITORING, AND RESULTS BENCHSHEETS

NORTHWESTERN AQUATIC SCIENCES
HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

PROTOCOL NO. NAS-XXX-HA4b

REVIEWED PAGES 1-30 - GJI

Test No. 885-1 Client ESA Investigator

STUDY MANAGEMENT

Client: Environmental Science Associates, 5309 Shilshole Ave. NW, Suite 200, Seattle, WA 98107
Client's Study Monitor: Mr. Jim Good
Testing Laboratory: Northwestern Aquatic Sciences
Test Location: Newport Laboratory
Laboratory's Study Personnel:
Proj. Man./Study Dir. G.J. Irissarri GJI
QA Officer L.K. Nemeth
1. Yves Matagama II 2. GABrielle Ercis
3. C. Brown JB 4.
5. 6.
7. 8.

Study Schedule:
Test Beginning: 9-22-17 1045 Test Ending: 10-2-17 1030

TEST MATERIAL

General description (see sample logbook/chain-of-custody for details):

NAS Sample No.:	5991G	5992G	5993G	5994G
Description:	OF2-1	OF2-2	OF2-3	OF1-1
Collection Date:	9/12/17	9/12/17	9/12/17	9/13/17
Receipt Date:	9/15/17	9/15/17	9/15/17	9/15/17
:				

NAS Sample No.:	5995G	5996G	5997G	5998G
Description:	OF1-2	OF1-3	OF2-4	OF2-5
Collection Date:	9/13/17	9/13/17	9/14/17	9/14/17
Receipt Date:	9/15/17	9/15/17	9/15/17	9/15/17
:				

NAS Sample No.:	5999G			
Description:	OF1-4			
Collection Date:	9/14/17			
Receipt Date:	9/15/17			
:				

NAS Sample No.:				
Description:				
Collection Date:				
Receipt Date:				
:				

NAS Sample No.:				
Description:				
Collection Date:				
Receipt Date:				
:				

Error codes: 1) correction of handwriting error
2) written in wrong location; entry deleted
3) wrong date deleted, replaced with correct date
4) error found in measurement; measurement repeated

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator

SEDIMENT DESCRIPTIONS – SUPPLEMENTAL NOTES

Sample No.	Description
5989G	FINE BLACK MUD
5991G	BROWN SAND W/ SMALL CLAMS & PLANT DEBRIS
5992G	GRAY SAND W/ SMALL CLAMS & PLANT DEBRIS
5993G	BROWN SAND W/ SMALL CLAMS & PLANT DEBRIS
5994G	GRAY/BROWN SAND W/ SOME PLANT DEBRIS
5995G	Gray/Brown Sand w/ small clams & Plant Debris
5996G	BROWN SAND
5997G	Brown Sand w/ small clams & Plant Debris
5998G	BROWN SAND W/ SMALL clam shells & plant debris
5999G	GRAY SAND

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator

TEST WATER

Source: Dechlorinated Newport, OR tap water

Date of Collection: 9-19-17

pH 7.6

Cond (umhos/cm^2) 182

Hardness (mg/L) 26

Alkalinity (mg/L) 30

Total Chlorine (mg/L) <0.02

Treatments: Aerated ≥ 24 hrs

TEST ORGANISMS

Species: *Hyalella azteca* Age: 7-8 DAYS Date received: 9-21-17

Source: Chesapeake Cultures, Hayes, VA

Acclimation Data:

Date	Temp. (deg.C)	pH	DO (mg/L)	Cond umhos/cm	Feeding amount	Feeding description	Water changes	Hardness (mg/L)	Alkalinity (mg/L)
9-21-17	22.4	7.3	14.7	821	10 mL	YTC	YES	205	220
9-22-17	21.9	8.3	7.7	583	—	—	—	137	160
Mean	22.2	7.8	11.0	702				171	190
S.D.	—	—	—	—				—	—
(N)	2	2	2	2				2	2

Photoperiod during acclimation: 16:8 L:D

TEST PROCEDURES AND CONDITIONS

Test chambers: 300 ml glass beakers

Test volumes: 100 ml of test sediment; 275 ml total volume

Replicates/treatment: (8) 8 Organisms/treatment: (80) 80 (10/REP)

Test water changes: Twice daily

Aeration: only if DO falls below 2.5 mg/L

Beaker placement: Total randomization

Feeding: everyday beginning with day zero

Photoperiod: 16:8, L:D

Test temperature (deg.C): 23

Control Sediment:

Source: From an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.

Date collected: 9/13/17

Sieved through 0.5 -mm screen

Storage: 4°C in the dark in closed containers. NAS# 5989G

MISCELLANEOUS NOTES

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator _____

Test conducted in (circle one): (room 1) room 2 trailer water bath other:_____

Randomization chart:

5									80
4									79
3									78
2									77
1									76

TOP SHELF – FRONT

Randomization chart:

Randomization chart:

Randomization chart:

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator

DAILY RECORD SHEET

Day 0 (9/22/17) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
12	22.0	8.2	115	7.5	26	30		Each beaker fed 1.0 ml
20	22.8	8.3	116	7.4	26	40		YTC suspension
28	22.2	8.0	116	7.3	17	30		Initials: GJS
51	22.2	8.0	117	7.1	26	30		
52	22.3	8.2	112	7.4	17	30		
56	22.4	8.2	115	7.4	17	40		
60 (9-22-17 GJ)	22.9	7.6	138	~~8.2~~ 7.0	17	30		
66	22.7	~~8.0~~	118	~~8.0~~ 7.1	17	30		Water changed in all
68	22.9	~~8.1~~	121	~~8.1~~ 7.2	34	40		beakers.
70	23.0	6.9	120	7.2	26	30		Time: 0610
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1705
								Initials: YC

*Water quality measurements to be taken.

Day 1 (9/23/17) GJS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
12	22.2	8.1						Each beaker fed 1.0 ml
20	22.9	8.2						YTC suspension
28	22.3	8.2						Initials: GJS
51	22.3	8.1						
52	22.3	8.0						
56	22.4	8.0						
60	23.3	7.8						
66	22.7	8.1						Water changed in all
68	22.8	8.2						beakers.
70	23.1	7.8						Time: 0550
								Initials: GJS
								Water changed in all
								beakers.
								Time: 1800
								Initials: YC

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator

DAILY RECORD SHEET

Day 2 (9/24/17) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
12	22.1	8.1						Each beaker fed 1.0 ml
20	22.6	8.1						YTC suspension
28	22.2	8.0						Initials: GJL
51	22.3	7.9						
52	22.3	7.9						
56	22.4	7.9						
60	23.0	7.6						
66	22.7	7.8						Water changed in all
68	22.8	7.9						beakers.
70	23.0	7.9						Time: 0555
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1825
								Initials:

*Water quality measurements to be taken.

Day 3 (9/25/17) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
12	22.3	7.8						Each beaker fed 1.0 ml
20	23.1	7.7						YTC suspension
28	22.4	7.7						Initials: GJL
51	22.5	7.6						
52	22.5	7.6						
56	22.7	7.6						
60	23.3	7.3						
66	23.0	7.6						Water changed in all
68	23.1	7.7						beakers.
70	23.3	7.8						Time: 0600
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1745
								Initials:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator _____

DAILY RECORD SHEET

Day 4 (9/26/17) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
12	22.7	7.6						Each beaker fed 1.0 ml
20	23.8	7.5						YTC suspension
28	23.0	7.5						Initials: GJ
51	23.1	7.4						
52	23.1	7.4						
56	23.3	7.5						
60	23.7	7.3						
66	23.4	7.4						Water changed in all
68	23.5	7.5						beakers.
70	23.7	7.5						Time: 0550
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1725
								Initials: JC

*Water quality measurements to be taken.

Day 5 (9/27/17) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
12	22.8	7.6						Each beaker fed 1.0 ml
20	23.4	7.6						YTC suspension
28	22.9	7.4						Initials: GJ
51	23.0	7.4						
52	23.0	7.4						
56	23.1	7.5						
60	23.5	7.1						
66	23.3	7.2						Water changed in all
68	23.4	7.4						beakers.
70	23.5	7.3						Time: 0605
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1715
								Initials: JC

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator _____

DAILY RECORD SHEET

Day 6 (9/28/17)CAF

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
12	23.0	7.5						Each beaker fed 1.0 ml
20	23.3	7.6						YTC suspension
28	22.9	7.5						Initials: OB
51	22.9	7.6						
52	22.9	7.5						
56	22.9	7.4						
60	23.4	7.2						
66	23.2	7.4						Water changed in all
68	23.2	7.6						beakers.
70	23.7	7.5						Time: 0600
								Initials: CAF
								Water changed in all
								beakers.
								Time: 1715
								Initials: Y

*Water quality measurements to be taken.

Day 7 (9/29/17)CAF

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
12	22.5	7.4						Each beaker fed 1.0 ml
20	23.1	7.5						YTC suspension
28	22.7	7.6						Initials: CAS
51	22.8	7.5						
52	22.8	7.3						
56	22.9	7.4						
60	23.4	7.2						
66	23.2	7.5						Water changed in all
68	23.2	7.5						beakers.
70	23.3	7.3						Time: 0535
								Initials: OB3
								Water changed in all
								beakers.
								Time: 1730
								Initials: Y

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator

DAILY RECORD SHEET

Day 8 (9/30/17) GB

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
12	22.8	7.7						Each beaker fed 1.0 ml
20	23.3	7.7						YTC suspension
28	22.8	7.6						Initials: GB
51	22.8	7.5						
52	22.8	7.8						
56	22.9	7.7						
60	23.4	7.6						
66	23.1	7.8						Water changed in all
68	23.1	7.7						beakers.
70	23.4	7.7						Time: 0550
								Initials: GB
								Water changed in all
								beakers.
								Time: 1715
								Initials:

*Water quality measurements to be taken.

Day 9 (10/1/17) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
12	22.4	7.7						Each beaker fed 1.0 ml
20	23.2	7.8						YTC suspension
28	22.7	7.6						Initials: GJ
51	22.8	7.5						
52	22.8	7.6						
56	22.9	7.7						
60	23.3	7.4						
66	23.1	7.4						Water changed in all
68	23.1	7.7						beakers.
70	23.3	7.5						Time: 0610
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1830
								Initials:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator [redacted]

DAILY RECORD SHEET

Day 10 (10 / 2 /17) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
12	22.2	7.9	108	7.6	17	30		
20	23.1	7.9	112	7.6	17	40		
28	22.4	7.8	112	7.6	17	30		
51	22.5	7.7	113	7.5	17	30		
52	22.5	7.8	110	7.6	17	30		
56	22.6	7.9	110	7.6	17	40		
60	23.3	7.4	126	8.0	17	30		
66	22.9	7.6	114	7.5	26	40		Water changed in all
68	23.0	7.7	115	7.6	17	30		beakers.
70	23.2	7.8	113	7.5	17	30		Time: 0605
								Initials: GJL

*Water quality measurements to be taken.

Day (/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
								Each beaker fed 1.0 ml
								YTC suspension
								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-1 Client ESA Investigator

DAY 10 TEST TERMINATION SHEET

Beaker No.	Number of survivors	Initials
1	9	
2	10	
3	10	GJL
4	10	GJL
5	10	
6	10	
7	10	GJL
8	10	GJL
9	10	
10	10	
11	10	GJL
12	8	GJL
13	10	
14	10	
15	10	GJL
16	10	GJL
17	10	
18	10	
19	10	GJL
20	10	GJL
21	10	GJL
22	10	GJL
23	10	
24	10	
25	10	GJL
26	10	GJL
27	8	
28	10	
29	10	GJL
30	8	GJL
31	10	
32	9	
33	10	GJL
34	10	GJL
35	10	GJL
36	10	GJL
37	10	
38	10	
39	10	GJL
40	10	GJL
41	10	
42	10	
43	10	GJL
44	10	GJL
45	10	

Beaker No.	Number of survivors	Initials	
46	10		
47	10	GJL	
48	10	GJL	
49	10	GJL	
50	10	GJL	
51	10		
52	9		
53	10	GJL	
54	10	GJL	
55	10		
56	10		
57	10		
58	10		
59	10	GJL	
60	10	GJL	
61	10		
62	10		
63	10	GJL	
64	9	GJL	GJL 10-2-17
65	10		
66	9		
67	10	GJL	
68	10	GJL	
69	10		
70	10		
71	10		
72	10		
73	10	GJL	
74	9	GJL	
75	10		
76	10		
77	10	GJL	
78	10	GJL	
79	10		
80	10		

Rec'd 9-21-17 E

Chesapeake Cultures
P.O. Box 507 Hayes, VA 23072 (804)693-4046 growfish@chesapeakecultures.com

NAS

Shipment Information

Species Hyalella azteca Date 9/20/17

Age ~5-6 days 1.4-1.6mm P.O. No. —

Quantity 1200+ Invoice No. 9393

Temperature 24°C Salinity _____ pH 7.86

Notes _____

Biologist SVM

Please inspect shipment and report any problem immediately

RAW DATA DIVIDER PAGE
Test No. 885-1

TEST DATA ANALYSIS RECORDS

Test Number: 885-1

Freshwater Sediment Test
10-Day Hyalella azteca

data entry verified against laboratory bench sheets 11-12-17 DZF

Endpoints Data Entry and Calculations File

BKR=beaker number
INIT=initial number
SURV=number survivors
MORT=number dead=INIT-SURV
PSURV=%survival=100(SURV/INIT)
PMORT=%mortality=100(MORT/INIT)

INDEX	BKR	NAS SMPL	CLIENT DESCRIP	REPL		INIT	SURV	MORT	PSURV	PMORT		SURV	MORT	PSURV	PMORT
1	57	5989G	Control	1		10	10	0	100.0	0.0					
2	49	5989G	Control	2		10	10	0	100.0	0.0					
3	23	5989G	Control	3		10	10	0	100.0	0.0					
4	29	5989G	Control	4		10	10	0	100.0	0.0					
5	35	5989G	Control	5		10	10	0	100.0	0.0	Mean	9.9	0.1	98.8	1.3
6	1	5989G	Control	6		10	9	1	90.0	10.0	SD	0.4	0.4	3.5	3.5
7	11	5989G	Control	7		10	10	0	100.0	0.0	n	8	8	8	8
8	60	5989G	Control	8	wq replicate	10	10	0	100.0	0.0					
9	77	5991G	OF2-1	1		10	10	0	100.0	0.0					
10	13	5991G	OF2-1	2		10	10	0	100.0	0.0					
11	64	5991G	OF2-1	3		10	9	1	90.0	10.0					
12	25	5991G	OF2-1	4		10	10	0	100.0	0.0					
13	42	5991G	OF2-1	5		10	10	0	100.0	0.0	Mean	9.6	0.4	96.3	3.8
14	71	5991G	OF2-1	6		10	10	0	100.0	0.0	SD	0.7	0.7	7.4	7.4
15	30	5991G	OF2-1	7		10	8	2	80.0	20.0	n	8	8	8	8
16	51	5991G	OF2-1	8	wq replicate	10	10	0	100.0	0.0					
17	7	5992G	OF2-2	1		10	10	0	100.0	0.0					
18	48	5992G	OF2-2	2		10	10	0	100.0	0.0					
19	15	5992G	OF2-2	3		10	10	0	100.0	0.0					
20	53	5992G	OF2-2	4		10	10	0	100.0	0.0					
21	31	5992G	OF2-2	5		10	10	0	100.0	0.0	Mean	10.0	0.0	100.0	0.0
22	44	5992G	OF2-2	6		10	10	0	100.0	0.0	SD	0.0	0.0	0.0	0.0
23	6	5992G	OF2-2	7		10	10	0	100.0	0.0	n	8	8	8	8
24	70	5992G	OF2-2	8	wq replicate	10	10	0	100.0	0.0					
25	17	5993G	OF2-3	1		10	10	0	100.0	0.0					
26	67	5993G	OF2-3	2		10	10	0	100.0	0.0					
27	43	5993G	OF2-3	3		10	10	0	100.0	0.0					
28	32	5993G	OF2-3	4		10	9	1	90.0	10.0					
29	8	5993G	OF2-3	5		10	10	0	100.0	0.0	Mean	9.9	0.1	98.8	1.3
30	79	5993G	OF2-3	6		10	10	0	100.0	0.0	SD	0.4	0.4	3.5	3.5
31	61	5993G	OF2-3	7		10	10	0	100.0	0.0	n	8	8	8	8
32	28	5993G	OF2-3	8	wq replicate	10	10	0	100.0	0.0					
33	5	5994G	OF1-1	1		10	10	0	100.0	0.0					
34	69	5994G	OF1-1	2		10	10	0	100.0	0.0					
35	39	5994G	OF1-1	3		10	10	0	100.0	0.0					
36	73	5994G	OF1-1	4		10	10	0	100.0	0.0					
37	46	5994G	OF1-1	5		10	10	0	100.0	0.0	Mean	9.9	0.1	98.8	1.3
38	65	5994G	OF1-1	6		10	10	0	100.0	0.0	SD	0.4	0.4	3.5	3.5
39	21	5994G	OF1-1	7		10	10	0	100.0	0.0	n	8	8	8	8
40	52	5994G	OF1-1	8	wq replicate	10	9	1	90.0	10.0					
41	14	5995G	OF1-2	1		10	10	0	100.0	0.0					
42	80	5995G	OF1-2	2		10	10	0	100.0	0.0					
43	22	5995G	OF1-2	3		10	10	0	100.0	0.0					
44	47	5995G	OF1-2	4		10	10	0	100.0	0.0					
45	40	5995G	OF1-2	5		10	10	0	100.0	0.0	Mean	10.0	0.0	100.0	0.0
46	2	5995G	OF1-2	6		10	10	0	100.0	0.0	SD	0.0	0.0	0.0	0.0
47	24	5995G	OF1-2	7		10	10	0	100.0	0.0	n	8	8	8	8
48	20	5995G	OF1-2	8	wq replicate	10	10	0	100.0	0.0					
49	50	5996G	OF1-3	1		10	10	0	100.0	0.0					
50	34	5996G	OF1-3	2		10	10	0	100.0	0.0					
51	27	5996G	OF1-3	3		10	8	2	80.0	20.0					
52	36	5996G	OF1-3	4		10	10	0	100.0	0.0					
53	76	5996G	OF1-3	5		10	10	0	100.0	0.0	Mean	9.8	0.3	97.5	2.5
54	37	5996G	OF1-3	6		10	10	0	100.0	0.0	SD	0.7	0.7	7.1	7.1
55	63	5996G	OF1-3	7		10	10	0	100.0	0.0	n	8	8	8	8
56	56	5996G	OF1-3	8	wq replicate	10	10	0	100.0	0.0					

Test Number: 885-1

Freshwater Sediment Test
10-Day Hyalella azteca

INDEX	BKR	NAS SMPL	CLIENT DESCRIP	REPL		INIT	SURV	MORT	PSURV	PMORT		SURV	MORT	PSURV	PMORT
57	72	5997G	OF2-4	1		10	10	0	100.0	0.0					
58	16	5997G	OF2-4	2		10	10	0	100.0	0.0					
59	55	5997G	OF2-4	3		10	10	0	100.0	0.0					
60	59	5997G	OF2-4	4		10	10	0	100.0	0.0					
61	10	5997G	OF2-4	5		10	10	0	100.0	0.0	Mean	10.0	0.0	100.0	0.0
62	62	5997G	OF2-4	6		10	10	0	100.0	0.0	SD	0.0	0.0	0.0	0.0
63	33	5997G	OF2-4	7		10	10	0	100.0	0.0	n	8	8	8	8
64	68	5997G	OF2-4	8	wq replicate	10	10	0	100.0	0.0					
65	9	5998G	OF2-5	1		10	10	0	100.0	0.0					
66	26	5998G	OF2-5	2		10	10	0	100.0	0.0					
67	4	5998G	OF2-5	3		10	10	0	100.0	0.0					
68	18	5998G	OF2-5	4		10	10	0	100.0	0.0					
69	41	5998G	OF2-5	5		10	10	0	100.0	0.0	Mean	9.9	0.1	98.8	1.3
70	45	5998G	OF2-5	6		10	10	0	100.0	0.0	SD	0.4	0.4	3.5	3.5
71	3	5998G	OF2-5	7		10	10	0	100.0	0.0	n	8	8	8	8
72	66	5998G	OF2-5	8	wq replicate	10	9	1	90.0	10.0					
73	19	5999G	OF1-4	1		10	10	0	100	0					
74	74	5999G	OF1-4	2		10	9	1	90	10					
75	38	5999G	OF1-4	3		10	10	0	100	0					
76	54	5999G	OF1-4	4		10	10	0	100	0					
77	78	5999G	OF1-4	5		10	10	0	100	0	Mean	9.6	0.4	96.3	3.8
78	58	5999G	OF1-4	6		10	10	0	100	0	SD	0.7	0.7	7.4	7.4
79	75	5999G	OF1-4	7		10	10	0	100	0	n	8	8	8	8
80	12	5999G	OF1-4	8	wq replicate	10	8	2	80	20					

Project Name: P885-1 Hyalella % Mortality

Sample:	x1
Samp ID:	OF2-1
Alias:	NAS# 5991G
Replicates:	8
Mean:	3.75
SD:	7.44
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS# 5989G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	7.573
SS:	1089.791
K:	8
b:	26.694
Alpha Level:	0.05
Calculated Value:	0.6539
Critical Value:	<= 0.887
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	8.438
Test Residual SD:	5.643
Ref. Residual Mean:	4.033
Ref. Residual SD:	4.888
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	1.6688
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	8
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	36.5
Critical Value:	>= 49.000
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	7	0	7	5.625	2.304	7		-5.625
2	0	7	0	7	5.625	2.304	7		-5.625
3	10	14.5	0	7	12.81	2.304	7		-5.625
4	0	7	0	7	5.625	2.304	7		-5.625
5	0	7	0	7	5.625	2.304	7		-5.625
6	0	7	10	14.5	5.625	16.131	7		-5.625
7	20	16	0	7	20.94	2.304	7		-2.304
8	0	7	0	7	5.625	2.304	7		-2.304
9							7		-2.304
10							7		-2.304
11							7		-2.304
12							7		-2.304
13							7		-2.304
14							14.5		12.81
15							14.5		16.131
16							16		20.94

The percent mortality in OF2-1 was not significantly higher than that of the Control at α=0.05.

-CJ1

Project Name: P885-1 Hyalella % Mortality

Sample:	x1
Samp ID:	OF2-2
Alias:	NAS# 5992G
Replicates:	8
Mean:	0
SD:	0
Tr Mean:	-0.118
Trans SD:	0

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS# 5989G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	0.118
Trans SD:	0.666

Shapiro-Wilk Results:

Residual Mean:	
Residual SD:	
SS:	
K:	
b:	
Alpha Level:	N/A
Calculated Value:	N/A
Critical Value:	N/A
Normally Distributed:	N/A
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	0
Test Residual SD:	0
Ref. Residual Mean:	0.412
Ref. Residual SD:	0.5
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	2.3333
Critical Value:	>= 1.761
Variances Homogeneous:	No

Test Results:

Statistic:	Approximate t
Balanced Design:	Yes
Transformation:	Rankits
Experimental Hypothesis	
Null:	x1 <= x2
Alternate:	x1 > x2
Degrees of Freedom:	7
Experimental Alpha Level:	0.05
Calculated Value:	-1
Critical Value:	>= 1.895
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	-0.118	0	-0.118	0	0.235		-0.118	
2	0	-0.118	0	-0.118	0	0.235		-0.118	
3	0	-0.118	0	-0.118	0	0.235		-0.118	
4	0	-0.118	0	-0.118	0	0.235		-0.118	
5	0	-0.118	0	-0.118	0	0.235		-0.118	
6	0	-0.118	10	1.766	0	1.648		-0.118	
7	0	-0.118	0	-0.118	0	0.235		-0.118	
8	0	-0.118	0	-0.118	0	0.235		-0.118	
9								-0.118	
10								-0.118	
11								-0.118	
12								-0.118	
13								-0.118	
14								-0.118	
15								-0.118	
16	The percent mortality in OF2-2 was not significantly higher than that of the Control at α=0.05.							1.766	

-CJ1

Project Name: P885-1 Hyalella % Mortality

Sample:	x1
Samp ID:	OF2-3
Alias:	NAS# 5993G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS# 5989G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	5.595
SS:	594.733
K:	8
b:	15.386
Alpha Level:	0.05
Calculated Value:	0.398
Critical Value:	<= 0.887
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	4.033
Test Residual SD:	4.888
Ref. Residual Mean:	4.033
Ref. Residual SD:	4.888
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	8
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	32
Critical Value:	>= 49.000
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
2	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
3	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
4	10	15.5	0	7.5	16.131	2.304	7.5		-2.304
5	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
6	0	7.5	10	15.5	2.304	16.131	7.5		-2.304
7	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
8	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
9							7.5		-2.304
10							7.5		-2.304
11							7.5		-2.304
12							7.5		-2.304
13							7.5		-2.304
14							7.5		-2.304
15							15.5		16.131
16							15.5		16.131

The percent mortality in OF2-3 was not significantly higher than that of the Control at α=0.05.

-GJ1

Project Name: P885-1 Hyalella % Mortality

Sample:	x1
Samp ID:	OF1-1
Alias:	NAS# 5994G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS# 5989G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	5.595
SS:	594.733
K:	8
b:	15.386
Alpha Level:	0.05
Calculated Value:	0.398
Critical Value:	<= 0.887
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	4.033
Test Residual SD:	4.888
Ref. Residual Mean:	4.033
Ref. Residual SD:	4.888
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order
Experimental Hypothesis	
Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	8
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	32
Critical Value:	>= 49.000
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
2	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
3	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
4	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
5	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
6	0	7.5	10	15.5	2.304	16.131	7.5		-2.304
7	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
8	10	15.5	0	7.5	16.131	2.304	7.5		-2.304
9							7.5		-2.304
10							7.5		-2.304
11							7.5		-2.304
12							7.5		-2.304
13							7.5		-2.304
14							7.5		-2.304
15							15.5		16.131
16							15.5		16.131

The percent mortality in OF1-1 was not significantly higher than that of the Control at α=0.05.

-CJ1

Project Name: P885-1 Hyalella % Mortality

Sample:	x1
Samp ID:	OF1-2
Alias:	NAS# 5995G
Replicates:	8
Mean:	0
SD:	0
Tr Mean:	-0.118
Trans SD:	0

Ref Samp:	x2
Ref ID:	Control
Alias	NAS# 5989G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	0.118
Trans SD:	0.666

Shapiro-Wilk Results:

Residual Mean:	
Residual SD:	
SS:	
K:	
b:	
Alpha Level:	N/A
Calculated Value:	N/A
Critical Value:	N/A
Normally Distributed:	N/A
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	0
Test Residual SD:	0
Ref. Residual Mean:	0.412
Ref. Residual SD:	0.5
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	2.3333
Critical Value:	>= 1.761
Variances Homogeneous:	No

Test Results:

Statistic:	Approximate t
Balanced Design:	Yes
Transformation:	Rankits
Experimental Hypothesis	
Null:	x1 <= x2
Alternate:	x1 > x2
Degrees of Freedom:	7
Experimental Alpha Level:	0.05
Calculated Value:	-1
Critical Value:	>= 1.895
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	-0.118	0	-0.118	0	0.235		-0.118	
2	0	-0.118	0	-0.118	0	0.235		-0.118	
3	0	-0.118	0	-0.118	0	0.235		-0.118	
4	0	-0.118	0	-0.118	0	0.235		-0.118	
5	0	-0.118	0	-0.118	0	0.235		-0.118	
6	0	-0.118	10	1.766	0	1.648		-0.118	
7	0	-0.118	0	-0.118	0	0.235		-0.118	
8	0	-0.118	0	-0.118	0	0.235		-0.118	
9								-0.118	
10								-0.118	
11								-0.118	
12								-0.118	
13								-0.118	
14								-0.118	
15								-0.118	
16								1.766	

The percent mortality in OF1-2 was not significantly higher than that of the Control at α=0.05.

-631

Project Name: P885-1 Hyalella % Mortality

Sample:	x1
Samp ID:	OF1-3
Alias:	NAS# 5996G
Replicates:	8
Mean:	2.5
SD:	7.071
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS# 5989G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	6.939
SS:	914.856
K:	8
b:	20.593
Alpha Level:	0.05
Calculated Value:	0.4636
Critical Value:	<= 0.887
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	5.811
Test Residual SD:	7.044
Ref. Residual Mean:	4.033
Ref. Residual SD:	4.888
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.5867
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	8
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	32.5
Critical Value:	>= 49.000
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Ranklits	Shipiro-Wilk Residuals
1	0	7.5	0	7.5	3.321	2.304	7.5		-3.321
2	0	7.5	0	7.5	3.321	2.304	7.5		-3.321
3	20	16	0	7.5	23.244	2.304	7.5		-3.321
4	0	7.5	0	7.5	3.321	2.304	7.5		-3.321
5	0	7.5	0	7.5	3.321	2.304	7.5		-3.321
6	0	7.5	10	15	3.321	16.131	7.5		-3.321
7	0	7.5	0	7.5	3.321	2.304	7.5		-3.321
8	0	7.5	0	7.5	3.321	2.304	7.5		-2.304
9							7.5		-2.304
10							7.5		-2.304
11							7.5		-2.304
12							7.5		-2.304
13							7.5		-2.304
14							7.5		-2.304
15							15		16.131
16							16		23.244

The percent mortality in OF1-3 was not significantly higher than that of the Control at α=0.05.

-631

Project Name: P885-1 Hyalella % Mortality

Sample:	x1
Samp ID:	OF2-4
Alias:	NAS# 5997G
Replicates:	8
Mean:	0
SD:	0
Tr Mean:	-0.118
Trans SD:	0

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS# 5989G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	0.118
Trans SD:	0.666

Shapiro-Wilk Results:

Residual Mean:	
Residual SD:	
SS:	
K:	
b:	
Alpha Level:	N/A
Calculated Value:	N/A
Critical Value:	N/A
Normally Distributed:	N/A
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	0
Test Residual SD:	0
Ref. Residual Mean:	0.412
Ref. Residual SD:	0.5
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	2.3333
Critical Value:	>= 1.761
Variances Homogeneous:	No

Test Results:

Statistic:	Approximate t
Balanced Design:	Yes
Transformation:	Rankits

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Degrees of Freedom:	7
Experimental Alpha Level:	0.05
Calculated Value:	-1
Critical Value:	>= 1.895
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	-0.118	0	-0.118	0	0.235		-0.118	
2	0	-0.118	0	-0.118	0	0.235		-0.118	
3	0	-0.118	0	-0.118	0	0.235		-0.118	
4	0	-0.118	0	-0.118	0	0.235		-0.118	
5	0	-0.118	0	-0.118	0	0.235		-0.118	
6	0	-0.118	10	1.766	0	1.648		-0.118	
7	0	-0.118	0	-0.118	0	0.235		-0.118	
8	0	-0.118	0	-0.118	0	0.235		-0.118	
9								-0.118	
10								-0.118	
11								-0.118	
12								-0.118	
13								-0.118	
14								-0.118	
15								-0.118	
16								1.766	

The percent mortality in OF2-4 was not significantly higher than that of the Control at α=0.05.

-CJL

Project Name: P885-1 Hyalella % Mortality

Sample:	x1
Samp ID:	OF2-5
Alias:	NAS# 5998G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS# 5989G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	5.595
SS:	594.733
K:	8
b:	15.386
Alpha Level:	0.05
Calculated Value:	0.398
Critical Value:	<= 0.887
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	4.033
Test Residual SD:	4.888
Ref. Residual Mean:	4.033
Ref. Residual SD:	4.888
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order
Experimental Hypothesis	
Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	8
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	32
Critical Value:	>= 49.000
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Ranks	Shipiro-Wilk Residuals
1	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
2	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
3	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
4	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
5	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
6	0	7.5	10	15.5	2.304	16.131	7.5		-2.304
7	0	7.5	0	7.5	2.304	2.304	7.5		-2.304
8	10	15.5	0	7.5	16.131	2.304	7.5		-2.304
9							7.5		-2.304
10							7.5		-2.304
11							7.5		-2.304
12							7.5		-2.304
13							7.5		-2.304
14							7.5		-2.304
15							15.5		16.131
16							15.5		16.131

The percent mortality in OF2-5 was not significantly higher than that of the Control at α=0.05.

-651

Project Name: P885-1 Hyalella % Mortality

Sample:	x1
Samp ID:	OF1-4
Alias:	NAS# 5999G
Replicates:	8
Mean:	3.75
SD:	7.44
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS# 5989G
Replicates:	8
Mean:	1.25
SD:	3.536
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	7.573
SS:	1089.791
K:	8
b:	26.694
Alpha Level:	0.05
Calculated Value:	0.6539
Critical Value:	<= 0.887
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	8.438
Test Residual SD:	5.643
Ref. Residual Mean:	4.033
Ref. Residual SD:	4.888
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	1.6688
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	8
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	36.5
Critical Value:	>= 49.000
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	7	0	7	5.625	2.304	7		-5.625
2	10	14.5	0	7	12.81	2.304	7		-5.625
3	0	7	0	7	5.625	2.304	7		-5.625
4	0	7	0	7	5.625	2.304	7		-5.625
5	0	7	0	7	5.625	2.304	7		-5.625
6	0	7	10	14.5	5.625	16.131	7		-5.625
7	0	7	0	7	5.625	2.304	7		-2.304
8	20	16	0	7	20.94	2.304	7		-2.304
9							7		-2.304
10							7		-2.304
11							7		-2.304
12							7		-2.304
13							7		-2.304
14							14.5		12.81
15							14.5		16.131
16							16		20.94

The percent mortality in OF1-4 was not significantly higher than that of the Control at α=0.05.

-GL

Test Number: 885-1

Freshwater Sediment Test
10-Day Hyalella azteca

data entry verified against laboratory bench sheets 10.19.17 SRC

Water Quality Data

BKR	NAS SMPL	CLIENT DESCRIP	REPL	DAY	Overlying water TEMP	DO	COND	pH	NH3	HARD	ALK
12	5999G	OF1-4	8	0	22.0	8.2	115	7.5	<0.1	26	30
20	5995G	OF1-2	8	0	22.8	8.3	116	7.4	<0.1	26	40
28	5993G	OF2-3	8	0	22.2	8.0	116	7.3	<0.1	17	30
51	5991G	OF2-1	8	0	22.2	8.0	117	7.1	0.1	26	30
52	5994G	OF1-1	8	0	22.3	8.2	112	7.4	<0.1	17	30
56	5996G	OF1-3	8	0	22.4	8.2	115	7.4	<0.1	17	40
60	5989G	Control	8	0	22.9	7.6	138	7.0	0.1	17	30
66	5998G	OF2-5	8	0	22.7	8.0	118	7.1	<0.1	17	30
68	5997G	OF2-4	8	0	22.9	8.1	121	7.2	<0.1	34	40
70	5992G	OF2-2	8	0	23.0	6.9	120	7.2	<0.1	26	30
12	5999G	OF1-4	8	1	22.2	8.1					
20	5995G	OF1-2	8	1	22.9	8.2					
28	5993G	OF2-3	8	1	22.3	8.2					
51	5991G	OF2-1	8	1	22.3	8.1					
52	5994G	OF1-1	8	1	22.3	8.0					
56	5996G	OF1-3	8	1	22.4	8.0					
60	5989G	Control	8	1	23.3	7.8					
66	5998G	OF2-5	8	1	22.7	8.1					
68	5997G	OF2-4	8	1	22.8	8.2					
70	5992G	OF2-2	8	1	23.1	7.8					
12	5999G	OF1-4	8	2	22.1	8.1					
20	5995G	OF1-2	8	2	22.6	8.1					
28	5993G	OF2-3	8	2	22.2	8.0					
51	5991G	OF2-1	8	2	22.3	7.9					
52	5994G	OF1-1	8	2	22.3	7.9					
56	5996G	OF1-3	8	2	22.4	7.9					
60	5989G	Control	8	2	23.0	7.6					
66	5998G	OF2-5	8	2	22.7	7.8					
68	5997G	OF2-4	8	2	22.8	7.9					
70	5992G	OF2-2	8	2	23.0	7.9					
12	5999G	OF1-4	8	3	22.3	7.8					
20	5995G	OF1-2	8	3	23.1	7.7					
28	5993G	OF2-3	8	3	22.4	7.7					
51	5991G	OF2-1	8	3	22.5	7.6					
52	5994G	OF1-1	8	3	22.5	7.6					
56	5996G	OF1-3	8	3	22.7	7.6					
60	5989G	Control	8	3	23.3	7.3					
66	5998G	OF2-5	8	3	23.0	7.6					
68	5997G	OF2-4	8	3	23.1	7.7					
70	5992G	OF2-2	8	3	23.3	7.8					
12	5999G	OF1-4	8	4	22.7	7.6					
20	5995G	OF1-2	8	4	23.8	7.5					
28	5993G	OF2-3	8	4	23.0	7.5					
51	5991G	OF2-1	8	4	23.1	7.4					
52	5994G	OF1-1	8	4	23.1	7.4					
56	5996G	OF1-3	8	4	23.3	7.5					
60	5989G	Control	8	4	23.7	7.3					
66	5998G	OF2-5	8	4	23.4	7.4					
68	5997G	OF2-4	8	4	23.5	7.5					
70	5992G	OF2-2	8	4	23.7	7.5					

Test Number: 885-1

Freshwater Sediment Test
10-Day Hyalella azteca

12	5999G	OF1-4	8	5	22.8	7.6				
20	5995G	OF1-2	8	5	23.4	7.6				
28	5993G	OF2-3	8	5	22.9	7.4				
51	5991G	OF2-1	8	5	23.0	7.4				
52	5994G	OF1-1	8	5	23.0	7.4				
56	5996G	OF1-3	8	5	23.1	7.5				
60	5989G	Control	8	5	23.5	7.1				
66	5998G	OF2-5	8	5	23.3	7.2				
68	5997G	OF2-4	8	5	23.4	7.4				
70	5992G	OF2-2	8	5	23.5	7.3				
12	5999G	OF1-4	8	6	23.0	7.5				
20	5995G	OF1-2	8	6	23.3	7.6				
28	5993G	OF2-3	8	6	22.9	7.5				
51	5991G	OF2-1	8	6	22.9	7.6				
52	5994G	OF1-1	8	6	22.9	7.5				
56	5996G	OF1-3	8	6	22.9	7.4				
60	5989G	Control	8	6	23.4	7.2				
66	5998G	OF2-5	8	6	23.2	7.4				
68	5997G	OF2-4	8	6	23.2	7.6				
70	5992G	OF2-2	8	6	23.3	7.5				
12	5999G	OF1-4	8	7	22.5	7.4				
20	5995G	OF1-2	8	7	23.1	7.5				
28	5993G	OF2-3	8	7	22.7	7.6				
51	5991G	OF2-1	8	7	22.8	7.5				
52	5994G	OF1-1	8	7	22.8	7.3				
56	5996G	OF1-3	8	7	22.9	7.4				
60	5989G	Control	8	7	23.4	7.2				
66	5998G	OF2-5	8	7	23.2	7.5				
68	5997G	OF2-4	8	7	23.2	7.5				
70	5992G	OF2-2	8	7	23.3	7.3				
12	5999G	OF1-4	8	8	22.8	7.7				
20	5995G	OF1-2	8	8	23.3	7.7				
28	5993G	OF2-3	8	8	22.8	7.6				
51	5991G	OF2-1	8	8	22.8	7.5				
52	5994G	OF1-1	8	8	22.8	7.8				
56	5996G	OF1-3	8	8	22.9	7.7				
60	5989G	Control	8	8	23.4	7.6				
66	5998G	OF2-5	8	8	23.1	7.8				
68	5997G	OF2-4	8	8	23.1	7.7				
70	5992G	OF2-2	8	8	23.4	7.7				
12	5999G	OF1-4	8	9	22.4	7.7				
20	5995G	OF1-2	8	9	23.2	7.8				
28	5993G	OF2-3	8	9	22.7	7.6				
51	5991G	OF2-1	8	9	22.8	7.5				
52	5994G	OF1-1	8	9	22.8	7.6				
56	5996G	OF1-3	8	9	22.9	7.7				
60	5989G	Control	8	9	23.3	7.4				
66	5998G	OF2-5	8	9	23.1	7.4				
68	5997G	OF2-4	8	9	23.1	7.7				
70	5992G	OF2-2	8	9	23.3	7.5				
12	5999G	OF1-4	8	10	22.2	7.9	108	7.6	<0.1	17	30
20	5995G	OF1-2	8	10	23.1	7.9	112	7.6	<0.1	17	40
28	5993G	OF2-3	8	10	22.4	7.8	112	7.6	<0.1	17	30

Test Number: 885-1

Freshwater Sediment Test
10-Day Hyalella azteca

51	5991G	OF2-1	8	10	22.5	7.7	113	7.5	<0.1	17	30
52	5994G	OF1-1	8	10	22.5	7.8	110	7.6	<0.1	17	30
56	5996G	OF1-3	8	10	22.6	7.9	110	7.6	<0.1	17	40
60	5989G	Control	8	10	23.3	7.4	126	8.0	<0.1	17	30
66	5998G	OF2-5	8	10	22.9	7.6	114	7.5	<0.1	26	40
68	5997G	OF2-4	8	10	23.0	7.7	115	7.6	<0.1	17	30
70	5992G	OF2-2	8	10	23.2	7.8	113	7.5	<0.1	17	30
				Mean	22.9	7.7	116	7.4	---	20	33
				SD	0.4	0.3	6.6	0.2	---	5	5
				n	110	110	20	20	20	20	20
				Min	22.0	6.9	108	7.0	<0.1	17	30
				Max	23.8	8.3	138	8.0	0.1	34	40

RAW DATA DIVIDER PAGE
Test No. 885-1

AMMONIA EXPOSURE BENCHSHEETS AND ANALYSIS

Total Ammonia-N in Sediment Pore Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD_{655}	NH_3-N (mg/L)	pH	Salinity (ppt)
	Blank	----	----	----		
	1.0 mg/L NH_3-N Std.	----	0.139	1.00		
	3.0 mg/L NH_3-N Std.	----	0.431	3.00		
	6.0 mg/L NH_3-N Std.	----	0.850	6.00		
	10.0 mg/L NH_3-N Std.	----	1.350	10.00		
	3.0 mg/L spike	----	0.433	3.15		
	3.0 mg/L spike dupl.	----	0.435	3.17		
	5.0 mg/L 2nd source		0.620	4.52		
1.	Day 0 (9-22-17)					
2.	12	1	0.008	ND		
3.	20	1	0.008	ND		
4.	28	1	0.004	ND		
5.	51	1	0.017	0.12		
6.	52	1	0.000	ND		
7.	56	1	0.002	ND		
8.	60	1	0.019	0.14		
9.	66	1	0.001	ND		
10.	68	1	0.001	ND		
11.	70	1	0.002	ND		
12.						
13.	Day 10 (10-2-17)					
14.	12	1	0.010	ND		
15.	20	1	0.001	ND		
16.	28	1	0.000	ND		
17.	51	1	0.000	ND		
18.	52	1	0.000	ND		
19.	56	1	0.001	ND		
20.	60	1	0.000	ND		
21.	66	1	0.001	ND		
22.	68	1	0.000	ND		
23.	70	1	0.001	ND		
24.						
25.						
26.						
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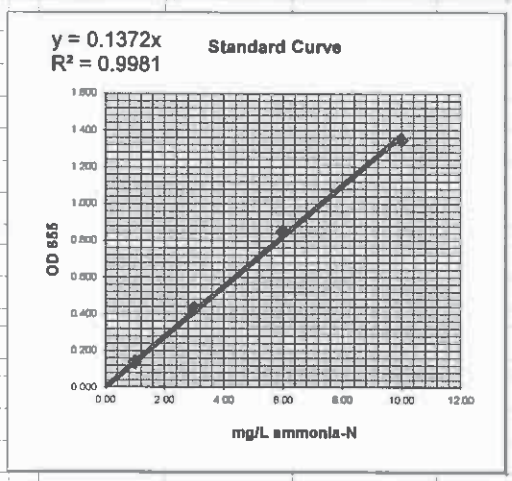
32.						
33.						
34.						
35.						
36.						



Reporting limit (mg/L) =	0.1
Recovery (%) =	105.4
Precision (RPD) =	-0.46
2nd source (%) =	90.3
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Proj. No.: **885-1**

Test Day: **0 & 10**

Species: ***Hyalella***

Sample Type (check)

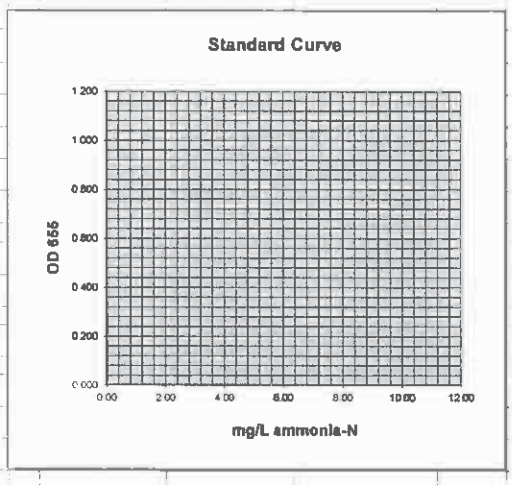
- Bulk Sediment Porewaters
- Test Beaker Porewaters
- X Overlying Water

Analyst:	JB
Date analyzed:	10/13/2017

Total Ammonia-N in Sediment Pore Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH3-N (mg/L)	pH	Salinity (ppt)
	Blank	-----	----	-----		
	1.0 mg/L NH3-N Std.	-----	0.139	1.00		
	3.0 mg/L NH3-N Std.	-----	0.431	3.00		
	6.0 mg/L NH3-N Std.	-----	0.850	6.00		
	10.0 mg/L NH3-N Std.	-----	1.350	10.00		
	3.0 mg/L spike	----	0.433			
	3.0 mg/L spike dupl.	-----	0.435			
	5.0 mg/L 2nd source		0.620			
1.	Day 0 (9-22-17)					
2.	12	1	0.008			
3.	20	1	0.008			
4.	28	1	0.004			
5.	51	1	0.017			
6.	52	1	0.000			
7.	56	1	0.002			
8.	60	1	0.019			
9.	66	1	0.001			
10.	68	1	0.001			
11.	70	1	0.002			
12.						
13.	Day 10 (10-2-17)					
14.	12	1	0.010			
15.	20	1	0.001			
16.	28	1	0.000			
17.	51	1	0.000			
18.	52	1	0.000			
19.	56	1	0.001			
20.	60	1	0.000			
21.	66	1	0.001			
22.	68	1	0.000			
23.	70	1	0.001			
24.						
25.						
26.						
27.						
28.						
29.						
30.						
31.						
32.						
33.						
34.						
35.						
36.						



Reporting limit (mg/L) =	0.1
Recovery (%) =	#VALUE!
Precision (RPD) =	#VALUE!
2nd source (%) =	#VALUE!
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Proj. No.: 885-1
Test Day: 0 & 10
Species: *Hyalella*

Sample Type (check)

- Bulk Sediment Porewaters
- Test Beaker Porewaters
- X Overlying Water

Analyst: JB
Date analyzed: 10/13/2017

RAW DATA DIVIDER PAGE
Test No. 885-1

CHAIN-OF-CUSTODY RECORDS

CHAIN OF CUSTODY RECORD

Northwestern Aquatic Sciences
3814 Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365
Tel: 541-265-7225, Fax: 541-265-2799, www.nwaquatic.com

Client Name	Project No.	Shipping Information	Testing Required					
Environmental Science Associates (ESA)	D160430	Carrier:	H. azteca 10-day mortality	C. dilutus 20-day survival/growth				
Address: 5309 Shilshole Ave. NW, Suite 200	Phone No.: 206-204-6960	Airbill No.						
City, State, Zip code: Seattle, WA 98107	Report Attention: Jim Good							

Lab Sample No.	Date Sampled	Time Sampled	Sampled by: J. Vlastelicia, C. French Sample Description	Number of Containers	H. azteca 10-day mortality	C. dilutus 20-day survival/growth				Comments
59916	9/12/17	1345	Camas Slough Sediment; OF2-1	6	X	X				
59926	9/12/17	1530	Camas Slough Sediment; OF2-2	6	X	X				
59936	9/12/17	1700	Camas Slough Sediment; OF2-3	6	X	X				
59946	9/13/17	1300	Columbia River Sediment; OF1-1	6	X	X				
59956	9/13/17	1505	Columbia River Sediment; OF1-2	6	X	X				
59966	9/13/17	1825	Columbia River Sediment; OF1-3	6	X	X				only 5 Jars
59976	9/14/17	1129	Camas Slough Sediment; OF2-4	3	X	X				
59986	9/14/17	1330	Camas Slough Sediment; OF2-5	3	X	X				
59996	9/14/17	1655	Columbia River Sediment; OF1-4	3	X	X				

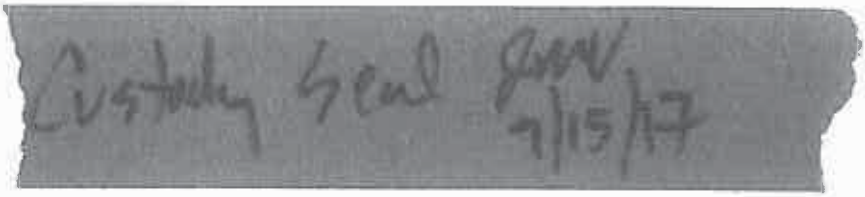
	Signature	Print Name	Company	Date	Time
Relinquished by		John Vlastelicia	ESA	9/15/17	1040
Received by		Luke Johnson	NSA	9/15/17	1040
Relinquished by		Luke Johnson	ESA	9/15/17	14:19
Received by laboratory		Gary Bohler	NAS	9/15/17	14:19

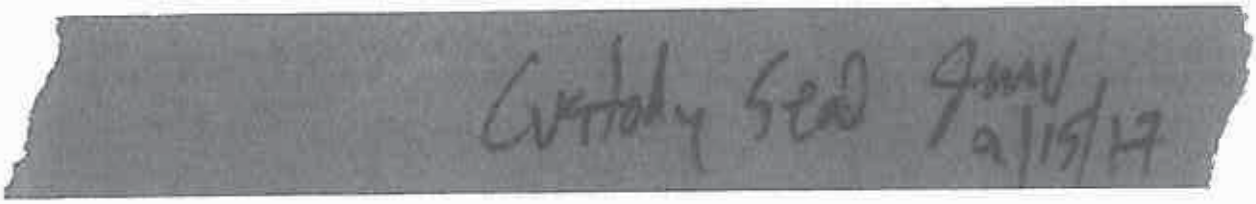
Custody Seal: Present/ Not Present
Cooler: Intact/ Not Intact

Internal Cooler Temperature Upon Lab Receipt (°C): All coolers 0.5°C.

PAGE 29 OF 30

Custody Seal
9/15/17


Custody Seal
9/15/17


Custody Seal
9/15/17

Custody Seal
9/15/17

APPENDIX III

RAW DATA – REFERENCE TOXICANT TEST

NORTHWESTERN AQUATIC SCIENCES — PROTOCOL NO. NAS-XXX-HA1

ACUTE TOXICITY TEST (ALL SPECIES)

REVIEWED PAGES 1-9 GJI

Test No. 999-3712 Client: QC Test Investigator

Test Type (rangefinding/definitive) Test Length (hr) 96

Species *Hyalella azteca*

STUDY MANAGEMENT

Client: QC test

Client's Study Monitor: QC test

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.J. Irissarri GJI

QA Officer L. K. Nemeth

1. [illegible] 2. GA Bubler 09-22-17

3. 4.

Test Beginning: 09-22-17 1015 Test Ending: 9-26-17 0920

TEST MATERIAL

Description: Potassium Chloride Crystals - Lot No.: FISHER 147960

NAS Sample No.				
Date of Collection:				
Date of Receipt:				
Temperature (deg C):				
Dissolved oxygen (mg/L):				
pH:				
Conductivity (umhos/cm):				
Hardness (mg/L):				
Alkalinity (mg/L):				
Salinity (ppt):				
Total chlorine (mg/L):				
Total ammonia-N (mg/L):				
:				

DILUTION WATER

Description: Moderately hard synthetic water

Date of Preparation/Collection: 9-14-17

Water Quality: Cond. (umhos/cm): 309 Salinity (ppt) [illegible] pH 8.0

Hardness (mg/L as $CaCO_3$): 94 Alkalinity (mg/L as $CaCO_3$): 70

Treatments: Aerated ≥ 24 hrs

TEST LOCATION

Test conducted in (circle one): (room 1) room 2 trailer water bath other:

Randomization chart:

REPL										
A	0.125	0.063	1	ϕ	0.5	0.25				
B	0.5	ϕ	0.25	0.063	1	0.125				

Error codes: 1) Correction of handwriting error
2) Written in wrong location; entry deleted
3) Wrong date deleted; replaced with correct date
4) Error found in measurement; measurement repeated

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA1

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-3712 Client QC Test Investigator

TEST ORGANISMS

Species: *Hyalella azteca* Age: 7-8 DAYS Size:

Source: Chesapeake Cultures, Hayes, VA Date received: 9-21-17

Acclimation Data:

Date	Temp. (deg.C)	pH	DO (mg/L)	Cond. umhos/cm	Hardness (mg/L)	Alkalinity (mg/L)	Feeding Amount	Feeding description	Water changes
9-21-17	22.4	7.3	14.3	821	205	220	10 mL	YTC	YES
9-22-17	21.9	8.3	7.7	583	137	160	—	—	—
				702 9-27-17					
Mean	22.2	7.8	11.0	296	171	190			
S.D.	—	—	—	—	—	—			
(N)	2	2	2	2	2	2			

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test concentrations (50% series recommended): 1, 0.5, 0.25, 0.125, 0.063 0 g/L

Test chamber: 250 ml glass beakers Test volume: 100 ml

Replicates/treatment: 2 Organisms/treatment: 20 (10/rep)

Test water changes: None Aeration during test: None

Feeding: 0.5 ml YTC suspension per beaker on days 0 and 2

Duration: 24-hr, 48-hr, 96-hr Test temperature (deg.C): 23 ± 1 or 20 ± 1

Beaker placement: Stratified randomization Photoperiod: 16:8, L:D

MISCELLANEOUS NOTES

Test solution preparation:

Working stock: Dissolve 0.5g KCl crystals in dilution water and dilute to 500 mL.
Final conc.: 1.0 g/L.

Test concentration (g/L)	KCl working stock (ml/200ml)	Dilution water
1	200	Brought up to final volume of 200 ml with dilution water and distributed evenly between two replicates
0.5	100	
0.25	50	
0.125	25	
0.063	12.5	
0	0	

9-22-17 631

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA1

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-3712 Client QC Test

DAILY RECORD SHEET

Day 0 (9 /22 /17) GJL

Conc. (g/L)	Temp. (deg.C)	pH	Cond. (umhos/cm)	DO (ppm)	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	23.2	7.9	1506	7.6	94	70	10	10
2. 0.5	23.1	7.9	932	7.7			10	10
3. 0.25	23.1	7.9	625	7.7			10	10
4. 0.125	23.2	7.9	486	7.6			10	10
5. 0.063	23.1	7.9	407	7.7			10	10
6. 0	23.0	7.9	317	7.6	94	70	10	10
Each beaker fed 0.5 ml YTC suspension. Initials: YN								

Day 1 (9 /23 /17) GJL

Conc. (g/L)	Temp. (deg.C)	pH	Cond. (umhos/cm)	DO (ppm)	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	23.9	7.8	1534	8.2			10	10
2. 0.5	23.9	7.8	951	8.1			10	10
3. 0.25	23.7	7.8	645	8.2			10	10
4. 0.125	23.8	7.8	498	8.1			10	10
5. 0.063	23.9	7.7	420	8.3			10	10
6. 0	23.9	7.7	330	8.2			10	10

Day 2 (9 /24 /17) GJL

Conc. (g/L)	Temp. (deg.C)	pH	Cond. (umhos/cm)	DO (ppm)	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	23.7	7.8	1547	7.6			0(10D)	2(8D)
2. 0.5	23.6	7.8	998	7.7			10	10
3. 0.25	23.6	7.7	667	7.7			10	10
4. 0.125	23.8	7.7	518	7.7			10	10
5. 0.063	23.6	7.6	438	7.8			10	10
6. 0	23.7	7.6	348	7.8			10	10
Each beaker fed 0.5 ml YTC suspension. Initials: GJL								

Day 3 (9 /25/17) GJL

Conc. (g/L)	Temp. (deg.C)	pH	Cond. (umhos/cm)	DO (ppm)	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	—	—	—	—			∅	∅(2D)
2. 0.5	23.7	7.8	990	7.7			6(4D)	4(6D)
3. 0.25	23.7	7.8	679	7.7			10	10
4. 0.125	23.9	7.8	527	7.7			10	10
5. 0.063	23.8	7.8	449	7.8			10	10
6. 0	23.8	7.8	349	7.9			10	10

Day 4 (9 /26 /17) GJL

Conc. (g/L)	Temp. (deg.C)	pH	Cond. (umhos/cm)	DO (ppm)	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	—	—	—	—	—	—	∅	∅
2. 0.5	23.7	8.0	1016	7.7			6	3(1D)
3. 0.25	23.7	8.0	765	7.7			10	10
4. 0.125	23.8	7.9	539	7.7			10	10
5. 0.063	23.8	7.9	461	7.7			10	10
6. 0	23.9	7.8	354	7.8	94	70	10	10
Mean	23.6	7.8		7.8	94	70		
SD	0.3	0.1		0.2	0	0		
n	28	28		28	3	3		

Rec'd 9-21-17 JL

Chesapeake Cultures
P.O. Box 507 Hayes, VA 23072 (804)693-4046 growfish@chesapeakecultures.com

NAS

Shipment Information

Species Hyalella azteca Date 9/20/17

Age ~5-6 days 1.4-1.6mm P.O. No. —

Quantity 1200+ Invoice No. 9393

Temperature 24°C Salinity _____ pH 7.86

Notes _____

Biologist _____

Please inspect shipment and report any problem immediately

CETIS Analytical Report

Report Date: 02 Oct-17 06:48 (p 1 of 2)
Test Code: 999-3712 | 10-8807-8412

Reference Toxicant 96-h Acute Survival Test — Northwestern Aquatic Sciences

Analysis ID:	00-9419-0182	Endpoint:	96h Proportion Survived	CETIS Version:	CETISv1.8.7
Analyzed:	02 Oct-17 6:46	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes
Batch ID:	02-6946-4629	Test Type:	Survival (96h)	Analyst:	
Start Date:	22 Sep-17 10:15	Protocol:	EPA/821/R-02-012 (2002)	Diluent:	Mod-Hard Synthetic Water
Ending Date:	26 Sep-17 09:20	Species:	Hyalella azteca	Brine:	
Duration:	95h	Source:	Chesapeake Cultures, VA	Age:	
Sample ID:	15-3756-4298	Code:	5BA55E8A	Client:	Internal Lab
Sample Date:	22 Sep-17 10:15	Material:	Potassium chloride	Project:	
Receive Date:	22 Sep-17 10:15	Source:	Reference Toxicant		
Sample Age:	NA	Station:			

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	17.7%	0.25	0.5	0.3536	

Dunnett Multiple Comparison Test

Control	vs	C-gm/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		0.063	0	2.849	0.276	2	0.8000	CDF	Non-Significant Effect
		0.125	0	2.849	0.276	2	0.8000	CDF	Non-Significant Effect
		0.25	0	2.849	0.276	2	0.8000	CDF	Non-Significant Effect
		0.5*	7.009	2.849	0.276	2	0.0014	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.7380083	0.1845021	4	19.65	0.0029	Significant Effect
Error	0.04695193	0.009390387	5			
Total	0.7849602		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Distribution	Shapiro-Wilk W Normality	0.6583	0.7411	0.0003	Non-normal Distribution

96h Proportion Survived Summary

C-gm/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	2	1	1	1	1	1	1	0	0.0%	0.0%
0.063		2	1	1	1	1	1	1	0	0.0%	0.0%
0.125		2	1	1	1	1	1	1	0	0.0%	0.0%
0.25		2	1	1	1	1	1	1	0	0.0%	0.0%
0.5		2	0.45	0	1	0.45	0.3	0.6	0.15	47.14%	55.0%
1		2	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-gm/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	2	1.412	1.409	1.415	1.412	1.412	1.412	0	0.0%	0.0%
0.063		2	1.412	1.409	1.415	1.412	1.412	1.412	0	0.0%	0.0%
0.125		2	1.412	1.409	1.415	1.412	1.412	1.412	0	0.0%	0.0%
0.25		2	1.412	1.409	1.415	1.412	1.412	1.412	0	0.0%	0.0%
0.5		2	0.7329	-1.214	2.68	0.7329	0.5796	0.8861	0.1532	29.57%	48.1%
1		2	0.1588	0.1587	0.1589	0.1588	0.1588	0.1588	0	0.0%	88.76%

96h Proportion Survived Detail

C-gm/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1	1
0.063		1	1
0.125		1	1
0.25		1	1
0.5		0.6	0.3
1		0	0

CETIS Analytical Report

Report Date: 02 Oct-17 06:48 (p 2 of 2)
Test Code: 999-3712 | 10-8807-8412

Reference Toxicant 96-h Acute Survival Test — Northwestern Aquatic Sciences

Analysis ID:	00-9419-0182	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv1.8.7
Analyzed:	02 Oct-17 6:46	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

C-gm/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1.412	1.412
0.063		1.412	1.412
0.125		1.412	1.412
0.25		1.412	1.412
0.5		0.8861	0.5796
1		0.1588	0.1588

CETIS Analytical Report

Report Date: 02 Oct-17 06:48 (p 1 of 1)
Test Code: 999-3712 | 10-8807-8412

Reference Toxicant 96-h Acute Survival Test — Northwestern Aquatic Sciences

Analysis ID:	03-1853-6091	Endpoint:	96h Proportion Survived	CETIS Version:	CETISv1.8.7
Analyzed:	02 Oct-17 6:46	Analysis:	Untrimmed Spearman-Kärber	Official Results:	Yes
Batch ID:	02-6946-4629	Test Type:	Survival (96h)	Analyst:	
Start Date:	22 Sep-17 10:15	Protocol:	EPA/821/R-02-012 (2002)	Diluent:	Mod-Hard Synthetic Water
Ending Date:	26 Sep-17 09:20	Species:	Hyalella azteca	Brine:	
Duration:	95h	Source:	Chesapeake Cultures, VA	Age:	
Sample ID:	15-3756-4298	Code:	5BA55E8A	Client:	Internal Lab
Sample Date:	22 Sep-17 10:15	Material:	Potassium chloride	Project:	
Receive Date:	22 Sep-17 10:15	Source:	Reference Toxicant		
Sample Age:	NA	Station:			

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	0.00%	-0.3161	0.03349	0.483	0.4139	0.5635

96h Proportion Survived Summary — Calculated Variate(A/B)

C-gm/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	2	1	1	1	0	0	0.0%	0.0%	20	20
0.063		2	1	1	1	0	0	0.0%	0.0%	20	20
0.125		2	1	1	1	0	0	0.0%	0.0%	20	20
0.25		2	1	1	1	0	0	0.0%	0.0%	20	20
0.5		2	0.45	0.3	0.6	0.15	0.2121	47.14%	55.0%	9	20
1		2	0	0	0	0	0		100.0%	0	20

96h Proportion Survived Detail

C-gm/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1	1
0.063		1	1
0.125		1	1
0.25		1	1
0.5		0.6	0.3
1		0	0

CETIS Test Data Worksheet

Report Date: 02 Oct-17 06:47 (p 1 of 1)
Test Code: 10-8807-8412/999-3712

Reference Toxicant 96-h Acute Survival Test				Northwestern Aquatic Sciences
Start Date:	22 Sep-17 10:15	Species:	Hyalella azteca	Sample Code: 5BA55E8A
End Date:	26 Sep-17 09:20	Protocol:	EPA/821/R-02-012 (2002)	Sample Source: Reference Toxicant
Sample Date:	22 Sep-17 10:15	Material:	Potassium chloride	Sample Station:

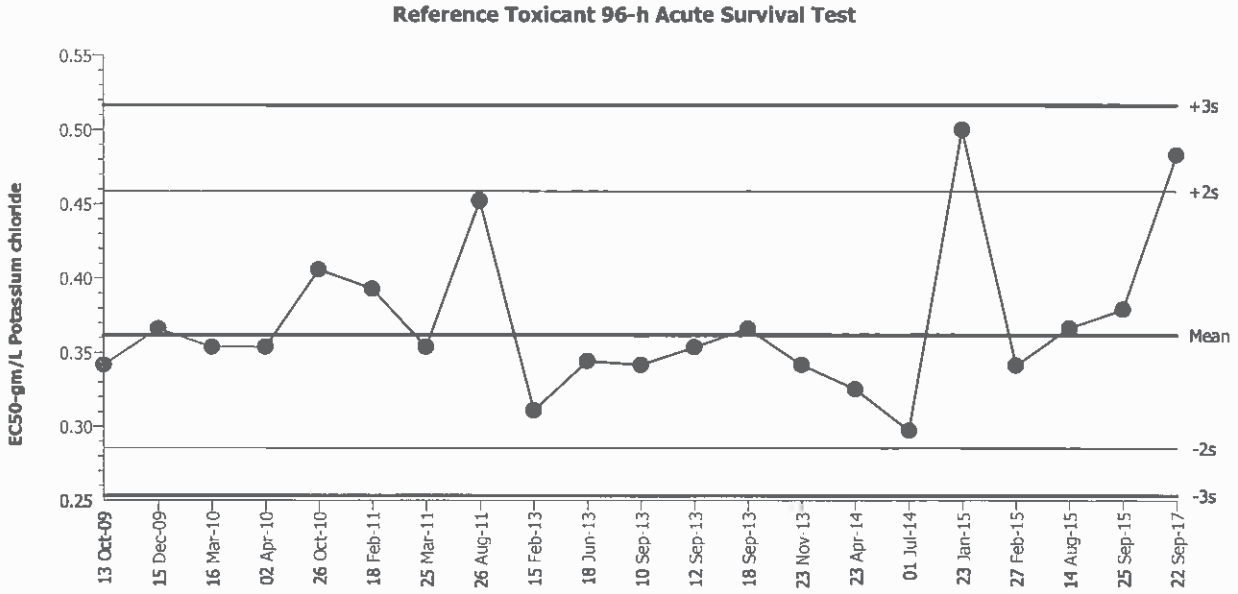
C-gm/L	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	5	10				10	
0	D	2	7	10				10	
0.063		1	1	10				10	
0.063		2	11	10				10	
0.125		1	6	10				10	
0.125		2	3	10				10	
0.25		1	10	10				10	
0.25		2	9	10				10	
0.5		1	2	10				6	
0.5		2	4	10				3	
1		1	8	10				0	
1		2	12	10				0	

data entry verified against laboratory bench sheets 10-12-17 JRF

CETIS QC Plot

Report Date: 02 Oct-17 13:54 (1 of 1)

Reference Toxicant 96-h Acute Survival Test			Northwestern Aquatic Sciences
Test Type: Survival (96h)	**Organism:** Hyalella azteca (Freshwater Amphip	**Material:**	Potassium chloride
Protocol: EPA/821/R-02-012 (2002)	**Endpoint:** 96h Proportion Survived	**Source:**	Reference Toxicant-REF



Mean:	0.3617	**Count:**	20	**-2s Warning Limit:**	0.2852	**-3s Action Limit:**	0.2533
Sigma:	NA	**CV:**	12.60%	**+2s Warning Limit:**	0.4586	**+3s Action Limit:**	0.5164

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2009	Oct	13	11:45	0.3415	-0.02017	-0.4834			18-9211-1534	15-1719-8467
2		Dec	15	12:05	0.366	0.004343	0.1006			07-7600-4762	10-5577-8618
3	2010	Mar	16	9:30	0.3536	-0.00813	-0.1914			19-2856-3151	01-8608-7439
4		Apr	2	9:45	0.3536	-0.00809	-0.1906			12-9008-9807	06-9335-1560
5		Oct	26	9:15	0.4058	0.04408	0.9688			13-3538-5406	17-1519-2066
6	2011	Feb	18	11:40	0.3928	0.03113	0.6956			20-2400-2930	19-9425-6046
7		Mar	25	10:50	0.3536	-0.00813	-0.1914			00-3927-9371	02-0123-2170
8		Aug	26	9:50	0.452	0.09033	1.878			08-0649-5130	17-0621-1561
9	2013	Feb	15	10:35	0.3107	-0.05099	-1.28			02-0730-7998	00-5455-1236
10		Jun	18	12:00	0.3441	-0.01758	-0.4199			09-0989-6270	06-1335-1972
11		Sep	10	11:05	0.3415	-0.02017	-0.4834			18-8504-1406	15-9421-5802
12			12	9:25	0.3536	-0.00813	-0.1914			00-6567-4353	10-6247-8720
13			18	10:50	0.366	0.004343	0.1006			13-2935-5475	16-5217-6513
14		Nov	23	8:00	0.3415	-0.02017	-0.4834			20-2953-8455	00-5678-8769
15	2014	Apr	23	10:10	0.3252	-0.0365	-0.8962			07-9558-8458	13-0269-8981
16		Jul	1	10:30	0.2973	-0.06438	-1.651			04-4395-5547	15-3935-4536
17	2015	Jan	23	9:15	0.5	0.1383	2.728	(+)		20-8359-7616	04-1511-7063
18		Feb	27	0:00	0.3412	-0.02044	-0.49			03-3890-7879	04-6075-9233
19		Aug	14	9:40	0.3663	0.004668	0.108			07-9658-3981	16-7990-4312
20		Sep	25	10:15	0.379	0.01733	0.3942			12-3120-7561	07-8700-7869
21	2017		22	10:15	0.483	0.1213	2.436	(+)		10-8807-8412	03-1853-6091

SECTION B

Midge (*Chironomus dilutus*) 20-day sediment bioassay 885-2 data report

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 885-2

Title: Toxicity of freshwater sediments using a 20-day midge, *Chironomus dilutus*, sediment bioassay as part of the remedial investigation at the Georgia-Pacific mill site in Camas, Washington.

Protocol No.: NAS-XXX-CT4c, October 18, 2000. Revision 1 (11-8-03). Based on ASTM 2001 (Standard test methods for measuring the toxicity of sediment-associated contaminants with fresh water invertebrates, E1706-00), Am. Soc. Test. Mat., Phila., PA, and EPA Method 100.5 (Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates, EPA/600/R-99/064). Washington State Sediment Management Standards (SMS) (Chapter 173-204 WAC, Last Update: 2/25/13).

STUDY MANAGEMENT

Study Sponsor: Environmental Science Associates, 5309 Shilshole Ave. NW, Suite 200, Seattle, WA 98107.
Sponsor's Study Monitor: Mr. Jim Good
Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365
Test Location: Newport laboratory
Laboratory's Study Personnel: G.J. Irissarri, B.S., Proj. Mngr./ Study Dir.; L.K. Nemeth, B.A., M.B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; J.B. Brown, B.S., D.V.M, Assoc. Aq. Toxicol.; Y. Nakahama, Sr. Tech.
Study Schedule:
Test Beginning: 9-22-17, 1400 hrs.
Test Ending: 10-12-17, 1130 hrs.
Disposition of Study Records: All raw data, reports, and other study records are stored at Northwestern Aquatic Sciences, 3814 Yaquina Bay Rd., Newport, OR 97365.
Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Test Sediments: Freshwater test sediments collected as part of the remedial investigation at the Georgia-Pacific mill site in Camas, Washington. Details are as follows:

NAS Sample No.	5991G	5992G	5993G	5994G	5995G
Description	OF2-1	OF2-2	OF2-3	OF1-1	OF1-2
Collection Date	9/12/17	9/12/17	9/12/17	9/13/17	9/13/17
Receipt Date	9/15/17	9/15/17	9/15/17	9/15/17	9/15/17

NAS Sample No.	5996G	5997G	5998G	5999G
Description	OF1-3	OF2-4	OF2-5	OF1-4
Collection Date	9/13/17	9/14/17	9/14/17	9/14/17
Receipt Date	9/15/17	9/15/17	9/15/17	9/15/17

Control Sediment: The negative control sediment (NAS#5989G) was collected on 9-13-17 from an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.
Treatments: Homogenized at test set up by mixing using stainless steel implements.
Storage: All test and control sediments were stored at 4°C in the dark in sealed containers until used.

TEST WATER

Source: Dechlorinated municipal tap water.
Dates of Preparation: 9-19-17, 10-9-17
Water Quality:
pH: 7.6, 7.2

Exhibit 8 SHOR23-01

conductivity: 102, 104 µmhos/cm
hardness: 26, 17 mg/L as $CaCO_3$
alkalinity: 30, 30 mg/L as $CaCO_3$.
total chlorine: <0.02, <0.02 mg/L
Pretreatment: Dechlorinated and aerated ≥24 hr.

TEST ORGANISMS

Species: *Chironomus dilutus* (formerly *C. tentans*), midge.
Size: 1st instar
Source: NAS cultures
Acclimation: Holding conditions prior to testing averaged: Temperature, 21.2 ± 1.9°C; dissolved oxygen, 8.5 ± 0.2 mg/L; pH, 7.6 ± 0.2; conductivity, 162 ± 24 µmhos/cm; hardness, 30 mg/L as $CaCO_3$; and alkalinity, 40 mg/L as $CaCO_3$. Photoperiod was 16:8, L:D.

TEST PROCEDURES AND CONDITIONS

The following is an abbreviated statement of the test procedures and a statement of the test conditions actually employed. See the test protocol (Appendix I) for a more detailed description of the test procedures used in this study.

Test Chambers: 300 ml high-form glass beakers
Test Volumes: 100 ml sediment layer; 175 ml test water.
Replicates/Treatment: 8
Organisms/Treatment: 80
Water Volume Changes: 2 water volumes per day
Aeration: None.
Feeding: Animals were fed 1.5 ml of Tetra Fin suspension (1.5 ml contains 6 mg dry solids) per beaker daily.
Acceptance Criteria: Results are valid if mean control mortality does not exceed 32%, and the mean individual ash-free dry weight at test termination is ≥ 0.60 mg.
Effects Criteria: 1) survival after 20 days, and 2) average individual biomass (based on ash-free dry weight) after 20 days. Death is defined as no visible movement or response to tactile stimulation. Missing organisms were considered to be dead.
Water Quality and Other Test Conditions: The temperature, dissolved oxygen, conductivity, pH, hardness, alkalinity and ammonia-nitrogen were measured in the overlying water of one replicate test container per treatment on days 0 and 20 of the test. Temperature was measured daily, pH and dissolved oxygen three times per week, and conductivity weekly, in the overlying water of one replicate test container per treatment. Hardness and alkalinity were measured with titrimetric methods. Ammonia-N was measured using Hach reagents based on the salicylate (Clin. Chim. Acta 14:403, 1996) colorimetric method; samples were not distilled prior to analysis. The photoperiod was 16:8, L:D.

DATA ANALYSIS METHODS

Percent survival and average individual ash-free dry weight were calculated for each replicate as follows:

percent survival = 100 x (number surviving/initial number tested)
average individual ash-free dry wt. = (ash-free dry wt.)/number weighed,
where:
ash-free dry wt. = dry weight of organisms recovered on day 20 – ashed dry weight, in mg

Means and standard deviations for the biological endpoints described above, and for water quality data, were computed using Microsoft Excel 2010. The values for mortality and individual ash-free dry weight for the test sediment were statistically compared to the control sediment. Where appropriate, an arcsine square root transformation was performed on proportional mortality data before analysis. Following determination of normality and homogeneity of variances, a one-tailed Student T-test, Mann-Whitney or Approximate T test was conducted at the 0.05 level of significance. The statistical software used was BioStat (version Feb 9, 2006 (EXCEL)) bioassay software developed by the U.S. Army Corps of Engineers, Seattle District.

PROTOCOL DEVIATIONS

Beaker number 67 was inadvertently not inoculated with animals on day 0.

REFERENCE TOXICANT TEST

The reference toxicant test is a multi-concentration toxicity test using potassium chloride, to evaluate the performance of the test organisms used in the sediment toxicity test. The performance is evaluated by comparing the results of this test with historical results obtained at the laboratory. A summary of the reference toxicant test result is given below. The reference toxicant test raw data are found in Appendix III.

Test No.: 999-3713
Reference Toxicant and Source: Potassium Chloride (KCl), Fisher Lot #147960.
Test Date: 9-22-17.
Dilution Water Used: Moderately hard synthetic water prepared from Milli-Q® deionized water.
Result: 96-hr LC50, 2.46 g/L. This result is within the laboratory's control chart warning limits (1.52 –3.56 g/L).

TEST RESULTS

Observations of water quality in the overlying water throughout the test are summarized in Table 1. A detailed tabulation of the water quality results by sample and test day can be found in Appendix II. The means and standard deviations of percent mortality and growth (ash-free dry wt.) of midges exposed for 20 days to sediments are summarized in Tables 2 and 3. Detailed data organized by sample and replicate, and summary statistics for these observations, are given in Appendix II.

All water quality observations of overlying water temperature and dissolved oxygen were within the protocol specified ranges. Ammonia-N in the overlying water ranged between <0.1 and 0.2 mg/L for all day 0 and day 20 measurements.

The test met the acceptability criteria specified in the SMS with 2.5% mean control mortality (≤32% required) and a control mean ash-free dry weight of 1.63 mg per larvae (≥0.60 mg required). The reference toxicant (positive control) EC50 result was within the laboratory's control chart limits (2.46 g/L; control chart mean ± 2 S.D. = 2.54 ± 1.02).

Interpretation was based on guidelines from the Washington State Sediment Management Standards (SMS) (Chapter 173-204 WAC, Last Update: 2/25/13). The SMS include Sediment Cleanup Objectives (SCO) and Cleanup Screening Levels (CSL) biological criteria. The Sediment Cleanup Objectives establish a no adverse effects level, including no acute or chronic adverse effect, to the benthic community. The Cleanup Screening Levels establish a minor adverse effects level, including acute or chronic effects, to the benthic community. To exceed the SCO criterion for mortality, the mean mortality in the test sediment must be greater than 15 percent over the mean control mortality and statistically different from the control ($p \leq 0.05$). For the growth endpoint, a mean reduction in the biomass that is greater than 25 percent over the control sediment response and statistically different from the control ($p \leq 0.05$) is an exceedance. For the CSL criteria, mean mortality in the test sediment must be greater than 25 percent over the mean control mortality and statistically different from the control ($p \leq 0.05$); for the growth endpoint, a mean reduction in the biomass that is greater than 40 percent from the control and statistically different from the control ($p \leq 0.05$) indicates an exceedance.

None of test sediments exhibited a mean mortality that was more than either 15% (SCO) or 25% (CSL) above the control mortality; therefore none of the sediments exceeded the SCO or CSL criteria for mortality. For the growth endpoint, eight of the test sediments were significantly lower than the control, but only one test sediment, OF1-3, exceeded limits under the SCO guidelines with an ash-free dry weight of 1.17 mg/individual, which was greater than a 25% reduction relative to the control. No sediment failed the CSL criterion for growth.

STUDY APPROVAL

10-30-17
Project Manager/Study Director Date

10-31-17
Assistant Laboratory Director Date
For Linda Nemetz

10-31-17
Quality Assurance Unit Date
For Julie Fiore

Table 1. Summary of water quality conditions during tests of the midge, *Chironomus dilutus*, exposed to freshwater sediments.

Water Quality Parameter	Mean ± S.D.	Minimum	Maximum	N
Temperature (°C)	22.7 ± 0.5	22.0	23.8	210
Dissolved oxygen (mg/L)	6.7 ± 0.8	4.4	8.2	100
Conductivity (µmhos/cm)	115 ± 5	104	134	50
pH	6.9 ± 0.3	6.3	7.5	100
Hardness (mg/L as $CaCO_3$)	18 ± 3	17	26	20
Alkalinity (mg/L as $CaCO_3$)	31 ± 3	30	40	20
Total ammonia (mg/L)	---	<0.1	0.2	20

Table 2. Mortality results of *Chironomus* toxicity test and data interpretation using guidelines from the Washington State SMS.

Sample description	Percent mortality (Mean ± SD)	Significantly higher than the control sediment at α=0.05?	Percent higher (absolute) than control sediment	Exceedance under SCO?[1]	Exceedance under one-test criteria for CSL[2]
Control (NAS# 5989G)	2.5 ± 4.6	---	---	---	---
OF1-1 (NAS# 5994G)	15.0 ± 14.1	Yes	12.5	No	No
OF1-2 (NAS# 5995G)	11.3 ± 14.6	No	8.8	No	No
OF1-3 (NAS# 5996G)	5.0 ± 7.6	No	2.5	No	No
OF1-4 (NAS# 5999G)	12.5 ± 11.6	Yes	10.0	No	No
OF2-1 (NAS# 5991G)	13.8 ± 13.0	Yes	11.3	No	No
OF2-2 (NAS# 5992G)	8.8 ± 8.3	No	6.3	No	No
OF2-3 (NAS# 5993G)	7.1 ± 7.6	No	4.6	No	No
OF2-4 (NAS# 5997G)	8.8 ± 6.4	Yes	6.3	No	No
OF2-5 (NAS# 5998G)	12.5 ± 12.8	Yes	10.0	No	No

[1] Sediment Cleanup Objectives (SCO) exceedance if the test sediment mean mortality is significantly higher (1-tailed t-test at P≤0.05) than the control sediment mean mortality and the absolute difference is >15%.

[2] Cleanup Screening Levels (CSL) exceedance if the test sediment mean mortality is significantly higher (1-tailed t-test at P≤0.05) than the control sediment mean mortality and the absolute difference is >25%.

Table 3. Growth results of *Chironomus* toxicity test and data interpretation using guidelines from the Washington State SMS.

Sample description	Average ash-free dry wt/midge (mg)* (Mean ± SD)	Statistically significantly lower than control sediment at α=0.05?	Percent lower than control sediment	Exceedance under SCO?[1] ((MIG_C-MIG_T)/MIG_C>0.25)	Exceedance under one-test criteria for CSL?[2] ((MIG_C-MIG_T)/MIG_C>0.40)
Control (NAS# 5989G)	1.63 ± 0.16	---	---	---	---
OF1-1 (NAS# 5994G)	1.35 ± 0.14	Yes	17.5	No	No
OF1-2 (NAS# 5995G)	1.24 ± 0.16	Yes	23.9	No	No
OF1-3 (NAS# 5996G)	1.17 ± 0.12	Yes	28.9	Yes	No
OF1-4 (NAS# 5999G)	1.32 ± 0.20	Yes	19.1	No	No
OF2-1 (NAS# 5991G)	1.51 ± 0.28	No	7.5	No	No
OF2-2 (NAS# 5992G)	1.35 ± 0.16	Yes	17.5	No	No
OF2-3 (NAS# 5993G)	1.32 ± 0.11	Yes	19.3	No	No
OF2-4 (NAS# 5997G)	1.49 ± 0.14	Yes	9.0	No	No
OF2-5 (NAS# 5998G)	1.43 ± 0.20	Yes	12.4	No	No

* Pupae were not included in the sample to estimate ash-free dry weight (as per EPA/600/R-99/064, p. 59, section 12.3.8.2)

[1] Sediment Cleanup Objectives (SCO) exceedance if the test sediment mean growth is significantly lower (1-tailed t-test at P≤0.05) than the control sediment mean growth, and the difference is >25%.

[2] Cleanup Screening Levels (CSL) exceedance (one-test criteria) if the test sediment mean individual growth in significantly lower (1-tailed t-test at P≤0.05) than the control sediment mean growth, and the difference is >40%.

APPENDIX I

PROTOCOL

TEST PROTOCOL
FRESHWATER MIDGE, *CHIRONOMUS TENTANS*, 20-DAY SEDIMENT TOXICITY TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this study is to characterize the toxicity of freshwater sediments based on midge survival and growth using the midge, *Chironomus tentans*.

1.2 Referenced Method: This protocol is based on EPA Method 100.5 (EPA/600/R-99/064) and ASTM Method E 1706-00 (ASTM 2001).

1.3 Summary of Method: A summary of test conditions for the midge 20-day sediment toxicity test is tabulated below. The 20-day sediment toxicity test with *Chironomus tentans* is conducted at 23°C with a 16L:8D photoperiod at an illuminance of about 100-1000 lux. Test chambers are 300-mL high-form lipless beakers containing 100 mL of sediment and 175 mL of overlying water. Ten <24 hour-old (first-instar) midge larvae are used in each replicate. The number of replicates/treatment depends on the objective of the test. Eight replicates are recommended for routine testing. Midges in each test chamber are fed 1.5 mL (conatins 6.0 mg of dry solids) of fish food flakes suspension daily. Each chamber receives two volume additions per day of overlying water. Overlying water can be culture water, well water, surface water, site water, or reconstituted water. Test endpoints include survival and growth (dry weight or ash-free dry weight (AFDW)).

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
3814 Yaquina Bay Road, P.O. Box 1437
Newport, OR 97365.

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Study Director: _____
Quality Assurance Unit: _____
Aquatic Toxicologist: _____
Aquatic Toxicologist: _____

2.6 Proposed Testing Schedule: Sediments should be tested sometime between sediment collection and 8 weeks storage. Sediments that contain high concentrations of labile chemicals such as ammonia and volatile organics should be tested as soon as possible after collection, but no later than within two weeks. A 96-hr, water-only reference toxicant test may be run concurrently, or periodic reference toxicant tests run on cultures may be used to assess organism sensitivity.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).

3. TEST MATERIAL

The test materials are freshwater sediments. The control, reference, and test sediments are placed in solvent cleaned 1 L glass jars fitted with PTFE-lined screw caps. At the laboratory the samples are stored at 4°C in the dark. The original sealed containers may be stored for up to 8 weeks prior to testing, depending on the testing requirements. If jars are not full when received or if sediment is removed for testing, headspaces may be filled with nitrogen to retard deterioration, depending on testing requirements. A negative control sediment is collected from a clean site. In addition, a reference sediment, a clean sediment with physical characteristics similar to the test sediments, is normally employed as a comparison station. Test sediments should be homogenized before use in a test.

4. TEST WATER

Test water (overlying water) at NAS is normally *C. tentans* culture water, which is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals. Test water may also be well water, surface water or site water depending on the study design.

5. TEST ORGANISMS

5.1 Species: midge, *Chironomus tentans*.

5.2 Source: Cultured at NAS (originally obtained from U.S. EPA Environmental Research Lab, Duluth, MN) or purchased from a reputable commercial supplier.

5.3 Age: < 24 hour-old (first instar) larvae

5.4 Acclimation and Pretest Observation: Cultures are maintained at approximately 23°C under a 16:8 L:D photoperiod. The culture water is moderately hard synthetic water. Midges are fed *Selenastrum* algae and finely ground Tetrafin flakes in suspension (10g Tetrafin in 100 mL Milli-Q water).

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers used in the toxicity test are 300-mL high-form lipless glass beakers (Pyrex® 1040 or equivalent). Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath or by placement in a temperature-controlled room. Aeration is not empolyed unless dissolved oxygen drops below 2.5 mg/L. The test is conducted under an illuminance of 100-1000 lux with a 16L:8D photoperiod.

6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in EPA/600/4-90/027F. New glassware and test systems are soaked 15 minutes in tap water and scrubbed with detergent (or cleaned in automatic dishwasher); rinsed twice with tap water; carefully rinsed once with fresh, dilute (10%, V:V) hydrochloric or nitric acid to remove scale, metals, and bases; rinsed twice with deionized water; rinsed once with acetone to remove organic compounds (using a fume hood or canopy); and rinsed three times with deionized water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of midge larvae to test, control, and reference sediments. The sediments are placed on the bottom of the test containers and are overlain with test water. The test exposure is for 20 days. The renewal of overlying water consists of two volume additions per day, either continuous or intermittent. Each treatment consists of eight replicate test containers, each containing 10 organisms. Test chamber positions are completely randomized. Test organisms are randomly distributed to the test chambers. Blind testing is normally used.

7.2 Setup of Test Containers: Sediments are homogenized and placed in test chambers on the day before addition of test organisms. Sediment (100 ml) is placed into each of eight replicate beakers. After addition of the sediment, 175 ml of test water is gently added to each beaker in a manner to prevent resuspension. The overlying water is replaced twice daily. The test begins when midges are introduced to the test chambers. Initial water quality measurements are taken prior to the addition of test organisms.

7.3 Effect Criteria: The effect criteria used in the midge bioassay are survival (mortality) and growth. Mortality is defined as the lack of movement of body or appendages on response to tactile stimulation. Growth is determined by using either dry weight or ash-free dry weight measurements.

7.4 Test Conditions: No aeration is employed unless dissoved oxygen falls below 2.5 mg/L. The test temperature employed is 23°C (range of ± 1°C). A 16:8, L:D photoperiod is used. Illumination is supplied by daylight fluorescent lamps at 100-1000 lux. The overlying water is replaced twice daily.

7.5 Beginning the Test: The test is begun by adding the organisms to the equilibrated test containers as previously described.

7.6 Feeding: Midge larvae are fed 1.5 mL daily per test chamber (1.5 mL contains 6.0 mg of dry solids). A feeding may be skipped if there is a build up of excess food. However, all beakers must be treated similarly.

7.7 Test Duration, Type and Frequency of Observations, and Methods: The duration of the toxicity test is 20 days. The type and frequency of observations to be made are summarized as follows:

Type Of Observation	Times Of Observation
Biological Data	
Survival, growth	Day 20
Physical And Chemical Data	
Hardness, alkalinity, ammonia-N, conductivity, pH, dissolved oxygen, and temperature	Beginning and end of test in overlying water of one replicate beaker from each treatment.
Temperature	Daily
DO & pH	**3X/week**
Conductivity	Weekly

Dissolved oxygen is measured using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is measured using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using titrometric methods. Ammonia-nitrogen is measured using the salicylate colerimetric method (Clin. Chim. Acta 14:403, 1996).

7.8 Growth Measurement: Growth is measured as ash-free dry weight (AFDW) of animals in a test replicate at the end of the test on day 10. Pooled animals from each test replicate are rinsed with deionized water, gently blotted and placed into tared aluminum weigh pans. The pans are dried at 60-90°C to constant weight. The dried organisms are placed into a dessicator and weighed as soon as possible to the nearest 0.01 mg (desirable to use 0.001 mg). The total weight of the dried midge in each pan is divided by the number of midge weighed to obtain an

average dry weight per midge. The dried larvae in the pan are then ashed at 550°C for two hours. The pan with tthe ashed larvae is then reweighed and the tissue mass of the larvae is determined as teh difference between the weight of the dried larvae plus pan and the weight of the ashed larvae plus pan. Pupae or adult organisms are not included in the sample to estimate AFDW.

8. CRITERIA OF TEST ACCEPTANCE

The test results are acceptable if the minimum survival of organisms in the control treatment at the end of the test is at least 70% and the average dry weight of *C. tentans* in the surviving controls is at least 0.6 mg (or 0.48mg/surviving organism as AFDW).

9. DATA ANALYSIS

The endpoints of the toxicity test are survival and growth. Survival is obtained as a direct count of living organisms in each test container at the end of the test. Average midge dry weight or ash-free dry weight, also measured at the end of the test, may be used to compare growth between treatment sediments and the control or reference sediment. Ordinarily the following data analysis is performed. Due to special requirements, alternative methods may be used. The means and standard deviations are calculated for each treatment level. Identification of toxic sediments is established by statistical comparison of test endpoints between test and control or reference sediments. Between treatment comparisons may be made using a Student's t-test or Wilcoxon's Two-Sample test, where each treatment is compared to the control or the reference sediment. An arcsine-square root transformation of proportional data, and tests for normality and heterogeneity of variances, are performed prior to statistical comparisons.

10. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; date and time of test beginning and end; information on the test material; information on the source and quality of the overlying/test water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including feeding, if any, and water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses and a summary table of endpoints; a description of the statistical methods used; any unusual information about the test or deviations from procedures; reference toxicant testing information.

11. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

12. REFERENCE TOXICANT

The reference toxicant test is a standard multi-concentration toxicity test using a specified chemical toxicant to evaluate the performance of test organisms used in the study. Reference toxicant tests are 96-hour, water only exposures, not 20-day sediment exposures. The reference toxicant test is normally run concurrently; however, for this 20-day test periodic reference toxicant tests run on the cultures may be used to evaluate organism sensitivity. Performance is evaluated by comparing the results of the reference toxicant test with historical results (e.g., control charts) obtained at the laboratory.

13. REFERENCED GUIDELINES

ASTM. 2001. Standard Test Methods for Measuring the Toxicity of Sediment-associated Contaminants with Freshwater Invertebrates. ASTM Standard Method No. E 1706-00. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. EPA. 2000. Test Method 100.5, Life-cycle Test for measuring the Effects of Sediment-associated Contaminants on *Chironomus tentans*, pp. 84-91. In: Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. Second edition. EPA/600/R-99/064.

Weber, C.I. (Ed.) 1993. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fourth Edition). EPA/600/4-90/027F.

14. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

Appendix A
Test Conditions Summary

1. Test type	whole sediment toxicity test with renewal of overlying water
2. Test duration	20 days
3. Temperature	23 ± 1°C
4. Light quality	daylight flourescent light
5. Illuminance	100-1000 lux
6. Photoperiod	16L:8D
7. Test chamber size	300-mL high-form lipless beakers (Pyrex® 1040 or equivalent)
8. Sediment volume	100 mL
9. Overlying water volume	175 mL
10. Renewal overlying water	2 volume additions/day (continuous or intermittent)
11. Age of test organisms	< 24 hour-old (first instar) larvae
12. Organisms per test chamber	10
13. Replicates per treatment	8 recommended for routine testing (depends on design)
14. Organisms per treatment	80
15. Feeding regime	Fish food flakes, fed 1.5 mL daily/chamber (1.5 mL contains 6.0 mg of dry solids)
16. Aeration	None, unless DO falls below 2.5 mg/L
17. Overlying (test) water	Culture water, well water, surface water, site water or reconstituted water
18. Water quality	Hardness, alkalinity, conductivity, and ammonia-N beginning and end; temperature daily; dissolved oxygen, pH 3X/week and conductivity weekly
19. Endpoints	Survival and growth (ash-free dry weight.)
20. Test acceptability criteria	Minimum control survival of 70%; mean AFDW of surviving control organisms = 0.48 mg
21. Sample holding	up to 8 weeks at 4°C in the dark (14 days when volatiles in sediments)
22. Sample volume required	1L (800 mL per sediment)
23. Reference toxicant	KCl

APPENDIX II

RAW DATA

TEST DESCRIPTION, MONITORING, AND RESULTS BENCHSHEETS

NORTHWESTERN AQUATIC SCIENCES — PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

REVIEWED PAGES 1-48 -681

Test No. 885-2 Client ESA Investigator

STUDY MANAGEMENT

Client: Environmental Science Associates, 5309 Shilshole Ave. NW, Suite 200, Seattle, WA 98107

Client's Study Monitor: Mr. Jim Good

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.J. Irissarri GJI

QA Officer L.K. Nemeth

1. Yuri Nakagawa YN
2. GA Buhler GAB
3. J. Brown JB
4.
5.
6.
7.
8.

Study Schedule:

Test Beginning: 9-22-17 1400 Test Ending: 10-12-17 1130

TEST MATERIAL

General description (see sample logbook/chain-of-custody for details):

NAS Sample No.:	5991G	5992G	5993G	5994G
Description:	OF2-1	OF2-2	OF2-3	OF1-1
Collection Date:	9/12/17	9/12/17	9/12/17	9/13/17
Receipt Date:	9/15/17	9/15/17	9/15/17	9/15/17
:				
NAS Sample No.:	5995G	5996G	5997G	5998G
Description:	OF1-2	OF1-3	OF2-4	OF2-5
Collection Date:	9/13/17	9/13/17	9/14/17	9/14/17
Receipt Date:	9/15/17	9/15/17	9/15/17	9/15/17
:				
NAS Sample No.:	5999G			
Description:	OF1-4			
Collection Date:	9/14/17			
Receipt Date:	9/15/17			
:				
NAS Sample No.:				
Description:				
Collection Date:				
Receipt Date:				
:				
NAS Sample No.:				
Description:				
Collection Date:				
Receipt Date:				
:				

Error codes: 1) correction of handwriting error
2) written in wrong location; entry deleted
3) wrong date deleted, replaced with correct date
4) error found in measurement; measurement repeated

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator [redacted]

SEDIMENT DESCRIPTIONS -- SUPPLEMENTAL NOTES

Sample No.	Description
5989G	FINE BLACK MUD
5991G	BROWN SAND W/ SMALL CLAMS & PLANT DEBIS
5992G	GRAY SAND W/ SMALL CLAMS & PLANT DEBRIS
5993G	BROWN SAND W/ SMALL CLAMS & PLANT DEBRIS
5994G	GRAY/BROWN SAND W/ SOME PLANT DEBRIS
5995G	GRAY/BROWN SAND W/ SMALL CLAMS & PLANT DEBRIS
5996G	BROWN SAND
5997G	BROWN SAND W/ SMALL CLAMS & PLANT DEBRIS
5998G	BROWN SAND W/ SMALL CLAM SHELLS & PLANT DEBRIS
5999G	GRAY SAND

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS. 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

TEST WATER

Source: Dechlorinated Newport, OR tap water

Date of Collection: 9-19-17, 10-1-17

pH 7.6, 7.2

Cond (umhos/cm2) 102, 104

Hardness (mg/L) 26, 17

Alkalinity (mg/L) 30, 30

Total Chlorine (mg/L) <0.02, <0.02

Treatments:

TEST ORGANISMS

Species: *Chironomus dilutus* Age: < 24 HRS 1st instar

Source: NAS CULTURES Date received: N/A

Acclimation Data:

Date	Temp. (deg.C)	pH	DO (mg/L)	Cond. umhos/cm	Hardness (mg/L)	Alkalinity (mg/L)	Feeding	Water changes
9-20-17	22.7	7.5	8.5	135	26	40	None	–
9-21-17	19.0	7.8	8.7	180	–	–	↓	–
9-22-17	21.9	7.5	8.4	171	34	40	↓	–
Mean	21.2	7.6	8.5	162	30	40		
S.D.	1.9	0.2	0.2	24	–	–		
(N)	3	3	3	3	3	3		

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test chambers: 300 ml glass beakers

Test volumes: 100 ml of test sediment; 275 ml total volume

Replicates/treatment: (8) 8 Organisms/treatment: (80) 80 (10/REP)

Test water changes: Twice daily

Aeration: only if DO falls below 2.5 mg/L

Feeding: everyday beginning with day zero

Test temperature (°C): 23 ± 1

Beaker placement: Total randomization

Photoperiod: 16:8, L:D

Control Sediment:

Source: From an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.

Date collected: 9/13/17

Sieved through 0.5 -mm screen

Storage: 4°C in the dark in closed containers. NAS# 5989G

MISCELLANEOUS NOTES

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator _____

Test conducted in (circle one): (room 1) room 2 trailer water bath other:_____

Randomization chart:

6								78	
5								77	
4							→	76	
3								75	
2								74	80
1								73	79

FRONT - TOP SHELF

Randomization chart:

Randomization chart:

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator _____

DAILY RECORD SHEET

Day 0 (9/22/17) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
4	22.4	8.2	113	7.4	17	30		Each beaker fed 1.5 ml
21	22.1	8.2	112	7.5	17	30		Tetra Fin suspension
29	22.4	8.2	118	7.2	26	30		Initials:
49	22.2	7.6	134	7.1	17	30		
53	22.3	8.1	114	7.4	26	30		
58	22.2	8.2	112	7.3	17	30		
65	22.4	8.0	114	7.2	17	30		
66	22.8	8.0	118	7.2	26	30		
78	23.1	8.1	121	7.3	17	30		Water changed in all
80	23.2	7.8	119	7.3	17	30		beakers.
								Time: 0610
								Initials: GJ
								Water changed in all
								beakers.
								Time: —
								Initials: —

*Water quality measurements to be taken.

Day 1 (9/23/17) GJS

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	23.3							Each beaker fed 1.5 ml
21	22.0							Tetra Fin suspension
29	22.2							Initials: GJS
49	22.3							
53	22.6							
58	22.5							
65	22.6							
66	23.1							
78	23.4							Water changed in all
80	23.2							beakers.
								Time: 6550
								Initials: GJS
								Water changed in all
								beakers.
								Time: 1800
								Initials: YC

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator [redacted]

DAILY RECORD SHEET

Day 2 (9/24/17) GJ

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.1							Each beaker fed 1.5 ml
21	22.0							Tetra Fin suspension
29	22.3							Initials: GJ
49	22.2							
53	22.4							
58	22.3							
65	22.5							
66	22.8							
78	23.1							Water changed in all
80	22.9							beakers.
								Time: 0555
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1825
								Initials: [redacted]

*Water quality measurements to be taken.

Day 3 (9/25/17) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.5	7.4		7.0				Each beaker fed 1.5 ml
21	22.3	7.3		7.1				Tetra Fin suspension
29	22.7	7.1		6.9				Initials: GJ
49	22.5	7.2		7.0				
53	22.7	7.2		7.1				
58	22.6	7.2		7.0				
65	22.8	7.1		7.0				
66	23.2	7.1		7.0				
78	23.6	7.2		7.1				Water changed in all
80	23.4	7.1		7.1				beakers.
								Time: 0600
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1745
								Initials: [redacted]

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

DAILY RECORD SHEET

Day 4 (9/26/17) GJ

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.8							Each beaker fed 1.5 ml
21	22.8							Tetra Fin suspension
29	23.1							Initials: GJS
49	22.9							
53	23.2							
58	23.0							
65	23.2							
66	23.6							
78	23.8							Water changed in all
80	23.7							beakers.
								Time: 0550
								Initials: GJS
								Water changed in all
								beakers.
								Time: 1725
								Initials: JL

*Water quality measurements to be taken.

Day 5 (9/27/17) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.9	6.8	116	6.9				Each beaker fed 1.5 ml
21	22.7	6.7	117	6.8				Tetra Fin suspension
29	23.0	6.6	122	6.8				Initials: GJ
49	22.9	6.7	123	6.9				
53	23.1	6.6	118	6.9				
58	23.0	6.4	117	6.8				
65	23.2	6.4	121	6.9				
66	23.6	6.1	125	7.0				
78	23.8	6.4	121	7.0				Water changed in all
80	23.6	6.5	123	7.0				beakers.
								Time: 0605
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1715
								Initials: JL

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

DAILY RECORD SHEET

Day 6 (9/28/17) OFS

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.8							Each beaker fed 1.5 ml
21	22.6							Tetra Fin suspension
29	22.9							Initials: OFS
49	22.8							
53	22.9							
58	22.9							
65	23.0							
66	23.3							
78	23.5							Water changed in all
80	23.4							beakers.
								Time: 0600
								Initials: OFS
								Water changed in all
								beakers.
								Time: 1715
								Initials: IN

*Water quality measurements to be taken.

Day 7 (9/29/17) OFS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.7	7.5		6.4				Each beaker fed 1.5 ml
21	22.6	7.4		6.4				Tetra Fin suspension
29	22.9	7.2		6.4				Initials: OFS
49	22.8	7.1		6.5				
53	23.0	7.2		6.4				
58	22.9	6.9		6.4				
65	23.1	7.0		6.4				
66	23.3	7.1		6.3				
78	23.6	7.1		6.4				Water changed in all
80	23.5	7.2		6.4				beakers.
								Time: 0555
								Initials: OFS
								Water changed in all
								beakers.
								Time: 1730
								Initials:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c
CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

DAILY RECORD SHEET

10-1-17 CB 632

Day 8 (9/30/17) CB

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.8							Each beaker fed 1.5 ml
21	22.7							Tetra Fin suspension
29	22.9							Initials: CB
49	22.8							
53	22.9							
58	22.9							
65	23.0							
66	23.4							
78	23.7							Water changed in all
80	23.4							beakers.
								Time: 0550
								Initials: CB
								Water changed in all
								beakers.
								Time: 1715
								Initials:

*Water quality measurements to be taken.

632 10-1-17

Day 9 (10/1/17) 632

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.7							Each beaker fed 1.5 ml
21	22.6							Tetra Fin suspension
29	23.0							Initials: 632
49	22.8							
53	23.0							
58	22.9							
65	23.1							
66	23.3							
78	23.6							Water changed in all
80	23.4							beakers.
								Time: 0610
								Initials: 632
								Water changed in all
								beakers.
								Time: 1830
								Initials:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator [redacted]

DAILY RECORD SHEET

Day 10 (10/2/17) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.5	7.2		7.3				Each beaker fed 1.5 ml
21	22.3	7.1		7.2				Tetra Fin suspension
29	22.6	6.6		7.1				Initials: GJ
49	22.4	6.4		7.5				
53	22.6	6.8		7.2				
58	22.6	6.8		7.2				
65	22.8	6.5		7.1				
66	23.2	6.5		7.1				
78	23.5	6.7		7.2				Water changed in all
80	23.3	6.5		7.2				beakers.
								Time: 0605
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1720
								Initials: [redacted]

*Water quality measurements to be taken.

Day 11 (10/3/17) [redacted]

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.3							Each beaker fed 1.5 ml
21	22.0							Tetra Fin suspension
29	22.3							Initials: GJ
49	22.0							
53	22.3							
58	22.2							
65	22.4							
66	22.8							
78	23.3							Water changed in all
80	23.0							beakers.
								Time: 0605
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1800
								Initials: [redacted]

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c
CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

DAILY RECORD SHEET

Day 12 (10/4/17) CAB

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.0	7.6	110	7.1				Each beaker fed 1.5 ml
21	22.0	7.4	109	7.0				Tetra Fin suspension
29	22.1	7.3	112	7.0				Initials: CAB
49	22.0	7.2	122	7.0				
53	22.1	7.1	110	6.8				
58	22.0	7.3	110	6.7				
65	22.2	7.5	111	6.8				
66	22.6	7.4	114	6.8				
78	22.9	7.5	117	6.7				Water changed in all
80	22.6	7.5	104	6.6				beakers.
								Time: 0600
								Initials: CAB
								Water changed in all
								beakers.
								Time: 1715
								Initials:

*Water quality measurements to be taken.

Day 13 (10/5/17) CAB

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.3							Each beaker fed 1.5 ml
21	22.1							Tetra Fin suspension
29	22.2							Initials: CAB
49	22.0							
53	22.2							
58	22.2							
65	22.4							
66	22.9							
78	23.2							Water changed in all
80	23.0							beakers.
								Time: 0550
								Initials: CAB
								Water changed in all
								beakers.
								Time: 1715
								Initials:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c
CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator _____

DAILY RECORD SHEET

Day 14 (10/6/17) 0D

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.5	7.3		6.8				Each beaker fed 1.5 ml
21	22.1	7.2		6.7				Tetra Fin suspension
29	22.2	7.2		6.7				Initials: GD
49	22.0	7.1		6.6				
53	22.3	7.2		6.7				
58	22.2	7.0		6.6				
65	22.4	7.3		6.6				
66	22.8	7.0		6.7				
78	23.1	7.2		6.6				Water changed in all
80	22.9	7.1		6.6				beakers.
								Time: 0550
								Initials: UB
								Water changed in all
								beakers.
								Time: 1705
								Initials: TA

*Water quality measurements to be taken.

Day 15 (10/7/17) 0D

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.9							Each beaker fed 1.5 ml
21	22.6							Tetra Fin suspension
29	22.7							Initials: GD
49	22.7							
53	22.9							
58	22.9							
65	23.0							
66	23.4							
78	23.8							Water changed in all
80	23.6							beakers.
								Time: 0550
								Initials: GD
								Water changed in all
								beakers.
								Time: 1705
								Initials: GD

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c
CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

DAILY RECORD SHEET

Day 16 (10 / 8 /17) GJL

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.2							Each beaker fed 1.5 ml
21	22.0							Tetra Fin suspension
29	22.3							Initials: GJL
49	22.0							
53	22.3							
58	22.2							
65	22.4							
66	22.9							
78	23.4							Water changed in all
80	23.0							beakers.
								Time: 0605
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1710
								Initials: GJL

*Water quality measurements to be taken.

Day 17 (10 /9 /17) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.3	6.1		6.5				Each beaker fed 1.5 ml
21	22.0	6.3		6.6				Tetra Fin suspension
29	22.3	6.3		6.6				Initials: GJL
49	22.1	5.8		6.7				
53	22.3	5.9		6.6				
58	22.2	5.7		6.7				
65	22.4	5.0		6.6				
66	22.8	5.3		6.6				
78	23.3	4.8		6.7				Water changed in all
80	23.0	4.4		6.7				beakers.
								Time: 0600
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1720
								Initials: YC

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c
CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

DAILY RECORD SHEET

Day 18 (10/10/17) GAS

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.1							Each beaker fed 1.5 ml
21	22.1							Tetra Fin suspension
29	22.3							Initials: GAS
49	22.0							
53	22.2							
58	22.2							
65	22.4							
66	22.8							
78	22.9							Water changed in all
80	22.8							beakers.
								Time: 0550
								Initials: GAS
								Water changed in all
								beakers.
								Time: 1815
								Initials:

*Water quality measurements to be taken.

Day 19 (10/11/17) GJ1

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.1	5.9	114	6.6				Each beaker fed 1.5 ml
21	22.0	5.7	114	6.6				Tetra Fin suspension
29	22.2	5.7	118	6.7				Initials: GJ1
49	22.1	5.4	115	6.6				
53	22.2	5.6	113	6.6				
58	22.1	5.8	114	6.7				
65	22.3	5.3	114	6.6				
66	22.7	5.4	115	6.6				
78	23.1	6.2	116	6.8				Water changed in all
80	22.8	5.8	116	6.7				beakers.
								Time: 0555
								Initials: GJ1
								Water changed in all
								beakers.
								Time: 1705
								Initials: GJ1

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

DAILY RECORD SHEET

Day 20 (10/ 2 /17) GB

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
4	22.4	6.2	110	7.2	17	30		
21	22.0	5.6	109	6.9	17	40		
29	22.3	5.7	112	7.0	17	30		
49	22.1	5.3	111	6.9	17	30		
53	22.4	5.5	111	6.9	17	30		
58	22.3	5.7	111	7.0	17	30		
65	22.5	5.4	110	6.9	17	30		
66	22.9	5.6	110	6.9	17	30		
78	23.3	6.1	115	7.2	17	30		Water changed in all
80	23.1	6.0	111	7.1	17	40		beakers.
								Time: 0550
								Initials: GB

*Water quality measurements to be taken.

Day (/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
								Each beaker fed 1.5 ml
								Tetra Fin suspension
								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator _____

DAY 20 TEST TERMINATION SHEET

Beaker No.	Number of survivors	Initials	
1	10	GJL	
2	8	GJL	2 pupa
3	9	GJL	
4	10	GJL	
5	6	GJL	3 pupa
6	10	GJL	
7	7	GJL	2 pupa
8	6	GJL	
9	10	GJL	
10	9	GJL	
11	10	GJL	
12	6	GJL	3 pupa
13	9	GJL	1 pupa
14	8	GJL	2 pupa
15	10	GAB	
16	10	GAB	
17	9	GJL	
18	9	GJL	
19	7	GB	2 pupa
GJL ② 10-12-17 20	16 9	GJL GB	1-pupa
21	6	GJL	
22	9	GJL	
23	8	GAB	
24	4	GB	3 pupa
25	8	GJL	1 pupa
26	8	GJL	
27	6	GJL	1 pupa
28	10	GJL	
29	7	GB	1-pupa
30	7	GB	2 pupa
31	10	GJL	
32	10	GJL	
33	9	GAB	1-pupa
34	10	GAB	
35	9	GJL	
36	9	GJL	1 pupa
37	5	GB	4 pupa
38	9	GB	1-pupa
39	9	GJL	1 pupa
40	6	GJL	1 pupa
41	7	GB	2 pupa
42	7	GAB	
43	9	GJL	
44	10	GJL	
45	7	GJL	

Beaker No.	Number of survivors	Initials	
46	6	GJL	2 pupa
47	7	GB	2 pupa
48	4	GB	3 pupa
49	9	GAB	
50	7	GAB	
51	8	GJL	2 pupa
52	5	GJL	3 pupa
53	10	GB	
54	10	GAB	
55	7	GJL	1 pupa
56	9	GJL	1 pupa
57	9	GAB	1 pupa
58	9	GAB	
59	9	GJL	
60	5	GJL	3 pupa
61	10	GB	
62	9	GAB	1 pupa
63	9	GJL	
64	8	GJL	1 pupa
65	8	GAB	
66	4	GB	5 pupa
67	8	GJL	
68	9	GJL	
69	10	GAB	
② GJL 10-12-17 70	~~10~~ 7	GJL	3 pupa
71	10	GJL	
72	9	GJL	1 pupae
73	8	GB	1 pupa
74	7	GAB	1 pupa
75	10	GJL	
76	8	GJL	
77	7	GB	1 pupa
78	9	GAB	
79	10	GAB	
80	7	GB	2 pupa

NORTHWESTERN AQUATIC SCIENCES — PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

WEIGHING DATA SHEET

Tare:	Date 10-2-17	Oven temp (C.) 550	Drying time (hr.) 2	Initials JDF
	Standard Weights:	10 mg: 10.004	100mg: 100.003	
Final #1:	Date 10-16-17	Oven temp (C.) 62	Drying time (hr.) 27	Initials GJL
	Standard Weights:	10 mg: 10.006	100mg: 100.010	
Final #2:	Date 10-17-17	Oven temp (C.) 65	Drying time (hr.) 24	Initials GJL
	Standard Weights:	10 mg: 10.007	100mg: 100.010	
Final #3:	Date 10-18-17	Oven temp (C.) 550	Drying time (hr.) 2	Initials JDF
	Standard Weights:	10 mg: 10.006	100mg: 100.016	

Equip. used: Oven BLUE M #2, FISHER ISOTEMP MUFFLE FURNACE Balance SARTORIUS M3P

(Dry overnight at 60-90 degrees C) **(Final ashing is at 550 degrees C for 2 hours)**

Bkr. #	Pan #	Tare wt. (mg)	Dry total wt. (mg) 1	Dry total wt. (mg) 2	no. weighed	put into pans-initials	Ash weight (mg)	
1	1	103.44	124.60	124.46	10	~~83~~	113.91	
2	2	97.85	117.43	117.21	8		102.22	
3	3	95.97	116.57	116.41	9		104.47	
4	4	101.20	115.88	115.74	10		105.53	
5	5	93.44	104.88	104.78	6		97.11	
6	6	97.24	118.00	119.86	~~10~~ 9		105.71	① 10-12-17 83
7	7	93.55	107.10	106.99	7		97.73	
8	8	95.77	111.50	111.37	6		100.67	
9	9	95.87	117.89	117.71	10		102.36	
10	10	95.33	119.06	118.90	9		103.18	
11	11	92.09	110.78	110.63	10		98.62	
12	12	93.78	104.55	104.45	6		96.91	
13	13	103.08	119.94	119.81	9		108.72	
14	14	90.04	107.72	107.60	8		96.22	
15	15	94.56	114.28	114.15	10		100.81	
16	16	92.32	108.95	108.85	10		97.68	
17	17	84.87	106.65	106.55	9		93.58	
18	18	96.29	116.49	116.40	9		104.61	
19	19	97.59	111.03	110.95	7		102.26	
20	20	96.20	117.32	117.14	9		101.81	
21	21	95.11	106.20	106.11	6		97.36	
22	22	91.64	107.11	107.02	9		95.77	
23	23	95.15	117.78	117.55	8		104.77	
24	24	91.89	104.97	104.91	4		97.13	
25	25	85.76	101.29	101.24	8		90.85	
26	26	98.76	115.29	115.20	8		104.90	
27	27	98.43	114.01	113.94	6		104.37	
28	28	94.79	115.07	114.92	10		102.31	
29	29	98.08	120.95	120.76	7		107.43	
30	30	91.73	101.84	101.73	7		94.06	
31	31	91.07	105.77	105.65	10		95.21	
32	32	93.18	113.48	113.32	10		100.76	
33	33	100.40	120.28	120.14	9 ~~8~~	✓	108.84	① 10-12-17 83

NORTHWESTERN AQUATIC SCIENCES — PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

WEIGHING DATA SHEET

See page _____ for information on drying times and temperatures, standard weights,etc.

Bkr. #	Pan #	Tare wt. (mg)	Total wt. (mg) 1	Total wt. (mg) 2	no. weighed	put into pans-initials	Ash weight (mg)	
34	34	99.33	115.10	114.97	10	BB	103.92	
35	35	101.76	122.22	122.09	9		109.99	
36	36	92.66	110.20	110.04	9		96.48	
37	37	95.10	107.81	107.73	5		100.37	
38	38	90.59	114.02	113.87	9		99.23	
39	39	91.92	113.45	113.29	10		97.75	
40	40	96.14	111.99	111.90	6		102.08	
41	41	87.23	101.05	101.03	7		92.34	
42	42	97.02	114.38	114.34	7		103.96	
43	43	92.34	108.17	108.12	9		97.39	
44	44	93.56	~~101.05~~ 111.24	111.16	10		99.10	
45	45	93.96	112.70	112.58	7		100.25	
46	46	90.54	103.97	103.93	6		95.48	
47	47	93.77	111.89	111.85	7		100.84	
48	48	94.02	102.25	102.21	4		96.12	
49	49	96.05	115.43	115.31	8		100.98	
50	50	105.84	119.27	119.20	7		108.72	
51	51	94.48	111.32	111.28	8		101.35	
52	52	90.67	100.39	100.35	5		93.39	
53	53	94.76	111.34	111.28	10		99.05	
54	54	105.45	125.01	124.96	10		112.74	
55	55	89.70	102.35	102.30	7		92.41	
56	56	92.74	110.71	110.64	9		99.23	
57	57	101.85	124.07	124.02	9		111.38	
58	58	~~98~~ 93.06	109.16	109.13	9		97.99	
59	59	95.96	113.32	113.28	9		102.38	
60	60	89.51	99.72	99.69	5		92.49	
61	61	94.90	111.42	111.34	10		~~97.37~~ 100.58	
62	62	96.35	114.68	114.59	9		102.93	
63	63	96.57	117.67	117.52	9		102.30	
64	64	93.17	111.85	111.75	8		100.28	
65	65	87.79	107.38	107.29	8		95.55	
66	66	95.20	104.53	104.48	4		98.62	
67	67	90.54	—	—	0		—	
68	68	101.57	121.34	121.22	9		107.71	
69	69	89.44	109.37	109.31	10		98.26	
70	70	96.63	111.61	111.56	7		102.21	
71	71	101.25	121.18	121.05	10		106.94	
72	72	90.79	108.87	108.82	9		98.42	
73	73	96.90	114.62	114.56	8		103.42	
74	74	88.51	101.20	101.14	7		91.45	
75	75	98.66	114.80	114.72	10	✓	103.57	
76	76	97.06	115.77	115.73	8		105.00	

10-16-17 (2) 632

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CT4c

CHIRONOMUS DILUTUS 20-DAY SOLID PHASE SEDIMENT TEST

Test No. 885-2 Client ESA Investigator

WEIGHING DATA SHEET

See page _____ for information on drying times and temperatures, standard weights,etc.

Bkr. #	Pan #	Tare wt. (mg)	Total wt. (mg) 1	Total wt. (mg) 2	no. weighed	put into pans-initials	Ash weight (mg)	
77	77	96.45	111.30	111.26	7		101.34	
78	78	91.14	113.53	113.48	9		100.81	
79	79	98.80	120.63	120.56	10		107.65	
80	80	97.46	111.50	111.46	7		102.76	

RAW DATA DIVIDER PAGE
Test No. 885-2

TEST DATA ANALYSIS RECORDS

Test Number: 885-2

Freshwater Sediment Test
20-Day Chironomus dilutus

data entry verified against laboratory bench sheets 10/3/13 JTF

Endpoints Data Entry and Calculations File

BKR=beaker number
INIT=initial number
SURV=number survivors
MORT=number dead=INIT-SURV
PSURV=%survival=100(SURV/INIT)
PMORT=%mortality=100(MORT/INIT)

TARE WT= ashed weight of pan used for that replicate at test termination (mg), or dry weight of pan if ash-free dry weight is not an endpoint
WT COUNT= number of test organisms weighed at test end
DRY WT= TARE WT + dry weight of test organisms recovered at test termination (mg)
TWT=total biomass=DRY WT-TARE WT
WT=average individual biomass=TWT/WT COUNT

ASHED DRY WT= weight of ashed pan + weight of ashed test organisms recovered at test termination
TAFDW=DRY WT - ASHED DRY WT= total ash-free organism weight for given replicate
AFDW=average individual ash-free biomass=TAFDW/WT COUNT

INDEX	BKR	NAS SMPL	CLIENT DESCRIP	REPL		INIT	SURV	MORT	PSURV	PMORT	TARE WT (mg)	WT COUNT	DRY WT (mg)	ASHED DRY WT (mg)	TWT (mg)	WT (mg)	TAFDW (mg)	AFDW (mg)		SURV	MORT	PSURV	PMORT	WT	AFDW
1	71	5989G	Control	1		10	10	0	100.0	0.0	101.25	10	121.05	106.94	19.80	1.98	14.11	1.41							
2	9	5989G	Control	2		10	10	0	100.0	0.0	95.87	10	117.71	102.36	21.84	2.18	15.35	1.54							
3	2	5989G	Control	3		10	10	0	100.0	0.0	97.85	8	117.21	102.22	19.36	2.42	14.99	1.87							
4	20	5989G	Control	4		10	10	0	100.0	0.0	96.20	9	117.14	101.81	20.94	2.33	15.33	1.70							
5	63	5989G	Control	5		10	9	1	90.0	10.0	96.57	9	117.52	102.30	20.95	2.33	15.22	1.69	Mean	9.8	0.3	97.5	2.5	2.21	1.63
6	39	5989G	Control	6		10	10	0	100.0	0.0	91.92	10	113.29	97.75	21.37	2.14	15.54	1.55	SD	0.5	0.5	4.6	4.6	0.19	0.16
7	38	5989G	Control	7		10	10	0	100.0	0.0	92.66	8	110.04	98.48	17.38	1.93	13.56	1.51	n	8	8	8	8	8	8
8	49	5989G	Control	8	wq replicate	10	9	1	90.0	10.0	96.05	8	115.31	100.99	19.26	2.41	14.33	1.79							
9	40	5991G	OF2-1	1		10	7	3	70.0	30.0	96.14	8	111.90	102.08	15.76	2.63	9.82	1.64							
10	78	5991G	OF2-1	2		10	8	2	80.0	20.0	97.06	8	115.73	105.00	18.67	2.33	10.73	1.34							
11	24	5991G	OF2-1	3		10	7	3	70.0	30.0	91.89	4	104.91	97.13	13.02	3.26	7.76	1.95							
12	32	5991G	OF2-1	4		10	10	0	100.0	0.0	93.18	10	113.32	100.76	20.14	2.01	12.56	1.26							
13	57	5991G	OF2-1	5		10	10	0	100.0	0.0	101.85	9	124.02	111.38	22.17	2.46	12.64	1.40	Mean	8.6	1.4	86.3	13.8	2.54	1.51
14	79	5991G	OF2-1	6		10	10	0	100.0	0.0	98.60	10	120.56	107.85	21.76	2.18	12.91	1.29	SD	1.3	1.3	13.0	13.0	0.47	0.28
15	18	5991G	OF2-1	7		10	9	1	90.0	10.0	96.29	9	116.40	104.61	20.11	2.23	11.79	1.31	n	8	8	8	8	8	8
16	29	5991G	OF2-1	8	wq replicate	10	8	2	80.0	20.0	98.08	7	120.76	107.43	22.68	3.24	13.33	1.90							
17	8	5992G	OF2-2	1		10	10	0	100.0	0.0	97.24	10	117.86	105.71	20.62	2.06	12.15	1.22							
18	12	5992G	OF2-2	2		10	9	1	90.0	10.0	93.78	6	104.45	96.91	10.67	1.78	7.54	1.26							
19	23	5992G	OF2-2	3		10	8	2	80.0	20.0	95.15	8	117.55	104.77	22.40	2.80	12.78	1.60							
20	46	5992G	OF2-2	4		10	8	2	80.0	20.0	90.54	6	103.93	95.48	13.39	2.23	8.45	1.41							
21	33	5992G	OF2-2	5		10	10	0	100.0	0.0	100.40	9	120.14	108.84	19.74	2.19	11.30	1.26	Mean	9.1	0.9	91.3	8.8	2.24	1.35
22	69	5992G	OF2-2	6		10	10	0	100.0	0.0	89.44	10	109.31	98.26	19.87	1.99	11.05	1.11	SD	0.8	0.8	8.3	8.3	0.32	0.16
23	37	5992G	OF2-2	7		10	9	1	90.0	10.0	85.10	5	107.73	100.37	12.63	2.53	7.36	1.47	n	8	8	8	8	8	8
24	66	5992G	OF2-2	8	wq replicate	10	9	1	90.0	10.0	95.20	4	104.48	98.62	9.28	2.32	5.86	1.47							
25	14	5993G	OF2-3	1		10	10	0	100.0	0.0	90.04	8	107.60	98.22	17.56	2.20	11.38	1.42							
26	67	5993G	OF2-3*	2																					
27	54	5993G	OF2-3	3		10	10	0	100.0	0.0	105.45	10	124.96	112.74	19.51	1.95	12.22	1.22							
28	77	5993G	OF2-3	4		10	8	2	80.0	20.0	96.45	7	111.26	101.34	14.81	2.12	8.92	1.42							
29	3	5993G	OF2-3	5		10	9	1	90.0	10.0	95.97	9	116.41	104.47	20.44	2.27	11.94	1.33	Mean	9.3	0.7	92.9	7.1	2.14	1.32
30	72	5993G	OF2-3	6		10	10	0	100.0	0.0	90.79	8	108.82	98.42	18.03	2.00	10.40	1.16	SD	0.8	0.8	7.8	7.8	0.17	0.11
31	17	5993G	OF2-3	7		10	9	1	90.0	10.0	84.87	9	106.55	93.58	21.68	2.41	12.97	1.44	n	7	7	7	7	7	7
32	80	5993G	OF2-3	8	wq replicate	10	9	1	90.0	10.0	97.46	7	111.46	102.78	14.00	2.00	8.70	1.24							
33	42	5994G	OF1-1	1		10	7	3	70.0	30.0	97.02	7	114.34	103.96	17.32	2.47	10.38	1.48							
34	48	5994G	OF1-1	2		10	7	3	70.0	30.0	94.02	4	102.21	96.12	8.19	2.05	6.09	1.52							
35	22	5994G	OF1-1	3		10	9	1	90.0	10.0	91.84	9	107.02	95.77	15.38	1.71	11.25	1.25							
36	11	5994G	OF1-1	4		10	10	0	100.0	0.0	92.09	10	110.63	98.62	18.54	1.85	12.01	1.20							
37	52	5994G	OF1-1	5		10	8	2	80.0	20.0	90.67	5	100.35	93.39	9.68	1.94	6.96	1.39	Mean	8.5	1.5	85.0	15.0	1.92	1.35
38	50	5994G	OF1-1	6		10	7	3	70.0	30.0	105.84	7	119.20	108.72	13.36	1.91	10.48	1.50	SD	1.4	1.4	14.1	14.1	0.26	0.14
39	44	5994G	OF1-1	7		10	10	0	100.0	0.0	93.56	10	111.16	99.10	17.60	1.76	12.06	1.21	n	8	8	8	8	8	8
40	53	5994G	OF1-1	8	wq replicate	10	10	0	100.0	0.0	84.76	10	111.28	99.05	16.52	1.65	12.23	1.22							
41	74	5995G	OF1-2	1		10	8	2	80.0	20.0	88.51	7	101.14	91.45	12.63	1.80	9.69	1.38							
42	16	5995G	OF1-2	2		10	10	0	100.0	0.0	92.32	10	108.85	97.68	16.53	1.65	11.17	1.12							
43	55	5995G	OF1-2	3		10	8	2	80.0	20.0	89.70	7	102.30	92.41	12.60	1.80	9.89	1.41							
44	34	5995G	OF1-2	4		10	10	0	100.0	0.0	99.33	10	114.97	103.92	15.64	1.56	11.05	1.11							
45	43	5995G	OF1-2	5		10	9	1	90.0	10.0	92.34	9	108.12	97.39	15.78	1.75	10.73	1.19	Mean	8.9	1.1	88.8	11.3	1.72	1.24
46	13	5995G	OF1-2	6		10	10	0	100.0	0.0	103.08	9	119.81	108.72	16.73	1.86	11.09	1.23	SD	1.5	1.5	14.8	14.8	0.14	0.16
47	31	5995G	OF1-2	7		10	10	0	100.0	0.0	91.07	10	105.65	95.21	14.58	1.46	10.44	1.04	n	8	8	8	8	8	8
48	21	5995G	OF1-2	8	wq replicate	10	6	4	60.0	40.0	95.11	8	108.11	97.36	11.00	1.63	8.75	1.46							

PAGE 20 OF 48

Test Number: 885-2

Freshwater Sediment Test
20-Day Chironomus dilutus

INDEX	BKR	NAS SMPL	CLIENT DESCRIP	REPL		INIT	SURV	MORT	PSURV	PMORT	TARE WT (mg)	WT COUNT	DRY WT (mg)	ASHED DRY WT (mg)	TWT (mg)	WT (mg)	TAFDW (mg)	AFDW (mg)		SURV	MORT	PSURV	PMORT	WT	AFDW
49	25	5996G	OF1-3	1		10	9	1	90.0	10.0	85.76	8	101.24	90.85	15.48	1.94	10.39	1.30							
50	62	5996G	OF1-3	2		10	10	0	100.0	0.0	96.35	9	114.59	102.93	18.24	2.03	11.68	1.30							
51	41	5996G	OF1-3	3		10	9	1	90.0	10.0	87.23	7	101.03	92.34	13.80	1.97	8.69	1.24							
52	75	5996G	OF1-3	4		10	10	0	100.0	0.0	98.86	10	114.72	103.57	16.06	1.61	11.15	1.12							
53	1	5996G	OF1-3	5		10	10	0	100.0	0.0	103.44	10	124.46	113.91	21.02	2.10	10.55	1.06	Mean	9.5	0.5	95.0	5.0	1.85	1.17
54	26	5996G	OF1-3	6		10	8	2	80.0	20.0	98.76	8	115.20	104.90	16.44	2.06	10.30	1.29	SD	0.8	0.8	7.6	7.6	0.24	0.12
55	61	5996G	OF1-3	7		10	10	0	100.0	0.0	94.80	10	111.34	100.58	16.44	1.64	10.76	1.08	n	8	8	8	8	8	8
56	4	5996G	OF1-3	8	wq replicate	10	10	0	100.0	0.0	101.20	10	115.74	105.53	14.54	1.45	10.21	1.02							
57	64	5997G	OF2-4	1		10	9	1	90.0	10.0	93.17	8	111.75	100.28	18.58	2.32	11.47	1.43							
58	68	5997G	OF2-4	2		10	9	1	90.0	10.0	101.57	9	121.22	107.71	19.65	2.18	13.51	1.50							
59	70	5997G	OF2-4	3		10	10	0	100.0	0.0	96.83	7	111.56	102.21	14.93	2.13	9.35	1.34							
60	80	5997G	OF2-4	4		10	8	2	80.0	20.0	89.51	5	99.69	92.49	10.18	2.04	7.20	1.44							
61	73	5997G	OF2-4	5		10	9	1	90.0	10.0	96.90	8	114.56	103.42	17.66	2.21	11.14	1.39	Mean	9.1	0.9	91.3	8.8	2.32	1.49
62	38	5997G	OF2-4	6		10	10	0	100.0	0.0	90.59	9	113.87	99.23	23.28	2.59	14.64	1.63	SD	0.8	0.8	8.4	8.4	0.22	0.14
63	10	5997G	OF2-4	7		10	9	1	90.0	10.0	95.33	9	116.90	103.18	23.57	2.82	15.72	1.75	n	8	8	8	8	8	8
64	78	5997G	OF2-4	8	wq replicate	10	9	1	90.0	10.0	91.14	9	113.48	100.81	22.34	2.48	12.87	1.41							
65	47	5998G	OF2-5	1		10	9	1	90.0	10.0	93.77	7	111.85	100.84	18.08	2.58	11.01	1.57							
66	27	5998G	OF2-5	2		10	7	3	70.0	30.0	98.43	8	113.94	104.37	15.51	2.59	9.57	1.60							
67	56	5998G	OF2-5	3		10	10	0	100.0	0.0	92.74	9	110.64	99.23	17.90	1.99	11.41	1.27							
68	45	5998G	OF2-5	4		10	7	3	70.0	30.0	93.86	7	112.58	100.25	18.62	2.66	12.33	1.76							
69	51	5998G	OF2-5	5		10	10	0	100.0	0.0	94.48	8	111.28	101.35	16.80	2.10	9.93	1.24	Mean	8.8	1.3	87.5	12.5	2.26	1.43
70	28	5998G	OF2-5	6		10	10	0	100.0	0.0	94.79	10	114.92	102.31	20.13	2.01	12.61	1.26	SD	1.3	1.3	12.8	12.8	0.31	0.20
71	5	5998G	OF2-5	7		10	9	1	90.0	10.0	93.44	6	104.78	97.11	11.34	1.89	7.87	1.28	n	8	8	8	8	8	8
72	65	5998G	OF2-5	8	wq replicate	10	8	2	80.0	20.0	87.79	8	107.29	95.55	19.50	2.44	11.74	1.47							
73	7	5999G	OF1-4	1		10	9	1	90.0	10.0	93.55	7	106.99	97.73	13.44	1.92	9.26	1.32							
74	19	5999G	OF1-4	2		10	9	1	90.0	10.0	97.59	7	110.95	102.26	13.36	1.91	8.69	1.24							
75	15	5999G	OF1-4	3		10	10	0	100.0	0.0	94.56	10	114.15	100.81	19.59	1.96	13.34	1.33							
76	35	5999G	OF1-4	4		10	9	1	90.0	10.0	101.76	9	122.09	109.99	20.33	2.26	12.10	1.34							
77	8	5999G	OF1-4	5		10	6	4	60.0	40.0	95.77	6	111.37	100.67	15.6	2.60	10.70	1.78	Mean	8.8	1.3	87.5	12.5	1.97	1.32
78	59	5999G	OF1-4	6		10	9	1	90.0	10.0	95.96	9	113.28	102.38	17.32	1.92	10.90	1.21	SD	1.2	1.2	11.6	11.6	0.34	0.20
79	30	5999G	OF1-4	7		10	9	1	90.0	10.0	91.73	7	101.73	94.08	10	1.43	7.87	1.10	n	8	8	8	8	8	8
80	58	5999G	OF1-4	8	wq replicate	10	9	1	90.0	10.0	93.06	9	109.13	97.99	16.07	1.79	11.14	1.24							

*Animals inadvertently not added to beaker on day 0

PAGE 21 OF 49

Project Name: P885-2 Chironomus % Mortality

Sample:	x1
Samp ID:	OF2-1
Alias:	NAS #5991G
Replicates:	8
Mean:	13.75
SD:	13.025
Tr Mean:	13.75
Trans SD:	13.025

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	2.5
SD:	4.629
Tr Mean:	2.5
Trans SD:	4.629

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	8.39
SS:	1337.5
K:	8
b:	34.722
Alpha Level:	0.05
Calculated Value:	0.9014
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	11.25
Test Residual SD:	5
Ref. Residual Mean:	3.75
Ref. Residual SD:	2.315
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	3.8501
Critical Value:	>= 1.761
Variances Homogeneous:	No

Test Results:

Statistic:	Approximate t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Degrees of Freedom:	9
Experimental Alpha Level:	0.05
Calculated Value:	2.302
Critical Value:	>= 1.833
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	30	30	0	0	16.25	2.5			-13.75
2	20	20	0	0	6.25	2.5			-13.75
3	30	30	0	0	16.25	2.5			-13.75
4	0	0	0	0	13.75	2.5			-3.75
5	0	0	10	10	13.75	7.5			-2.5
6	0	0	0	0	13.75	2.5			-2.5
7	10	10	0	0	3.75	2.5			-2.5
8	20	20	10	10	6.25	7.5			-2.5
9									-2.5
10									-2.5
11									6.25
12									6.25
13									7.5
14									7.5
15									16.25
16									16.25

The percent mortality in OF2-1 was significantly higher than that of the Control at α=0.05. -631

Project Name: P885-2 Chironomus % Mortality

Sample:	x1
Samp ID:	OF2-2
Alias:	NAS #5992G
Replicates:	8
Mean:	8.75
SD:	8.345
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	2.5
SD:	4.629
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	8.799
SS:	1470.95
K:	8
b:	35.855
Alpha Level:	0.05
Calculated Value:	0.874
Critical Value:	<= 0.887
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	10.166
Test Residual SD:	4.382
Ref. Residual Mean:	6.913
Ref. Residual SD:	4.267
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	1.5041
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	8
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	46
Critical Value:	>= 49.000
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	5	0	5	13.554	4.609	5		-13.554
2	10	12	0	5	4.881	4.609	5		-13.554
3	20	15.5	0	5	13.011	4.609	5		-13.554
4	20	15.5	0	5	13.011	4.609	5		-4.609
5	0	5	10	12	13.554	13.826	5		-4.609
6	0	5	0	5	13.554	4.609	5		-4.609
7	10	12	0	5	4.881	4.609	5		-4.609
8	10	12	10	12	4.881	13.826	5		-4.609
9							5		-4.609
10							12		4.881
11							12		4.881
12							12		4.881
13							12		13.011
14							12		13.011
15							15.5		13.826
16							15.5		13.826

The percent mortality in OF2-2 was not significantly higher than that of the Control at α=0.05. -GJL

Project Name: P885-2 Chironomus % Mortality

Sample:	x1
Samp ID:	OF2-3
Alias:	NAS #5993G
Replicates:	7
Mean:	7.143
SD:	7.559
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	2.5
SD:	4.629
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	8.2
SS:	1277.489
K:	7
b:	33.151
Alpha Level:	0.05
Calculated Value:	0.8603
Critical Value:	<= 0.881
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	10.025
Test Residual SD:	3.272
Ref. Residual Mean:	6.913
Ref. Residual SD:	4.267
Deg. of Freedom:	13
Alpha Level:	0.1
Calculated Value:	1.5658
Critical Value:	>= 1.771
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	7
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	38
Critical Value:	>= 43.000
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	5	0	5	11.696	4.609	5		-11.696
2	0	5	0	5	11.696	4.609	5		-11.696
3	20	15	0	5	14.869	4.609	5		-11.696
4	10	12	0	5	6.739	4.609	5		-4.609
5	0	5	10	12	11.696	13.826	5		-4.609
6	10	12	0	5	6.739	4.609	5		-4.609
7	10	12	0	5	6.739	4.609	5		-4.609
8			10	12		13.826	5		-4.609
9							5		-4.609
10							12		6.739
11							12		6.739
12							12		6.739
13							12		13.826
14							12		13.826
15							15		14.869

The percent mortality in OF2-3 was not significantly higher than that of the Control at α=0.05. -631

Project Name: P885-2 Chironomus % Mortality

Sample:	x1
Samp ID:	OF1-1
Alias:	NAS #5994G
Replicates:	8
Mean:	15
SD:	14.142
Tr Mean:	15
Trans SD:	14.142

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	2.5
SD:	4.629
Tr Mean:	2.5
Trans SD:	4.629

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	9.032
SS:	1550
K:	8
b:	37.226
Alpha Level:	0.05
Calculated Value:	0.894
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	12.5
Test Residual SD:	4.629
Ref. Residual Mean:	3.75
Ref. Residual SD:	2.315
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	4.7819
Critical Value:	>= 1.761
Variances Homogeneous:	No

Test Results:

Statistic:	Approximate t
Balanced Design:	Yes
Transformation:	No Transformation
Experimental Hypothesis	
Null:	x1 <= x2
Alternate:	x1 > x2
Degrees of Freedom:	8
Experimental Alpha Level:	0.05
Calculated Value:	2.376
Critical Value:	>= 1.860
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	30	30	0	0	15	2.5			-15
2	30	30	0	0	15	2.5			-15
3	10	10	0	0	5	2.5			-15
4	0	0	0	0	15	2.5			-5
5	20	20	10	10	5	7.5			-2.5
6	30	30	0	0	15	2.5			-2.5
7	0	0	0	0	15	2.5			-2.5
8	0	0	10	10	15	7.5			-2.5
9									-2.5
10									-2.5
11									5
12									7.5
13									7.5
14									15
15									15
16									15

The percent mortality in OF1-1 was significantly higher than that of the Control at α=0.05. -631

Project Name: P885-2 Chironomus % Mortality

Sample:	x1
Samp ID:	OF1-2
Alias:	NAS #5995G
Replicates:	8
Mean:	11.25
SD:	14.577
Tr Mean:	0.289
Trans SD:	0.979

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	2.5
SD:	4.629
Tr Mean:	-0.289
Trans SD:	0.534

Shapiro-Wilk Results:

Residual Mean:	
Residual SD:	
SS:	
K:	
b:	
Alpha Level:	N/A
Calculated Value:	N/A
Critical Value:	N/A
Normally Distributed:	N/A
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	0.866
Test Residual SD:	0.318
Ref. Residual Mean:	0.433
Ref. Residual SD:	0.267
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	2.9498
Critical Value:	>= 1.761
Variances Homogeneous:	No

Test Results:

Statistic:	Approximate t
Balanced Design:	Yes
Transformation:	Rankits

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Degrees of Freedom:	11
Experimental Alpha Level:	0.05
Calculated Value:	1.4648
Critical Value:	>= 1.796
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	20	1.138	0	-0.577	0.849	0.288		-0.577	
2	0	-0.577	0	-0.577	0.866	0.288		-0.577	
3	20	1.138	0	-0.577	0.849	0.288		-0.577	
4	0	-0.577	0	-0.577	0.866	0.288		-0.577	
5	10	0.576	10	0.576	0.288	0.865		-0.577	
6	0	-0.577	0	-0.577	0.866	0.288		-0.577	
7	0	-0.577	0	-0.577	0.866	0.288		-0.577	
8	40	1.766	10	0.576	1.477	0.865		-0.577	
9								-0.577	
10								-0.577	
11								0.576	
12								0.576	
13								0.576	
14								1.138	
15								1.138	
16								1.766	

The percent mortality in OF1-2 was not significantly higher than that of the Control at α=0.05. —631

Project Name: P885-2 Chironomus % Mortality

Sample:	x1
Samp ID:	OF1-3
Alias:	NAS #5996G
Replicates:	8
Mean:	5
SD:	7.559
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	2.5
SD:	4.629
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	8.56
SS:	1392.169
K:	8
b:	32.316
Alpha Level:	0.05
Calculated Value:	0.7501
Critical Value:	<= 0.887
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	9.912
Test Residual SD:	3.712
Ref. Residual Mean:	6.913
Ref. Residual SD:	4.267
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	1.4996
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	8
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	37
Critical Value:	>= 49.000
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	10	13.5	0	6	10.506	4.609	6		-7.929
2	0	6	0	6	7.929	4.609	6		-7.929
3	10	13.5	0	6	10.506	4.609	6		-7.929
4	0	6	0	6	7.929	4.609	6		-7.929
5	0	6	10	13.5	7.929	13.826	6		-7.929
6	20	16	0	6	18.636	4.609	6		-4.609
7	0	6	0	6	7.929	4.609	6		-4.609
8	0	6	10	13.5	7.929	13.826	6		-4.609
9							6		-4.609
10							6		-4.609
11							6		-4.609
12							13.5		10.506
13							13.5		10.506
14							13.5		13.826
15							13.5		13.826
16							16		18.636

The percent mortality in OF1-3 was not significantly higher than that of the Control at α=0.05. -631

Project Name: P885-2 Chironomus % Mortality

Sample:	x1
Samp ID:	OF2-4
Alias:	NAS #5997G
Replicates:	8
Mean:	8.75
SD:	6.409
Tr Mean:	14.842
Trans SD:	9.581

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	2.5
SD:	4.629
Tr Mean:	4.609
Trans SD:	8.534

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	7.788
SS:	1152.317
K:	8
b:	32.292
Alpha Level:	0.05
Calculated Value:	0.9049
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	7.421
Test Residual SD:	5.371
Ref. Residual Mean:	6.913
Ref. Residual SD:	4.267
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.2095
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	ArcSin

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Degrees of Freedom:	14
Experimental Alpha Level:	0.05
Calculated Value:	2.256
Critical Value:	>= 1.761
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	10	18.435	0	0	3.592	4.609			-14.842
2	10	18.435	0	0	3.592	4.609			-14.842
3	0	0	0	0	14.842	4.609			-4.609
4	20	26.565	0	0	11.723	4.609			-4.609
5	10	18.435	10	18.435	3.592	13.826			-4.609
6	0	0	0	0	14.842	4.609			-4.609
7	10	18.435	0	0	3.592	4.609			-4.609
8	10	18.435	10	18.435	3.592	13.826			-4.609
9									3.592
10									3.592
11									3.592
12									3.592
13									3.592
14									11.723
15									13.826
16									13.826

The percent mortality in OF2-4 was significantly higher than that of the Control at α=0.05. -CJ1

Project Name: P885-2 Chironomus % Mortality

Sample:	x1
Samp ID:	OF2-5
Alias:	NAS #5998G
Replicates:	8
Mean:	12.5
SD:	12.817
Tr Mean:	16.232
Trans SD:	14.558

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	2.5
SD:	4.629
Tr Mean:	4.609
Trans SD:	8.534

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	10.242
SS:	1993.249
K:	8
b:	42.121
Alpha Level:	0.05
Calculated Value:	0.8901
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	12.174
Test Residual SD:	6.523
Ref. Residual Mean:	6.913
Ref. Residual SD:	4.267
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	1.9091
Critical Value:	>= 1.761
Variances Homogeneous:	No

Test Results:

Statistic:	Approximate t
Balanced Design:	Yes
Transformation:	ArcSin

Experimental Hypothesis

Null:	x1 <= x2
Alternate:	x1 > x2
Degrees of Freedom:	11
Experimental Alpha Level:	0.05
Calculated Value:	1.9483
Critical Value:	>= 1.796
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	10	18.435	0	0	2.203	4.609			-16.232
2	30	33.211	0	0	16.979	4.609			-16.232
3	0	0	0	0	16.232	4.609			-16.232
4	30	33.211	0	0	16.979	4.609			-4.609
5	0	0	10	18.435	16.232	13.826			-4.609
6	0	0	0	0	16.232	4.609			-4.609
7	10	18.435	0	0	2.203	4.609			-4.609
8	20	26.565	10	18.435	10.333	13.826			-4.609
9									-4.609
10									2.203
11									2.203
12									10.333
13									13.826
14									13.826
15									16.979
16									16.979

The percent mortality in OF2-5 was significantly higher than that of the Control at α=0.05. −6.51

Project Name: P885-2 Chironomus % Mortality

Sample:	x1
Samp ID:	OF1-4
Alias:	NAS #5999G
Replicates:	8
Mean:	12.5
SD:	11.65
Tr Mean:	N/A
Trans SD:	N/A

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	2.5
SD:	4.629
Tr Mean:	N/A
Trans SD:	N/A

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	8.212
SS:	1281.419
K:	8
b:	32.698
Alpha Level:	0.05
Calculated Value:	0.8343
Critical Value:	<= 0.887
Normally Distributed:	No
Override Option:	Not Invoked

Levene's Results:

Test Residual Mean:	5.125
Test Residual SD:	8.956
Ref. Residual Mean:	6.913
Ref. Residual SD:	4.267
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.5097
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Mann-Whitney
Balanced Design:	Yes
Transformation:	rank-order
Experimental Hypothesis	
Null:	x1 <= x2
Alternate:	x1 > x2
Mann-Whitney N1:	8
Mann-Whitney N2:	8
Degrees of Freedom:	
Experimental Alpha Level:	0.05
Calculated Value:	53
Critical Value:	>= 49.000
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Ranks	Shipiro-Wilk Residuals
1	10	11.5	0	4	0.295	4.609	4		-18.73
2	10	11.5	0	4	0.295	4.609	4		-4.609
3	0	4	0	4	18.73	4.609	4		-4.609
4	10	11.5	0	4	0.295	4.609	4		-4.609
5	40	16	10	11.5	20.501	13.826	4		-4.609
6	10	11.5	0	4	0.295	4.609	4		-4.609
7	10	11.5	0	4	0.295	4.609	4		-4.609
8	10	11.5	10	11.5	0.295	13.826	11.5		-0.295
9							11.5		-0.295
10							11.5		-0.295
11							11.5		-0.295
12							11.5		-0.295
13							11.5		-0.295
14							11.5		13.826
15							11.5		13.826
16							16		20.501

The percent mortality in OF1-4 was significantly higher than that of the Control at α=0.05. -GSI

Project Name: P885-2 Chironomus Growth (AFDW)

Sample:	x1
Samp ID:	OF2-1
Alias:	NAS #5991G
Replicates:	8
Mean:	1.511
SD:	0.281
Tr Mean:	1.511
Trans SD:	0.281

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	1.633
SD:	0.155
Tr Mean:	1.633
Trans SD:	0.155

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.195
SS:	0.723
K:	8
b:	0.808
Alpha Level:	0.05
Calculated Value:	0.9022
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.239
Test Residual SD:	0.118
Ref. Residual Mean:	0.13
Ref. Residual SD:	0.069
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	2.2547
Critical Value:	>= 1.761
Variances Homogeneous:	No

Test Results:

Statistic:	Approximate t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	11
Experimental Alpha Level:	0.05
Calculated Value:	1.0668
Critical Value:	>= 1.796
Accept Null Hypothesis:	Yes
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	1.64	1.64	1.41	1.41	0.129	0.223			-0.251
2	1.34	1.34	1.54	1.54	0.171	0.093			-0.223
3	1.95	1.95	1.87	1.87	0.439	0.238			-0.221
4	1.26	1.26	1.7	1.7	0.251	0.067			-0.201
5	1.4	1.4	1.69	1.69	0.111	0.057			-0.171
6	1.29	1.29	1.55	1.55	0.221	0.083			-0.123
7	1.31	1.31	1.51	1.51	0.201	0.123			-0.111
8	1.9	1.9	1.79	1.79	0.389	0.158			-0.093
9									-0.083
10									0.057
11									0.067
12									0.129
13									0.158
14									0.238
15									0.389
16									0.439

Average individual ash-free dry weight in test sediment OF2-1 is not significantly less than that in the control sediment at α=0.05. -631

Project Name: P885-2 Chironomus Growth (AFDW)

Sample:	x1
Samp ID:	OF2-2
Alias:	NAS #5992G
Replicates:	8
Mean:	1.35
SD:	0.163
Tr Mean:	1.35
Trans SD:	0.163

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	1.633
SD:	0.155
Tr Mean:	1.633
Trans SD:	0.155

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.137
SS:	0.355
K:	8
b:	0.577
Alpha Level:	0.05
Calculated Value:	0.9384
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.138
Test Residual SD:	0.07
Ref. Residual Mean:	0.13
Ref. Residual SD:	0.069
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.2151
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	14
Experimental Alpha Level:	0.05
Calculated Value:	3.5504
Critical Value:	>= 1.761
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	1.22	1.22	1.41	1.41	0.13	0.223			-0.24
2	1.26	1.26	1.54	1.54	0.09	0.093			-0.223
3	1.6	1.6	1.87	1.87	0.25	0.238			-0.13
4	1.41	1.41	1.7	1.7	0.06	0.067			-0.123
5	1.26	1.26	1.69	1.69	0.09	0.057			-0.093
6	1.11	1.11	1.55	1.55	0.24	0.083			-0.09
7	1.47	1.47	1.51	1.51	0.12	0.123			-0.09
8	1.47	1.47	1.79	1.79	0.12	0.158			-0.083
9									0.057
10									0.06
11									0.067
12									0.12
13									0.12
14									0.158
15									0.238
16									0.25

Average individual ash-free dry weight in test sediment OF2-2 is significantly less than that in the control sediment at α=0.05. -6.1

Project Name: P885-2 Chironomus Growth (AFDW)

Sample:	x1
Samp ID:	OF2-3
Alias:	NAS #5993G
Replicates:	7
Mean:	1.319
SD:	0.113
Tr Mean:	1.319
Trans SD:	0.113

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	1.633
SD:	0.155
Tr Mean:	1.633
Trans SD:	0.155

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.114
SS:	0.245
K:	7
b:	0.485
Alpha Level:	0.05
Calculated Value:	0.959
Critical Value:	<= 0.881
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.096
Test Residual SD:	0.045
Ref. Residual Mean:	0.13
Ref. Residual SD:	0.069
Deg. of Freedom:	13
Alpha Level:	0.1
Calculated Value:	1.109
Critical Value:	>= 1.771
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	13
Experimental Alpha Level:	0.05
Calculated Value:	4.4145
Critical Value:	>= 1.771
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	1.42	1.42	1.41	1.41	0.101	0.223			-0.223
2	1.22	1.22	1.54	1.54	0.099	0.093			-0.159
3	1.42	1.42	1.87	1.87	0.101	0.238			-0.123
4	1.33	1.33	1.7	1.7	0.011	0.067			-0.099
5	1.16	1.16	1.69	1.69	0.159	0.057			-0.093
6	1.44	1.44	1.55	1.55	0.121	0.083			-0.083
7	1.24	1.24	1.51	1.51	0.079	0.123			-0.079
8			1.79	1.79		0.158			0.011
9									0.057
10									0.067
11									0.101
12									0.101
13									0.121
14									0.158
15									0.238

Average individual ash-free dry weight in test sediment OF2-3 is significantly less than that in the control sediment at α=0.05. – 631

Project Name: P885-2 Chironomus Growth (AFDW)

Sample:	x1
Samp ID:	OF1-1
Alias:	NAS #5994G
Replicates:	8
Mean:	1.346
SD:	0.141
Tr Mean:	1.346
Trans SD:	0.141

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	1.633
SD:	0.155
Tr Mean:	1.633
Trans SD:	0.155

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.127
SS:	0.308
K:	8
b:	0.531
Alpha Level:	0.05
Calculated Value:	0.9166
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.126
Test Residual SD:	0.04
Ref. Residual Mean:	0.13
Ref. Residual SD:	0.069
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.1323
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	14
Experimental Alpha Level:	0.05
Calculated Value:	3.8614
Critical Value:	>= 1.761
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	1.48	1.48	1.41	1.41	0.134	0.223			-0.223
2	1.52	1.52	1.54	1.54	0.174	0.093			-0.146
3	1.25	1.25	1.87	1.87	0.096	0.238			-0.136
4	1.2	1.2	1.7	1.7	0.146	0.067			-0.126
5	1.39	1.39	1.69	1.69	0.044	0.057			-0.123
6	1.5	1.5	1.55	1.55	0.154	0.083			-0.096
7	1.21	1.21	1.51	1.51	0.136	0.123			-0.093
8	1.22	1.22	1.79	1.79	0.126	0.158			-0.083
9									0.044
10									0.057
11									0.067
12									0.134
13									0.154
14									0.158
15									0.174
16									0.238

Average individual ash-free dry weight in test sediment OF1-1 is significantly less than that in the control sediment at α=0.05. -631

Project Name: P885-2 Chironomus Growth (AFDW)

Sample:	x1
Samp ID:	OF1-2
Alias:	NAS #5995G
Replicates:	8
Mean:	1.243
SD:	0.156
Tr Mean:	1.243
Trans SD:	0.156

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	1.633
SD:	0.155
Tr Mean:	1.633
Trans SD:	0.155

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.134
SS:	0.34
K:	8
b:	0.563
Alpha Level:	0.05
Calculated Value:	0.9346
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.131
Test Residual SD:	0.07
Ref. Residual Mean:	0.13
Ref. Residual SD:	0.069
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.0179
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	14
Experimental Alpha Level:	0.05
Calculated Value:	5.0074
Critical Value:	>= 1.761
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	1.38	1.38	1.41	1.41	0.138	0.223			-0.223
2	1.12	1.12	1.54	1.54	0.123	0.093			-0.203
3	1.41	1.41	1.87	1.87	0.168	0.238			-0.133
4	1.11	1.11	1.7	1.7	0.133	0.067			-0.123
5	1.19	1.19	1.69	1.69	0.053	0.057			-0.123
6	1.23	1.23	1.55	1.55	0.013	0.083			-0.093
7	1.04	1.04	1.51	1.51	0.203	0.123			-0.083
8	1.46	1.46	1.79	1.79	0.218	0.158			-0.053
9									-0.013
10									0.057
11									0.067
12									0.138
13									0.158
14									0.168
15									0.218
16									0.238

Average individual ash-free dry weight in test sediment OF1-2 is significantly less than that in the control sediment at α=0.05. ~631

Project Name: P885-2 Chironomus Growth (AFDW)

Sample:	x1
Samp ID:	OF1-3
Alias:	NAS #5996G
Replicates:	8
Mean:	1.176
SD:	0.118
Tr Mean:	1.176
Trans SD:	0.118

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	1.633
SD:	0.155
Tr Mean:	1.633
Trans SD:	0.155

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.119
SS:	0.267
K:	8
b:	0.502
Alpha Level:	0.05
Calculated Value:	0.9432
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.106
Test Residual SD:	0.033
Ref. Residual Mean:	0.13
Ref. Residual SD:	0.069
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.8732
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	14
Experimental Alpha Level:	0.05
Calculated Value:	6.6083
Critical Value:	>= 1.761
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	1.3	1.3	1.41	1.41	0.124	0.223			-0.223
2	1.3	1.3	1.54	1.54	0.124	0.093			-0.156
3	1.24	1.24	1.87	1.87	0.064	0.238			-0.123
4	1.12	1.12	1.7	1.7	0.056	0.067			-0.116
5	1.06	1.06	1.69	1.69	0.116	0.057			-0.096
6	1.29	1.29	1.55	1.55	0.114	0.083			-0.093
7	1.08	1.08	1.51	1.51	0.096	0.123			-0.083
8	1.02	1.02	1.79	1.79	0.156	0.158			-0.056
9									0.057
10									0.064
11									0.067
12									0.114
13									0.124
14									0.124
15									0.158
16									0.238

Average individual ash-free dry weight in test sediment OF1-3 is significantly less than that in the control sediment at α=0.05. −651

Project Name: P885-2 Chironomus Growth (AFDW)

Sample:	x1
Samp ID:	OF2-4
Alias:	NAS #5997G
Replicates:	8
Mean:	1.486
SD:	0.137
Tr Mean:	1.486
Trans SD:	0.137

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	1.633
SD:	0.155
Tr Mean:	1.633
Trans SD:	0.155

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.126
SS:	0.301
K:	8
b:	0.532
Alpha Level:	0.05
Calculated Value:	0.9398
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.105
Test Residual SD:	0.079
Ref. Residual Mean:	0.13
Ref. Residual SD:	0.069
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.6649
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	14
Experimental Alpha Level:	0.05
Calculated Value:	1.9944
Critical Value:	>= 1.761
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	1.43	1.43	1.41	1.41	0.056	0.223			-0.223
2	1.5	1.5	1.54	1.54	0.014	0.093			-0.146
3	1.34	1.34	1.87	1.87	0.146	0.238			-0.123
4	1.44	1.44	1.7	1.7	0.046	0.067			-0.096
5	1.39	1.39	1.69	1.69	0.096	0.057			-0.093
6	1.63	1.63	1.55	1.55	0.144	0.083			-0.083
7	1.75	1.75	1.51	1.51	0.264	0.123			-0.076
8	1.41	1.41	1.79	1.79	0.076	0.158			-0.056
9									-0.046
10									0.014
11									0.057
12									0.067
13									0.144
14									0.158
15									0.238
16									0.264

Average individual ash-free dry weight in test sediment OF2-4 is significantly less than that in the control sediment at α=0.05. −651

Project Name: P885-2 Chironomus Growth (AFDW)

Sample:	x1
Samp ID:	OF2-5
Alias:	NAS #5998G
Replicates:	8
Mean:	1.431
SD:	0.197
Tr Mean:	1.431
Trans SD:	0.197

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	1.633
SD:	0.155
Tr Mean:	1.633
Trans SD:	0.155

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.152
SS:	0.441
K:	8
b:	0.64
Alpha Level:	0.05
Calculated Value:	0.9276
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.169
Test Residual SD:	0.08
Ref. Residual Mean:	0.13
Ref. Residual SD:	0.069
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	1.0381
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	14
Experimental Alpha Level:	0.05
Calculated Value:	2.2677
Critical Value:	>= 1.761
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	1.57	1.57	1.41	1.41	0.139	0.223			-0.223
2	1.6	1.6	1.54	1.54	0.169	0.093			-0.191
3	1.27	1.27	1.87	1.87	0.161	0.238			-0.171
4	1.76	1.76	1.7	1.7	0.329	0.067			-0.161
5	1.24	1.24	1.69	1.69	0.191	0.057			-0.151
6	1.26	1.26	1.55	1.55	0.171	0.083			-0.123
7	1.28	1.28	1.51	1.51	0.151	0.123			-0.093
8	1.47	1.47	1.79	1.79	0.039	0.158			-0.083
9									0.039
10									0.057
11									0.067
12									0.139
13									0.158
14									0.169
15									0.238
16									0.329

Average individual ash-free dry weight in test sediment OF2-5 is significantly less than that in the control sediment at α=0.05. -631

Project Name: P885-2 Chironomus Growth (AFDW)

Sample:	x1
Samp ID:	OF1-4
Alias:	NAS #5999G
Replicates:	8
Mean:	1.32
SD:	0.202
Tr Mean:	1.32
Trans SD:	0.202

Ref Samp:	x2
Ref ID:	Control
Alias:	NAS#5989G
Replicates:	8
Mean:	1.633
SD:	0.155
Tr Mean:	1.633
Trans SD:	0.155

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.155
SS:	0.454
K:	8
b:	0.64
Alpha Level:	0.05
Calculated Value:	0.9001
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.123
Test Residual SD:	0.154
Ref. Residual Mean:	0.13
Ref. Residual SD:	0.069
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.1258
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	14
Experimental Alpha Level:	0.05
Calculated Value:	3.4694
Critical Value:	>= 1.761
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	1.32	1.32	1.41	1.41	0	0.223			-0.223
2	1.24	1.24	1.54	1.54	0.08	0.093			-0.22
3	1.33	1.33	1.87	1.87	0.01	0.238			-0.123
4	1.34	1.34	1.7	1.7	0.02	0.067			-0.11
5	1.78	1.78	1.69	1.69	0.46	0.057			-0.093
6	1.21	1.21	1.55	1.55	0.11	0.083			-0.083
7	1.1	1.1	1.51	1.51	0.22	0.123			-0.08
8	1.24	1.24	1.79	1.79	0.08	0.158			-0.08
9									0
10									0.01
11									0.02
12									0.057
13									0.067
14									0.158
15									0.238
16									0.46

Average individual ash-free dry weight in test sediment OF1-4 is significantly less than that in the control sediment at α=0.05. – 631

Test Number: 885-2

Freshwater Sediment Test
20-Day Chironomus dilutus

data entry verified against laboratory bench sheets 10.19.17 JDF

Water Quality Data

BKR	NAS SMPL	CLIENT DESCRIP	REPL	DAY	Overlying water TEMP	DO	COND	pH	NH3	HARD	ALK
4	5996G	OF1-3	8	0	22.4	8.2	113	7.4	<0.1	17	30
21	5995G	OF1-2	8	0	22.1	8.2	112	7.5	<0.1	17	30
29	5991G	OF2-1	8	0	22.4	8.2	118	7.2	<0.1	26	30
49	5989G	Control	8	0	22.2	7.6	134	7.1	<0.1	17	30
53	5994G	OF1-1	8	0	22.3	8.1	114	7.4	<0.1	26	30
58	5999G	OF1-4	8	0	22.2	8.2	112	7.3	<0.1	17	30
65	5998G	OF2-5	8	0	22.4	8.0	114	7.2	<0.1	17	30
66	5992G	OF2-2	8	0	22.8	8.0	118	7.2	<0.1	26	30
78	5997G	OF2-4	8	0	23.1	8.1	121	7.3	<0.1	17	30
80	5993G	OF2-3	8	0	23.2	7.8	119	7.3	<0.1	17	30
4	5996G	OF1-3	8	1	22.3						
21	5995G	OF1-2	8	1	22.0						
29	5991G	OF2-1	8	1	22.2						
49	5989G	Control	8	1	22.3						
53	5994G	OF1-1	8	1	22.6						
58	5999G	OF1-4	8	1	22.5						
65	5998G	OF2-5	8	1	22.6						
66	5992G	OF2-2	8	1	23.1						
78	5997G	OF2-4	8	1	23.4						
80	5993G	OF2-3	8	1	23.2						
4	5996G	OF1-3	8	2	22.1						
21	5995G	OF1-2	8	2	22.0						
29	5991G	OF2-1	8	2	22.3						
49	5989G	Control	8	2	22.2						
53	5994G	OF1-1	8	2	22.4						
58	5999G	OF1-4	8	2	22.3						
65	5998G	OF2-5	8	2	22.5						
66	5992G	OF2-2	8	2	22.8						
78	5997G	OF2-4	8	2	23.1						
80	5993G	OF2-3	8	2	22.9						
4	5996G	OF1-3	8	3	22.5	7.4		7.0			
21	5995G	OF1-2	8	3	22.3	7.3		7.1			
29	5991G	OF2-1	8	3	22.7	7.1		6.9			
49	5989G	Control	8	3	22.5	7.2		7.0			
53	5994G	OF1-1	8	3	22.7	7.2		7.1			
58	5999G	OF1-4	8	3	22.6	7.2		7.0			
65	5998G	OF2-5	8	3	22.8	7.1		7.0			
66	5992G	OF2-2	8	3	23.2	7.1		7.0			
78	5997G	OF2-4	8	3	23.6	7.2		7.1			
80	5993G	OF2-3	8	3	23.4	7.1		7.1			
4	5996G	OF1-3	8	4	22.8						
21	5995G	OF1-2	8	4	22.8						
29	5991G	OF2-1	8	4	23.1						
49	5989G	Control	8	4	22.9						
53	5994G	OF1-1	8	4	23.2						
58	5999G	OF1-4	8	4	23.0						
65	5998G	OF2-5	8	4	23.2						
66	5992G	OF2-2	8	4	23.6						
78	5997G	OF2-4	8	4	23.8						

Test Number: 885-2

Freshwater Sediment Test
20-Day Chironomus dilutus

80	5993G	OF2-3	8	4	23.7			
4	5996G	OF1-3	8	5	22.9	6.8	116	6.9
21	5995G	OF1-2	8	5	22.7	6.7	117	6.8
29	5991G	OF2-1	8	5	23.0	6.6	122	6.8
49	5989G	Control	8	5	22.9	6.7	123	6.9
53	5994G	OF1-1	8	5	23.1	6.6	118	6.9
58	5999G	OF1-4	8	5	23.0	6.4	117	6.8
65	5998G	OF2-5	8	5	23.2	6.4	121	6.9
66	5992G	OF2-2	8	5	23.6	6.1	125	7.0
78	5997G	OF2-4	8	5	23.8	6.4	121	7.0
80	5993G	OF2-3	8	5	23.6	6.5	123	7.0
4	5996G	OF1-3	8	6	22.8			
21	5995G	OF1-2	8	6	22.6			
29	5991G	OF2-1	8	6	22.9			
49	5989G	Control	8	6	22.8			
53	5994G	OF1-1	8	6	22.9			
58	5999G	OF1-4	8	6	22.9			
65	5998G	OF2-5	8	6	23.0			
66	5992G	OF2-2	8	6	23.3			
78	5997G	OF2-4	8	6	23.5			
80	5993G	OF2-3	8	6	23.4			
4	5996G	OF1-3	8	7	22.7	7.5		6.4
21	5995G	OF1-2	8	7	22.6	7.4		6.4
29	5991G	OF2-1	8	7	22.9	7.2		6.4
49	5989G	Control	8	7	22.8	7.1		6.5
53	5994G	OF1-1	8	7	23.0	7.2		6.4
58	5999G	OF1-4	8	7	22.9	6.9		6.4
65	5998G	OF2-5	8	7	23.1	7.0		6.4
66	5992G	OF2-2	8	7	23.3	7.1		6.3
78	5997G	OF2-4	8	7	23.6	7.1		6.4
80	5993G	OF2-3	8	7	23.5	7.2		6.4
4	5996G	OF1-3	8	8	22.8			
21	5995G	OF1-2	8	8	22.7			
29	5991G	OF2-1	8	8	22.9			
49	5989G	Control	8	8	22.8			
53	5994G	OF1-1	8	8	22.9			
58	5999G	OF1-4	8	8	22.9			
65	5998G	OF2-5	8	8	23.0			
66	5992G	OF2-2	8	8	23.4			
78	5997G	OF2-4	8	8	23.7			
80	5993G	OF2-3	8	8	23.4			
4	5996G	OF1-3	8	9	22.7			
21	5995G	OF1-2	8	9	22.6			
29	5991G	OF2-1	8	9	23.0			
49	5989G	Control	8	9	22.8			
53	5994G	OF1-1	8	9	23.0			
58	5999G	OF1-4	8	9	22.9			
65	5998G	OF2-5	8	9	23.1			
66	5992G	OF2-2	8	9	23.3			
78	5997G	OF2-4	8	9	23.6			
80	5993G	OF2-3	8	9	23.4			
4	5996G	OF1-3	8	10	22.5	7.2		7.3

Test Number: 885-2

Freshwater Sediment Test
20-Day Chironomus dilutus

21	5995G	OF1-2	8	10	22.3	7.1		7.2
29	5991G	OF2-1	8	10	22.6	6.6		7.1
49	5989G	Control	8	10	22.4	6.4		7.5
53	5994G	OF1-1	8	10	22.6	6.8		7.2
58	5999G	OF1-4	8	10	22.6	6.8		7.2
65	5998G	OF2-5	8	10	22.8	6.5		7.1
66	5992G	OF2-2	8	10	23.2	6.5		7.1
78	5997G	OF2-4	8	10	23.5	6.7		7.2
80	5993G	OF2-3	8	10	23.3	6.5		7.2
4	5996G	OF1-3	8	11	22.3			
21	5995G	OF1-2	8	11	22.0			
29	5991G	OF2-1	8	11	22.3			
49	5989G	Control	8	11	22.0			
53	5994G	OF1-1	8	11	22.3			
58	5999G	OF1-4	8	11	22.2			
65	5998G	OF2-5	8	11	22.4			
66	5992G	OF2-2	8	11	22.8			
78	5997G	OF2-4	8	11	23.3			
80	5993G	OF2-3	8	11	23.0			
4	5996G	OF1-3	8	12	22.0	7.6	110	7.1
21	5995G	OF1-2	8	12	22.0	7.4	109	7.0
29	5991G	OF2-1	8	12	22.1	7.3	112	7.0
49	5989G	Control	8	12	22.0	7.2	122	7.0
53	5994G	OF1-1	8	12	22.1	7.1	110	6.8
58	5999G	OF1-4	8	12	22.0	7.3	110	6.7
65	5998G	OF2-5	8	12	22.2	7.5	111	6.8
66	5992G	OF2-2	8	12	22.6	7.4	114	6.8
78	5997G	OF2-4	8	12	22.9	7.5	117	6.7
80	5993G	OF2-3	8	12	22.6	7.5	104	6.6
4	5996G	OF1-3	8	13	22.3			
21	5995G	OF1-2	8	13	22.1			
29	5991G	OF2-1	8	13	22.2			
49	5989G	Control	8	13	22.0			
53	5994G	OF1-1	8	13	22.2			
58	5999G	OF1-4	8	13	22.2			
65	5998G	OF2-5	8	13	22.4			
66	5992G	OF2-2	8	13	22.9			
78	5997G	OF2-4	8	13	23.2			
80	5993G	OF2-3	8	13	23.0			
4	5996G	OF1-3	8	14	22.5	7.3		6.8
21	5995G	OF1-2	8	14	22.1	7.2		6.7
29	5991G	OF2-1	8	14	22.2	7.2		6.7
49	5989G	Control	8	14	22.0	7.1		6.6
53	5994G	OF1-1	8	14	22.3	7.2		6.7
58	5999G	OF1-4	8	14	22.2	7.0		6.6
65	5998G	OF2-5	8	14	22.4	7.3		6.6
66	5992G	OF2-2	8	14	22.8	7.0		6.7
78	5997G	OF2-4	8	14	23.1	7.2		6.6
80	5993G	OF2-3	8	14	22.9	7.1		6.6
4	5996G	OF1-3	8	15	22.9			
21	5995G	OF1-2	8	15	22.6			
29	5991G	OF2-1	8	15	22.7			

Test Number: 885-2

Freshwater Sediment Test
20-Day Chironomus dilutus

49	5989G	Control	8	15	22.7							
53	5994G	OF1-1	8	15	22.9							
58	5999G	OF1-4	8	15	22.9							
65	5998G	OF2-5	8	15	23.0							
66	5992G	OF2-2	8	15	23.4							
78	5997G	OF2-4	8	15	23.8							
80	5993G	OF2-3	8	15	23.6							
4	5996G	OF1-3	8	16	22.2							
21	5995G	OF1-2	8	16	22.0							
29	5991G	OF2-1	8	16	22.3							
49	5989G	Control	8	16	22.0							
53	5994G	OF1-1	8	16	22.3							
58	5999G	OF1-4	8	16	22.2							
65	5998G	OF2-5	8	16	22.4							
66	5992G	OF2-2	8	16	22.9							
78	5997G	OF2-4	8	16	23.4							
80	5993G	OF2-3	8	16	23.0							
4	5996G	OF1-3	8	17	22.3	6.1		6.5				
21	5995G	OF1-2	8	17	22.0	6.3		6.6				
29	5991G	OF2-1	8	17	22.3	6.3		6.6				
49	5989G	Control	8	17	22.1	5.8		6.7				
53	5994G	OF1-1	8	17	22.3	5.9		6.6				
58	5999G	OF1-4	8	17	22.2	5.7		6.7				
65	5998G	OF2-5	8	17	22.4	5.0		6.6				
66	5992G	OF2-2	8	17	22.8	5.3		6.6				
78	5997G	OF2-4	8	17	23.3	4.8		6.7				
80	5993G	OF2-3	8	17	23.0	4.4		6.7				
4	5996G	OF1-3	8	18	22.1							
21	5995G	OF1-2	8	18	22.1							
29	5991G	OF2-1	8	18	22.3							
49	5989G	Control	8	18	22.0							
53	5994G	OF1-1	8	18	22.2							
58	5999G	OF1-4	8	18	22.2							
65	5998G	OF2-5	8	18	22.4							
66	5992G	OF2-2	8	18	22.8							
78	5997G	OF2-4	8	18	22.9							
80	5993G	OF2-3	8	18	22.8							
4	5996G	OF1-3	8	19	22.1	5.9	114	6.6				
21	5995G	OF1-2	8	19	22.0	5.7	114	6.6				
29	5991G	OF2-1	8	19	22.2	5.7	118	6.7				
49	5989G	Control	8	19	22.1	5.4	115	6.6				
53	5994G	OF1-1	8	19	22.2	5.6	113	6.6				
58	5999G	OF1-4	8	19	22.1	5.8	114	6.7				
65	5998G	OF2-5	8	19	22.3	5.3	114	6.6				
66	5992G	OF2-2	8	19	22.7	5.4	115	6.6				
78	5997G	OF2-4	8	19	23.1	6.2	116	6.8				
80	5993G	OF2-3	8	19	22.8	5.8	116	6.7				
4	5996G	OF1-3	8	20	22.4	6.2	110	7.2	<0.1	17	30	
21	5995G	OF1-2	8	20	22.0	5.6	109	6.9	<0.1	17	40	
29	5991G	OF2-1	8	20	22.3	5.7	112	7.0	<0.1	17	30	
49	5989G	Control	8	20	22.1	5.3	111	6.9	0.1	17	30	
53	5994G	OF1-1	8	20	22.4	5.5	111	6.9	<0.1	17	30	

Test Number: 885-2

Freshwater Sediment Test
20-Day Chironomus dilutus

58	5999G	OF1-4	8	20	22.3	5.7	111	7.0	0.2	17	30
65	5998G	OF2-5	8	20	22.5	5.4	110	6.9	<0.1	17	30
66	5992G	OF2-2	8	20	22.9	5.6	110	6.9	<0.1	17	30
78	5997G	OF2-4	8	20	23.3	6.1	115	7.2	<0.1	17	30
80	5993G	OF2-3	8	20	23.1	6.0	111	7.1	<0.1	17	40
				Mean	22.7	6.7	115	6.9	—	18	31
				SD	0.5	0.8	5	0.3	—	3	3
				n	210	100	50	100	20	20	20
				Min	22.0	4.4	104	6.3	<0.1	17	30
				Max	23.8	8.2	134	7.5	0.2	26	40

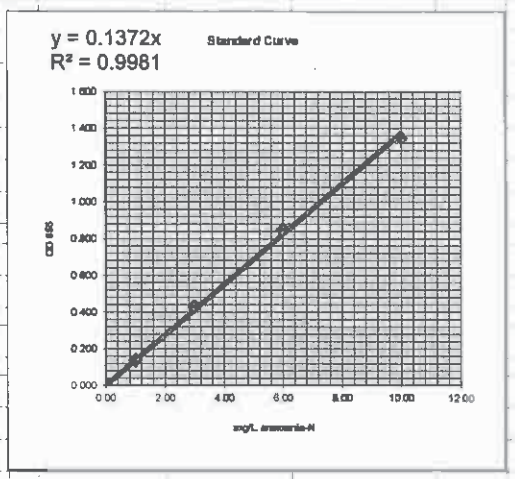
RAW DATA DIVIDER PAGE
Test No. 885-2

AMMONIA EXPOSURE BENCHSHEETS AND ANALYSIS

Total Ammonia-N in Sediment Pore Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD_{655}	NH_3-N (mg/L)	pH	Salinity (ppt)
	Blank	-----	-----	-----		
	1.0 mg/L NH_3-N Std.	----	0.139	1.00		
	3.0 mg/L NH_3-N Std.	-----	0.431	3.00		
	6.0 mg/L NH_3-N Std.	----	0.850	6.00		
	10.0 mg/L NH_3-N Std.	----	1.350	10.00		
	3.0 mg/L spike	----	0.433	3.15		
	3.0 mg/L spike dupl.	-----	0.435	3.17		
	5.0 mg/L 2nd source		0.620	4.52		
1	Day 0 (9-22-17)					
2	4	1	0.003	ND		
3	21	1	0.002	ND		
4	29	1	0.001	ND		
5	49	1	0.008	ND		
6	53	1	0.000	ND		
7	58	1	0.001	ND		
8	65	1	0.001	ND		
9	66	1	0.000	ND		
10	78	1	0.000	ND		
11	80	1	0.002	ND		
12						
13	Day 20 (10-12-17)					
14	4	1	0.002	ND		
15	21	1	0.002	ND		
16	29	1	0.000	ND		
17	49	1	0.018	0.13		
18	53	1	0.000	ND		
19	58	1	0.020	0.15		
20	65	1	0.000	ND		
21	66	1	0.000	ND		
22	78	1	0.000	ND		
23	80	1	0.000	ND		
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						



Reporting limit (mg/L) =	0.10
Recovery (%) =	105.4
Precision (RPD) =	-0.46
2nd source (%) =	90.3
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.: 885-2
Test Day: 0 & 20
Species: *Chironomus*

Sample Type (check)

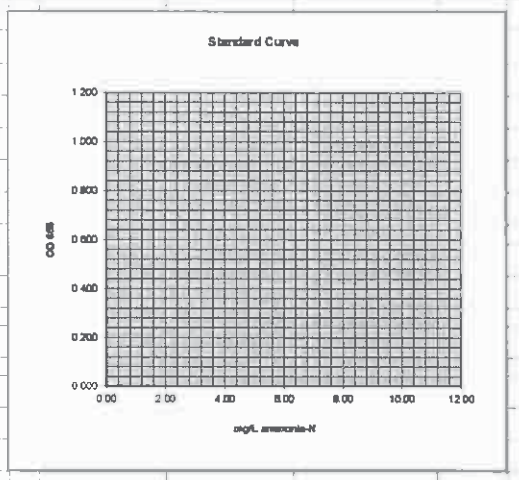
	Bulk Sediment Porewaters
	Test Beaker Porewaters
X	Overlying Water

Analyst: JB
Date analyzed: 10/13/2017

Total Ammonia-N in Sediment Pore Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH3-N (mg/L)	pH	Salinity (ppt)
	Blank	-----	----	----		
	1.0 mg/L NH3-N Std.	----	0.139	1.00		
	3.0 mg/L NH3-N Std.	-----	0.431	3.00		
	6.0 mg/L NH3-N Std.	----	0.850	6.00		
	10.0 mg/L NH3-N Std.	----	1.350	10.00		
	3.0 mg/L spike	----	0.433			
	3.0 mg/L spike dupl.	-----	0.435			
	5.0 mg/L 2nd source		0.620			
1	Day 0 (9-22-17)					
2	4	1	0.003			
3	21	1	0.002			
4	29	1	0.001			
5	49	1	0.008			
6	53	1	0.000			
7	58	1	0.001			
8	65	1	0.001			
9	66	1	0.000			
10	78	1	0.000			
11	80	1	0.002			
12						
13	Day 20 (10-12-17)					
14	4	1	0.002			
15	21	1	0.002			
16	29	1	0.000			
17	49	1	0.018			
18	53	1	0.000			
19	58	1	0.020			
20	65	1	0.000			
21	66	1	0.000			
22	78	1	0.000			
23	80	1	0.000			
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						



Reporting limit (mg/L) = 0.10

Recovery (%) = #VALUE!
Precision (RPD) = #VALUE!
2nd source (%) = #VALUE!

Sample volume (ml): 0.50
Dilution factor 1

Sample Set Description:
- Test No.: 885-2
- Test Day: 0 & 20
- Species: *Chironomus*

Sample Type (check)
- Bulk Sediment Porewaters
- Test Beaker Porewaters
- X Overlying Water

Analyst: JB
Date analyzed: 10/13/2017

RAW DATA DIVIDER PAGE
Test No. 885-2

CHAIN-OF-CUSTODY RECORDS

CHAIN OF CUSTODY RECORD

Northwestern Aquatic Sciences
3814 Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365
Tel: 541-265-7225, Fax: 541-265-2799, www.nwaquatic.com

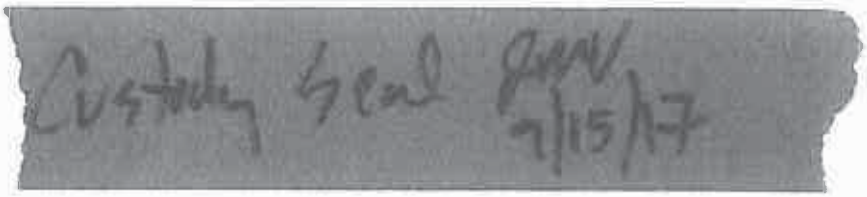
Client Name	Project No.	Shipping Information	Testing Required					
Environmental Science Associates (ESA)	D160430	Carrier:	H. azteca 10-day mortality	C. dilutus 20-day survival/growth				
Address: 5309 Shilshole Ave. NW, Suite 200	Phone No.: 206-204-6960	Airbill No.						
City, State, Zip code: Seattle, WA 98107	Report Attention: Jim Good							

Lab Sample No.	Date Sampled	Time Sampled	Sampled by: J. Vlastelicia, C. French Sample Description	Number of Containers	H. azteca 10-day mortality	C. dilutus 20-day survival/growth				Comments
59916	9/12/17	1345	Camas Slough Sediment; OF2-1	6	X	X				
59926	9/12/17	1530	Camas Slough Sediment; OF2-2	6	X	X				
59936	9/12/17	1700	Camas Slough Sediment; OF2-3	6	X	X				
59946	9/13/17	1300	Columbia River Sediment; OF1-1	6	X	X				
59956	9/13/17	1505	Columbia River Sediment; OF1-2	6	X	X				
59966	9/13/17	1825	Columbia River Sediment; OF1-3	6	X	X				only 5 Jars
59976	9/14/17	1129	Camas Slough Sediment; OF2-4	3	X	X				
59986	9/14/17	1330	Camas Slough Sediment; OF2-5	3	X	X				
59996	9/14/17	1655	Columbia River Sediment; OF1-4	3	X	X				

Signature	Print Name	Company	Date	Time	
Relinquished by	John Vlastelicia	ESA	9/15/17	1040	Custody Seal: (Present) / Not Present Cooler: (Intact) / Not Intact
Received by	Luke Johnson	NSA	9/15/17	1040	
Relinquished by	Luke Johnson	ESA	9/15/17	14:19	Internal Cooler Temperature Upon Lab Receipt (°C) All coolers 0.5°C.
Received by laboratory	Gary Buhler	NAS	9/15/17	14:19	

PAGE 47 OF 49

Custody Seal
9/15/17


Custody Seal
9/15/17

Custody Seal
9/15/17

Custody Seal
9/15/17

APPENDIX III

RAW DATA – REFERENCE TOXICANT TEST

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS- _____

ACUTE TOXICITY TEST (ALL SPECIES)

REVIEWED PAGES 1-7 -ESL

Test No. 999-3713 Client: QC Test Investigator _____

Test Type (rangefinding/definitive) Definitive Test Length (hr) 96

Species *Chironomus dilutus*

STUDY MANAGEMENT

Client: QC test

Client's Study Monitor: QC test

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. C.J. IRISSARRI 6SI

QA Officer L. K. Nemeth

1. Yves Katalayer 2. GA Ulster GB

3. _____ 4. _____

Study Schedule:

Test Beginning: 9-22-17 1520 Test Ending: 9-26-17 1330

TEST MATERIAL

Description: Potassium Chloride Crystals - Lot No.: 147960

NAS Sample No.				
Date of Collection:				
Date of Receipt:				
Temperature (deg C):				
Dissolved oxygen (mg/L):				
pH:				
Conductivity (umhos/cm):				
Hardness (mg/L):				
Alkalinity (mg/L):				
Salinity (ppt):				
Total chlorine (mg/L):				
Total ammonia-N (mg/L):				
_____:				

DILUTION WATER

Description: Moderately hard synthetic water

Date of Preparation/Collection: 9-14-17

Water Quality: Cond. (umhos/cm): 309 Salinity (ppt): _____ pH 8.0

Hardness (mg/L as $CaCO_3$): 94 Alkalinity (mg/L as $CaCO_3$): 70

Treatments: Aerated ≥ 24 hrs

TEST LOCATION

Test conducted in (circle one): (room 1) room 2 trailer water bath other: _____

Randomization chart:

Ø	10	5	10	2.5	2.5	5	10	2.5	1.25
5	2.5	2.5	1.25	5	10	10	5	10	10
2.5	Ø	10	Ø	1.25	Ø	0.63	Ø	0.63	2.5
1.25	5	0.63	2.5	Ø	1.25	2.5	1.25	1.25	5
0.63	0.63	Ø	0.63	0.63	0.63	1.25	0.63	5	Ø
10	1.25	1.25	5	10	5	Ø	2.5	Ø	0.63

Error codes: 1) Correction of handwriting error
2) Written in wrong location; entry deleted
3) Wrong date deleted; replaced with correct date
4) Error found in measurement; measurement repeated

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-3713 Client QC Test Investigator _____

TEST ORGANISMS

Species: *Chironomus dilutus* Age: 424 HRS Size: 1st instar

Source: ~~Aquatic BioSystems, FT. Collins, CO~~ NAS CULTURES

Acclimation Data:

Date	Temp. (deg.C)	pH	DO (mg/L)	Cond umhos/cm	Feeding amount	Feeding description	Water changes	Hardness (mg/L)	Alkalinity (mg/L)
9-20-17	22.7	7.5	8.5	135	NONE		—	26	40
9-21-17	19.0	7.8	8.7	180		"	—	—	—
9-22-17	21.9	7.5	8.4	171		"	—	34	40
Mean	21.2	7.6	8.5	162				30	40
S.D.	1.9	0.2	0.2	24				—	—
(N)	3	3	3	3				3	3

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test concentrations (50% series recommended): 10, 5, 2.5, 1.25, 0.63, 0 g/L

Test chamber: 30 ml plastic cups Test volume: 20 ml

Replicates/treatment: 10 Organisms/treatment: 10 (1/rep)

Test water changes: None Aeration during test: None

Feeding: 0.25 ml Tetra Fin (4g/L) suspension per cup on days 0 and 2

Duration: 24-hr, 48-hr, (96-hr) Test temperature (deg.C): 23 ± 1

Beaker placement: Stratified randomization Photoperiod: 16:8, L:D

MISCELLANEOUS NOTES

Test solution preparation:

Working stock: Dissolve 5g KCl crystals in dilution water and dilute to 500 mL.
Final conc.: 10 g/L.

Test concentration (g/L)	KCl working stock (ml/200ml)	ml of dilution water per 200 ml
10	200	0
5	100	100
2.5	50	150
1.25	25	175
0.63	12.5	187.5
0	0	0

9-22-17 WL

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-3713 Client _____ QC Test

DAILY RECORD SHEET

Day 0 (9/22/17) GSL Temp Beaker (°C): 23.3

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 10	22.8	7.8	10670	8.0	94	70	
2. 5	22.8	7.7	6470	8.0			
3. 2.5	22.9	7.7	3710	8.0			
4. 1.25	22.9	7.6	2230	7.9			
5. 0.63	22.9	7.6	1336	7.9			
6. 0	23.1	7.7	321	7.9	94	70	
Each replicate fed 0.25 ml Tetra Fin suspension. Initials: GSL							

GSL ① 9-22-17

Day 1 (9/23/17) GSL Temp Beaker (°C): 23.6

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 10							
2. 5							
3. 2.5							
4. 1.25							
5. 0.63							
6. 0							

Day 2 (9/24/17) GSL Temp Beaker (°C): 23.6

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 10							
2. 5							
3. 2.5							
4. 1.25							
5. 0.63							
6. 0							
Each replicate fed 0.25 ml Tetra Fin suspension. Initials: GSL							

Day 3 (9/25/17) GSL Temp Beaker (°C): 23.8

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 10							
2. 5							
3. 2.5							
4. 1.25							
5. 0.63							
6. 0							

Day 4 (9/26/17) GSL Temp Beaker (°C): 23.8

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 10	—	—	—	—	—	—	
2. 5	23.7	7.7	6510	7.8			
3. 2.5	23.8	7.9	3860	7.7			
4. 1.25	23.7	7.7	2350	7.7			
5. 0.63	23.7	7.8	1413	7.7			
6. 0	23.6	7.9	362	7.6	94	80	
Mean	23.3	7.7	control 342	7.8	94	73	
SD	0.4	0.1	—	0.1	0	6	
n	11	11	2	11	3	3	

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-3713 Client _____ QC Test _____ Investigator _____

DAILY RECORD SHEET - Survivors

Day 0 (9/22/17) 632

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 10	1	1	1	1	1	1	1	1	1	1	10
2. 5	1	1	1	1	1	1	1	1	1	1	10
3. 2.5	1	1	1	1	1	1	1	1	1	1	10
4. 1.25	1	1	1	1	1	1	1	1	1	1	10
5. 0.63	1	1	1	1	1	1	1	1	1	1	10
6. 0	1	1	1	1	1	1	1	1	1	1	10

Day 1 (9/23/17) 0837

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 10	1	1	1	1	1	1	1	1	1	1	10
2. 5	1	1	1	1	1	1	1	1	1	1	10
3. 2.5	1	1	1	1	1	1	1	1	1	1	10
4. 1.25	1	1	1	1	1	1	1	1	1	1	10
5. 0.63	1	1	1	1	1	1	1	1	1	1	10
6. 0	1	1	1	1	1	1	1	1	1	1	10

Day 2 (9/24/17) 631

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 10	0	0	0	0	0	0	0	0	0	0	0 (10D)
2. 5	1	1	1	1	1	0	0	0	0	1	4 (4D)
3. 2.5	1	1	1	1	1	1	1	1	1	1	10
4. 1.25	1	1	1	1	1	1	1	1	1	1	10
5. 0.63	1	1	1	1	1	1	1	1	1	1	10
6. 0	1	1	1	1	1	1	1	1	1	1	10

Day 3 (9/25/17) 631

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 10	0	0	0	0	0	0	0	0	0	0	0
2. 5	1	1	1	1	0	0	0	0	0	1	5 (1D)
3. 2.5	1	1	1	1	0	0	1	1	1	1	8 (2D)
4. 1.25	1	1	1	1	1	1	1	1	1	1	10
5. 0.63	1	1	0	1	1	1	1	1	1	1	9 (1D)
6. 0	1	1	1	1	1	1	1	1	1	1	10

Day 4 (9/26/17) 631

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 10	0	0	0	0	0	0	0	0	0	0	0
2. 5	0	0	0	0	0	0	0	0	0	0	0 (5D)
3. 2.5	1	0	1	1	0	0	1	0	1	0	5 (3D)
4. 1.25	1	1	1	1	1	1	1	1	1	1	10
5. 0.63	1	1	0	1	1	1	1	1	1	1	9
6. 0	1	1	1	1	1	1	1	1	1	1	10

Acute 96-hr Toxicity Test-96 Hr Survival

Start Date:	9/22/2017 15:20	Test ID:	999-3713	Sample ID:	REF-Ref Toxicant
End Date:	9/26/2017 13:30	Lab ID:	ORNAS-Northwestern Aquati	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	EPAF 91-EPA Freshwater	Test Species:	CT-Chironomus dilutus
Comments:					

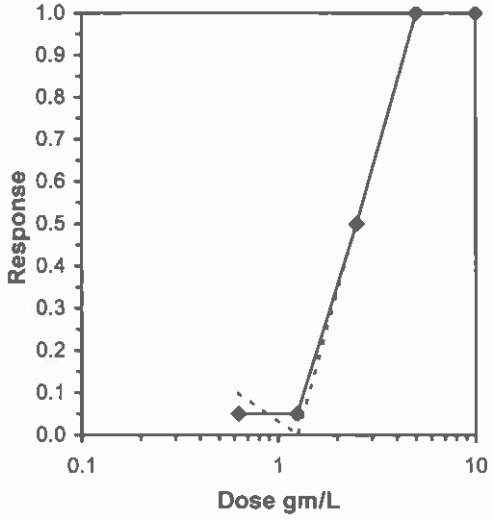
Conc-gm/L	1
D-Control	1.0000
0.63	0.9000
1.25	1.0000
2.5	0.5000
5	0.0000
10	0.0000

Conc-gm/L	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
D-Control	1.0000	1.0000	0	10	10	1			0	10
0.63	0.9000	0.9000	1	9	10	1	0.5000	0.0500	1	10
1.25	1.0000	1.0000	0	10	10	1	1.0000	0.0500	0	10
*2.5	0.5000	0.5000	5	5	10	1	0.0163	0.0500	5	10
*5	0.0000	0.0000	10	0	10	1	0.0000	0.0500	10	10
*10	0.0000	0.0000	10	0	10	1	0.0000	0.0500	10	10

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	1.25	2.5	1.76777	

Trimmed Spearman-Karber

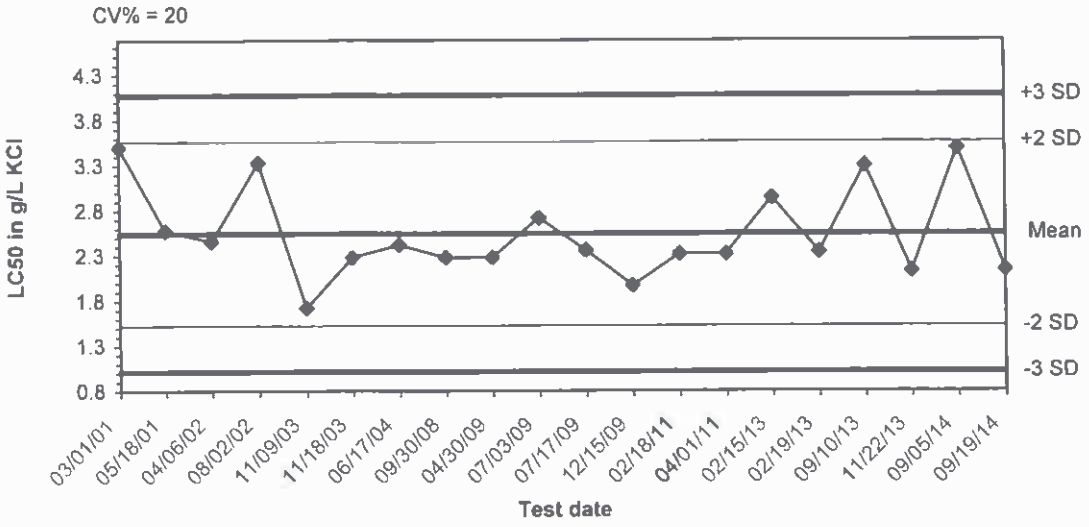
Trim Level	EC50	95% CL	
0.0%			
5.0%	2.4571	1.9172	3.1488
10.0%	2.4618	1.8712	3.2387
20.0%	2.4713	1.7274	3.5356
Auto-5.0%	2.4571	1.9172	3.1488



Test: AT-Acute 96-hr Toxicity Test						Test ID: 999-3713			
Species: CT-Chironomus dilutus						Protocol: EPAF 91-EPA Freshwater			
Sample ID: REF-Ref Toxicant						Sample Type: KCL-Potassium chloride			
Start Date: 9/22/2017 15:20			End Date: 9/26/2017 13:3			Lab ID: ORNAS-Northwestern Aquatic Sciences			
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	10				10	
	2	1	0.630	10				9	
	3	1	1.250	10				10	
	4	1	2.500	10				5	
	5	1	5.000	10				0	
	6	1	10.000	10				0	

Comments: data entry verified against laboratory bench sheets 10-5-17 JRF

First instar midge larvae, Chironomus dilutus, acute reference toxicant test



Dates	Values	Mean	-2 SD	-3 SD	+2 SD	+3 SD
03/01/01	3.5000	2.5440	1.5244	1.0147	3.5636	4.0733
05/18/01	2.5800	2.5440	1.5244	1.0147	3.5636	4.0733
04/06/02	2.4600	2.5440	1.5244	1.0147	3.5636	4.0733
08/02/02	3.3300	2.5440	1.5244	1.0147	3.5636	4.0733
11/09/03	1.7200	2.5440	1.5244	1.0147	3.5636	4.0733
11/18/03	2.2800	2.5440	1.5244	1.0147	3.5636	4.0733
06/17/04	2.4200	2.5440	1.5244	1.0147	3.5636	4.0733
09/30/08	2.2800	2.5440	1.5244	1.0147	3.5636	4.0733
04/30/09	2.2800	2.5440	1.5244	1.0147	3.5636	4.0733
07/03/09	2.7200	2.5440	1.5244	1.0147	3.5636	4.0733
07/17/09	2.3600	2.5440	1.5244	1.0147	3.5636	4.0733
12/15/09	1.9700	2.5440	1.5244	1.0147	3.5636	4.0733
02/18/11	2.3200	2.5440	1.5244	1.0147	3.5636	4.0733
04/01/11	2.3200	2.5440	1.5244	1.0147	3.5636	4.0733
02/15/13	2.9400	2.5440	1.5244	1.0147	3.5636	4.0733
02/19/13	2.3400	2.5440	1.5244	1.0147	3.5636	4.0733
09/10/13	3.3000	2.5440	1.5244	1.0147	3.5636	4.0733
11/22/13	2.1300	2.5440	1.5244	1.0147	3.5636	4.0733
09/05/14	3.4900	2.5440	1.5244	1.0147	3.5636	4.0733
09/19/14	2.1400	2.5440	1.5244	1.0147	3.5636	4.0733

Appendix C
Quality Assurance 1 Memorandum

ESA

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Suite 200
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206.789.9658 phone
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memorandum

date January 3, 2018

to Project file D160430.00

from Jim Good

subject QA1 review of sediment chemistry and bioassay data

This quality assurance report documents a QA1 review of sediment quality data collected in the Columbia River and Camas Slough offshore from the Georgia-Pacific Camas facility. The sediment quality data were collected in accordance with the Sediment Sampling and Analysis Plan (SSAP) to meet requirements of NPDES Waste Discharge Permit No. WQ0000256. Surficial sediment samples were collected from 9 sampling stations on September 12, 13 and 14. Water temperature measurements were also taken one foot off the bottom using a YSI pH 100 meter or YSI 556 sonde. This QA1 review includes the evaluations specified in the Sediment Cleanup User's Manual II (SCUM II, Ecology 2017).

Field Sample Collection and Handling The ESA field team performed a reconnaissance of the two outfall areas on August 2, 2017, and found that shallow water in Camas Slough would prevent access by boat to some of the sampling stations identified in the approved SSAP. After notifying Ecology on August 23, the following day Ecology provided suggested coordinates for moving the sampling stations near Outfall 002. These suggested coordinates became the targeted locations for sediment sampling.

After efforts to collect samples in the Outfall 002 area on the morning of September 12, ESA notified Ecology by email that the field team had encountered very coarse substrate and no fine sediments that could be sampled at the target locations. Gravel was observed in exposed and shallow areas along the shore during low tide. Ecology agreed with the approach to document attempts to sample at the suggested locations, and then move farther offshore to find sand and silt that could be sampled. This approach yielded samples that afternoon from three alternate stations where sand was first encountered, offset approximately 140 to 190 feet south of the target locations. Samples from two additional stations were collected in Camas Slough on September 14. In summary, sediment samples were successfully collected from five sampling stations in Camas Slough, all of which were offset from the target locations to avoid coarse gravel and cobble substrate.

Sampling in the Outfall 001 area started at the upriver end of the transect on September 13, and the first three stations were successfully sampled. Sufficient sediment was collected at the fourth Outfall 001 area station on September 14, but rock and strong current prevented successful sampling at the two downstream-most stations.

This is an area of fast-moving current between rock outcroppings on Lady Island and Ione Reef, and rock outcroppings were observed on sonar imagery. In summary sediment samples were successfully collected from four of the target sampling locations near Outfall 001; however, rock outcroppings prevented collection of sediments from the two downstream-most target locations.

Sample collection activities were thoroughly documented in a field logbook and field sample forms were used to record information on each individual sediment grab that was homogenized for filling sample jars. Station positioning, sampling equipment decontamination, sample collection using a Ponar grab sampler, water temperature and pH measurements, sample compositing and subsampling, sample container labeling, and field documentation all followed procedures described in the SSAP. Subsamples for total sulfides and ammonia were collected from the final grab at each station before sediment was homogenized, and total sulfides samples were preserved with zinc acetate. Communications between the Field Team Leader and TestAmerica confirmed that one unpreserved jar of sediment from OF1-1 was mislabeled as OF2-6, and this error was corrected at the lab.

Sample storage, chain-of-custody, and sample delivery also followed procedures described in the SSAP. Samples stored on ice in coolers for sediment chemistry and conventional analyses were picked up from the ESA Portland office by a TestAmerica representative each day following sample collection. TestAmerica reported that coolers were received at temperatures ranging from 1.7 to 3.1 °C. Samples shipped from TestAmerica to Maxxam for analysis of dioxins and furans were received at temperatures ranging from 3.8 to 4.8 °C. No action was taken to qualify dioxin and furan results that were received slightly above the recommended maximum 4.0 °C holding temperature. Samples for bioassay tests were hand-delivered by ESA to the Northwestern Aquatic Sciences (NAS) laboratory in Newport, Oregon, on September 15, the day after sample collection was completed. NAS reported that all coolers were received at 0.5 °C.

Completeness As described under Field Sample Collection and Handling, coarse substrate or submerged rock outcroppings prevented sampling at all 12 sampling stations; therefore samples were collected from a total of 9 sampling stations, or 75% of the number of stations planned for sample collection. There was no breakage of sample jars and 100% of the planned laboratory analyses were completed for stations sampled. Measurements of water temperature and pH were collected from approximately one meter above the sediment surface for a completeness of 100% for water quality measurements.

Field Duplicates Although not required in the SSAP, the field crew collected a set of duplicate samples for chemistry analyses and conventional parameters at station OF2-5, labeled OF2-5D. Duplicates were not collected for analysis of sulfides, and dioxins and furans. Results of field duplicates generally are not used to qualify sample results, but provide indications of overall precision in the sampling and analysis program and can include variability from uneven distribution of constituents in the material sampled, uneven homogenization of sample material from multiple grabs, and precision in laboratory analyses. Some differences were observed in the J-qualified estimates for Motor Oil and for SVOCs in the re-analysis of these samples; however, these results were all well below the SCO concentrations and already qualified as estimates by the laboratory. Other duplicate sample results were in very close agreement, including the results for grain size and TOC that indicated thorough homogenization of sample material.

Data Presentation TestAmerica provided three complete laboratory data reports, one for each batch of samples from the previous field sampling day. These reports were identified by Job ID 580-71236-1, 580-71266-1, and 580-71299-1. Each report includes a case narrative that summarizes sample receipt and quality control

results, results for client samples and laboratory QC samples, a lab chronicle, chain-of-custody forms, and sample receipt checklists.

NAS provided a single report for Test No. 885-1 & 2. The NAS report includes an executive summary of sediment bioassays, and report sections for the amphipod 10-day survival test and midge 20-day survival and growth tests. Each report section includes appendices for test protocols, and raw data for client samples (including test descriptions, test monitoring, results benchsheets, test data analysis records, ammonia exposure benchsheets and analyses, and chain-of-custody records), and raw data for reference toxicant tests.

Data packages from both laboratories were considered complete.

Sediment Chemistry and Conventional Analytes Data Packages

Reporting Limits Reporting limits were generally below the Sediment Cleanup Objective (SCO) concentrations from the Sediment Management Standards that are listed in Table VI of SCUM II. The laboratory case narratives reported that in the initial analysis of SVOCs by Method 8270D, samples were diluted due to the nature of the sample matrix and elevated reporting limits were provided. The TestAmerica laboratory inadvertently did not prepare 20 grams of sediment sample to a final volume of 2 ml for low-level reporting limits for semi-volatile organic compounds (SVOCs); thus, the initial reporting of several SVOCs (i.e., benzoic acid, bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, di-n-octyl phthalate, and phenol) showed non-detects at reporting limits higher than the SCO concentrations. No sample volume was frozen upon receipt at the laboratory, so non-frozen sample material was re-extracted for low-level analyses and results were qualified (H) as analyzed beyond the specified holding time. Reporting limits for the low-level re-analysis of SVOCs were all below SCO concentrations. The laboratory case narratives also reported that samples were diluted due to extract color in the analysis of organochlorine pesticides by Method 8081B, thus elevated reporting limits were provided. However, the reporting limits for these compounds were well below SCO concentrations. Reporting limits for dioxins and furans were below those listed in Table 5-6 of SCUM II.

Sample Holding Times Sample holding times generally complied with the maximum holding times identified in the SSAP.

- As described above under Reporting Limits, SVOCs were re-extracted for low-level analysis of five compounds that were not detected in the original analysis at concentrations higher than SCOs. These re-extractions were performed 57 to 84 days after sample collection; therefore, those sample results were qualified (H) as outside of the specified holding time (14 days). Sample material archived at NAS was shipped to TestAmerica for re-extraction and analysis of SVOCs in samples OF1-1, OF1-2, and OF1-3.

- Organotins were re-extracted and re-analyzed after the initial analysis found laboratory control sample results to be outside control limits for monobutyltin and tetra-n-butyltin. Re-extraction of organotins occurred 22 to 24 days after sample collection; therefore, those sample results were also qualified (H) as outside the specified holding time (14 days).

- Samples were analyzed for total organic carbon (TOC) 23 to 25 days after sample collection due to an instrument breakdown; therefore, those sample results were qualified (H) as outside the PSEP-specified holding time (14 days).

- Dioxins and furans from two of the three sample batches (samples OF1-1 through OF1-4, OF2-4, and OF2-5) were analyzed by Maxxam on October 8, ten to 11 days past the recommended maximum holding time of 14 days. An H qualifier has been added to dioxin and furan results that were outside the specified holding times.

Acceptability of Laboratory Quality Control Results Laboratory data packages from TestAmerica and Maxxam included sections on QC Sample Results where data were presented for method blank analyses, laboratory control samples (LCS) recoveries, LCS duplicate recoveries, relative percent differences (RPDs) between LCS and LCS duplicate samples, matrix spike (MS) and matrix spike duplicate (MSD) recoveries, RPDs between MS and MSD results, analytical duplicate and triplicate RPDs, and surrogate compound recoveries. The case narratives summarize many of the circumstances where quality control analyses were outside of control limits, including the resulting data qualifiers or re-analyses. The following quality control results led to the laboratory assigning qualifiers to sample results:

- Monobutyltin and tetra-n-butyltin LCS recoveries were outside of control limits and all of the original non-detect sample results were qualified with an asterisk. The surrogate recovery was also low. Organotins were re-analyzed with acceptable LCS and surrogate recoveries, and all of the re-analysis sample results were qualified as beyond the specified holding time (H).

- The LCS recovery exceeded the control limit for di-n-octyl phthalate, indicating a potential high bias, and initial sample results for OF2-1, OF2-2, OF2-3, OF1-1, OF1-2, and OF1-3 were qualified with an asterisk. However, this compound was not detected in the samples and the data were reported as usable.

- The LCS recovery was below the control limit for pentachlorophenol, indicating a potential low bias, and the re-analysis results for OF2-1, OF2-2, and OF2-3 were qualified with an asterisk. However, the original unqualified result for pentachlorophenol met reporting limit requirements and was submitted in the sediment data report.

- Except for sample OF1-4, results for all motor oil (i.e., TPH – Residual) sample analyses were qualified with a J to indicate the result is less than the reporting limit (RL) but greater than or equal to the method detection limit (MDL), thus the concentration is an approximate value. Most sample results for silver and many of the sample results for mercury were similarly J-qualified. The following SVOC and organochlorine pesticide compounds also were J-qualified in one or more sample: benzo(a) anthracene, benzo(a) pyrene, benzofluoranthene, bis(2-ethylhexyl) phthalate, indeno(1,2,3-cd) pyrene, pyrene, chrysene, fluoranthene, pentachlorophenol, 4,4'-DDE, beta-hexachlorocyclohexane

- TOC samples were qualified with a B to indicate that TOC was found in the method blank as well as the sample. Many of the TOC samples were also qualified with a J to indicate the result is less than the reporting limit (RL) but greater than or equal to the method detection limit (MDL), thus the concentration is an approximate value.

- The laboratory assigned a qualifier (p) to results for 4,4'-DDD, 4,4'-DDE, dieldrin, and endrin keytone in one or more sample from the Outfall 001 area. This qualifier indicates that the % RPD between the primary and confirmation column/detector is >40 %, and the lower value has been reported. These results were either detected or not detected at reporting limits that were far below SCO concentrations; therefore, the data qualifiers were not a concern for interpreting results.

- The laboratory assigned a qualifier (F1) to sample OF1-1 results for dieldrin and beta-hexachlorocyclohexane, due to MS and/or MSD recoveries outside of acceptance limits. Similarly, the F1 qualifier was assigned to results for benzo(g,h,i)perylene, dibenz(a,h,)anthracene, di-n-ocytl phthalate, and indeno(1,2,3-cd)pyrene in samples OF1-3; and benzoic acid in the original analysis of sample OF2-4. The F1 qualifier was also assigned to many of the SVOCs in the reanalysis of sample OF1-1. These results were non-detect at reporting limits more than one order of magnitude below SCO concentrations; therefore, the data qualifiers were not a concern for interpreting results.

- The laboratory assigned a qualifier (F2) to sample results due to the MS/MSD RPD exceeding control limits. This applied to several non-detect results for SVOCs in samples OF1-3 and OF2-4, low-level detections of SVOCs in the re-analysis of sample OF2-4, non-detect results for the original or re-analysis of organotins in samples OF2-4 and OF1-4, and the re-analysis of many SVOCs in sample OF-1. These data qualifiers did not affect comparisons to SCO concentrations.

- The chromium results for samples OF1-4, OF2-4, OF2-5, and OF2-5D were qualified with a B to indicate that chromium was found in the method blank as well as the sample. This indicator of potential positive bias in the sample results was not a concern because the reported concentrations were well below the SCO concentration.

- The laboratory assigned a qualifier (F1) to sample OF2-4 results for chromium and copper due to MS and/or MSD recoveries outside of acceptance limits. The high recoveries indicating potential positive bias in the sample results were not a concern because the reported concentrations were well below the SCO concentrations.

- Maxxam assigned a J qualifier to estimated concentrations between the Estimated Detection Limit (EDL) and Reportable Detection Limit (RDL). A U qualifier was used to indicate where the analyte was undetected at the limit of quantitation.

Sediment Bioassay Data Package

Both the amphipod 10-day sediment bioassay and the midge 20-day sediment bioassays were started on September 22, eight to ten days following sample collection, within the 2-week holding time recommended by Ecology. In addition, NAS collected a negative control sediment sample on September 13 from Beaver Creek near Newport, Oregon. The test data were reviewed by the NAS Quality Assurance Unit to assure that the studies were performed in accordance with the protocols and standard operating procedures.

All water quality observations during bioassay tests were within the protocol-specified ranges, and all other applicable acceptability criteria were met. Although the reference toxicant LC50 result for the amphipod test was slightly outside the laboratory's control chart action limits, a review of test organisms and test conditions and procedures indicated that there were no unusual circumstances that may have affected the test results. The amphipod test met the acceptability criteria specified in the SMS with 1.4% mean control mortality. The midge test met the acceptability criteria specified in the SMS with 2.5% mean control mortality and a control mean ash-free dry weight of 1.63 mg per larvae. The reference toxicant EC50 result for the midge test was within the laboratory's control chart limits. In summary, this data quality review found all of the bioassay test results to be acceptable.

Sampling and Analysis Plan for the Characterization of Sediments in the Camas Slough, Washington

In-water and Overwater Structures Removal Project

Camas Mill, Camas, Washington

March 10, 2023

Original Submittal: January 21, 2021

Revised (Version 1) Submittal: March 10, 2023

Prepared for

Georgia-Pacific

Georgia-Pacific Consumer Operations LLC
Camas, Washington

Prepared by

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Exhibit 9 SHOR23-01

Table of Contents

1.0 INTRODUCTION 1

1.1 Project Team 1

1.2 Safety 2

2.0 PROJECT OVERVIEW 3

2.1 Site History and Conceptual Site Model 3

2.2 Riverbank Final Surface Conditions 4

2.3 Columbia River Hydrograph 4

2.4 Invasive Species 4

3.0 STUDY OBJECTIVES 5

3.1 Purpose and Objectives 5

3.2 Sampling Areas 5

3.3 Dredged Materials Management Units 6

4.0 CAMAS SLOUGH SAMPLING 6

4.1 Dredging Plans 6

4.2 Camas Slough Sampling Design 6

5.0 TARGET ANALYTES 8

5.1 Conventional Analytes 8

5.2 Sediment Compositing 9

5.3 Chemicals of Concern 9

5.4 Additional Analytes 11

5.5 Laboratory Limits of Detection 12

6.0 FIELD SAMPLING PROCEDURES 12

6.1 Schedule 12

6.2 Sample Equipment 12

6.3 Horizontal Control: Datum and GPS Positioning 12

6.4 Vertical Control: Datum, Water Depth Determination, and Tidal Levels 12

6.5 Sample Acceptance Criteria 13

Exhibit 9 SHOR23-01

6.6 Sampling Logs and other Documentation 14
6.7 Sample Identification 15
6.8 Chain of Custody Procedures and Transport 15

7.0 SAMPLE PROCESSING 16

7.1 Decontamination Procedure 17
7.2 Sample Compositing 17
7.3 Subsamples for Total Sulfides 18
7.4 Archived Sediments 18

8.0 LABORATORY ANALYSIS 18

8.1 Quality Assurance and Quality Control 18
8.2 Laboratory Sample Handling 19
8.3 Laboratory Reporting 21
8.4 Bioassay Laboratory Protocols 21

9.0 DATA REPORTING REQUIREMENTS 23

10.0 ANTIDEGRADATION EVALUATION 24

11.0 REFERENCES 24

List of Tables

Table 1. Record of Coordination 2
Table 2. Tasks and Responsible Party 2
Table 3. Summary Information for Dredged Materials Management Units (DMMU) 6
Table 4. Camas Slough Sample and Analysis Quantities 7
Table 5. Camas Slough DMMUs—Unit Elevations and Thickness 7
Table 6. Conventional Analytes 8
Table 7. Sediment Compositing Scheme 9
Table 8. Chemicals of Concern and Freshwater Sediment Management Standards 9
Table 9. Perfluorooctanoic Acid Compounds 11
Table 10. Information Required to Be Collected for Core Sampling Logs 15
Table 11. Analyte, Estimated Sample Volume Needed, and Holding Conditions 20
Table 12. Recommended Measurement Performance Criteria 21
Table 13. Bioassay Species, Tests and Endpoints 22
Table 14. Bioassay Test Performance Standards and Screening Levels 22

List of Figures

Figure 1 Site Plan Showing Locations of Structures to Be Removed
Figure 2 Preliminary Grading Plan, Dock Warehouse Piers Plan View
Figure 3 Dock Warehouse Piers Dredge Prism, Cross Sections
Figure 4 Preliminary Grading Plan, PECO Dock

List of Appendices

Appendix A Health and Safety Plan (To be submitted with Final Plan to DMMO)
Appendix B Aquatic Invasive Species Decontamination Procedures
Appendix C Sampling Area Coordinates
Appendix D Field Forms

Exhibit 9 SHOR23-01

Acronyms and Abbreviations

°C	degree Celsius
COC	contaminant of concern
CRD	Columbia River Datum
GPS	global positioning system
DMMO	Dredged Material Management Office
DMMP	Washington Dredged Materials Management Program
DMMU	Dredged Materials Management Unit
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
GP	Georgia-Pacific Consumer Operations LLC
GPS	global positioning system
NAD 83	North American Datum of 1983
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OHWM	ordinary high water mark
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PQL	practical quantitation limit
PSET	Portland Sediment Evaluation Team
PS-SRM	Puget Sound standard reference material
QA	quality assurance
QC	quality control
SCO	Sediment Cleanup Objective
SSAP	Sediment Sampling and Analysis Plan (this report)
TEQ	toxicity equivalence quotient
TOC	total organic carbon
TVS	total volatile solids
USACE	U.S. Army Corps of Engineers
UTM	Universal Transverse Mercator

Signature Page

Draft Sampling and Analysis Plan for the Characterization of Sediments in the Camas Slough and Columbia River

In-water and Overwater Structures Removal Project
Camas Mill, Camas, Washington

The following subcontractors have read and agree to follow the proposed procedures documented in this Sampling and Analysis Plan. If there are any significant deviations from the procedures outlined, the Tetra Tech Project Manager and the DMMO Project Manager will be informed.

Name, Title	Date
Name, Title	Date
Name, Title	Date

1.0 INTRODUCTION

Georgia-Pacific Consumer Operations LLC (GP) plans to abate and demolish structures that are located in-water and/or overwater on the Columbia River and Camas Slough in the City of Camas and in unincorporated Clark County, Washington. Dredging will be required to enable barge access to remove piles in one location. Dredging will also occur where the Camas Slough riverbank is to be reshaped following the removal of overwater structures.

Note that because this project would remove older infrastructure, dredging will only be implemented to the extent needed to safely remove the features. Unlike most dredging projects, a specific deepening is not a requirement for most of the dredging. The exception is one location where dredging is planned to provide deepening for demolition barge access.

Figure 1 provides an overview of the locations of proposed activities (all figures are attached following this narrative). Dredged materials, if found suitable based on Washington Dredged Material Management Program (DMMP) criteria for in-water disposal, would be used as fill in areas of underwater structures that have been removed and/or for upland area fills. Excess dredged material, or dredged material found to be unsuitable for in-water disposal would be transferred to the Dredged Materials Management Areas on Lady Island (LI DMA) if acceptable as solid waste, or other approved upland facility.

This Sediment Sampling and Analysis Plan (SSAP) was prepared in accordance with the Dredged Materials Evaluation and Disposal Procedures User Manual (USACE December 2021), which provides guidance for evaluation of potential contaminant-related environmental impacts of dredging and aquatic disposal of dredged sediments and meets requirements of the DMMP.

A Tier 1 Report was developed and provided to the DMMP for review. The Tier 1 report summarizes available background information relative to the proposed quality of the sediment to be dredged. Coordination with the DMMP to date is summarized in **Table 1**, including coordination on review and revisions of the Tier 1 Report.

Once approved, any significant deviation from this approved SSAP will be coordinated with the DMMP.

1.1 Project Team

Mr. Matt Tiller, P.E., is the Director for Global Remediation & Environmental Services representing GP. He has overall project management responsibility and in this role is the primary point of contact for this effort for GP. Ms. Caleigh Belkoff, Environmental Manager at Camas Mill, is the local point of contact at the mill. GP is the sole organization responsible for maintaining, developing, removing, and demolishing the facilities at Camas Mill.

This SSAP was prepared for GP's use by Keir Craigie of Tetra Tech. Gary Braun (Tetra Tech) provided Senior Technical Review.

Table 2 provides information on roles and responsibilities for the activities under this SSAP. The full demolition and dredging project team is under development at the time of this writing. Following approval of this SSAP by the DMMP agencies, GP will formally establish a team for execution of the

Exhibit 9 SHOR23-01

plan. At this time, it is likely that Tetra Tech will be involved for administration of the sampling effort, and roles are tentatively identified in **Table 2**. Other contractors may be hired by GP, and GP would provide them a copy of this plan. A sampling and data quality assurance representative will be determined prior to generation of the data report. This entity will help perform quality assurance for the field sampling program and keep records of variances from the SSAP, if any.

Table 1. Record of Coordination

Action	Date	Note
Document Submitted to DMMP	August 10, 2020	Tier 1 only, no Sediment Sampling and Analysis Plan (SSAP) submitted
Comments Received from DMMP	September 2, 2020	Coordination meeting held between GP and DMMP
Document Revised	November 16, 2020	Substantive changes from August submission in response to DMMP comments were in Blue Text. An SSAP will be prepared as a separate document
Submitted to DMMP	December 2020	SSAP to be submitted as a separate document and references the Tier 1 Report for introduction and background information
Comments Received from DMMP on 11/16/2020 on Revised Tier 1	December 4, 2020	Comments received from DMMP on the Tier 1 Report and conceptual sampling plan
Submitted to DMMP	January 21, 2021	Submittal of Draft SSAP . Revised Tier 1 Report submitted as a separate document.
Comments Received from DMMP on 02/11/2021	February 11, 2021	Comments received from DMMP
This Document	March 10, 2023	Substantive changes for SSAP from January 2021 submission in response to DMMP comments and for changes in project scope.

Table 2. Tasks and Responsible Party

Tasks	GP	Tetra Tech
Project Management	Matt Tiller	Steve Negri
Environmental Management	Caleigh Belkoff	
SSAP Development		Keir Craigie; Gary Braun, reviewer
Health and Safety		Luke Maddox
Sediment Sampling/Field Quality Assurance		Corey Graves
Core Processing/Compositing/Subsampling		Luke Maddux
Chemical Analysis		To Be Determined
Conventional and Chemicals of Concern Analysis Quality Assurance		Lauren McHugh
Dioxin/Furan Analysis Quality Assurance		Lauren McHugh
Data Validation		Lauren McHugh
Data Analysis Summary and Reporting		Keir Craigie

1.2 Safety

Collection of sediment samples involves operations from a sampling vessel. Project-level and site-specific health and safety plans and job hazard assessments will be implemented throughout sampling. In addition, precautions are needed for work around chemicals that may pose safety concerns or toxicity. A safety plan is provided as **Appendix A (to be provided with final)**.

2.0 PROJECT OVERVIEW

The In-water/Overwater Structures Removal project includes removal of one building-like industrial structure, five docks/piers, and approximately 3,000 piles/dolphins. Structures to be removed are located both in-water and overwater. Access for construction equipment to conduct the structure removal project will require dredging to facilitate riverbank reshaping following removals.

Dredge volumes comprise approximately 10,500 cubic yards in the Camas Slough. No precise contingency has been used to calculate dredge volumes. Instead, the design of the dredge prisms has conservatively extended the layout of the dredge prisms beyond the limits of actual dredging anticipated to be required to allow access for construction equipment.

The project footprint is shown on **Figure 1** and includes:

- Areas along the Camas Slough, both along the north riverbank within the Camas Mill main site and south riverbank on Lady Island;
- Several other locations within the Camas Slough; and
- Dolphins extending approximately 3 miles downriver from the Camas Mill in the Camas Slough and the Columbia River.

Structures to be removed are shown in gold color on **Figure 1,** and design details and historical sediment sampling locations for work areas are shown on **Figures 2 through 4**. Work would occur following receipt of all permits and approvals during appropriate river conditions and regulatory open work windows. Several open work window periods are assumed to be needed.

Additional details regarding the removal project and demolition methods are presented in the *Revised Tier 1 Report* (Tetra Tech 2023a) and in the *In-water Overwater Structures Removal Project Description* (Tetra Tech 2023b).

2.1 Site History and Conceptual Site Model

Details of the site history were provided in the Tier 1 Report, and only essential information is briefly summarized here. According to the DMMP, the current risk ranking for sediment dredging projects in the Camas Slough is “Moderate.” Based on the Camas Slough management rank, the maximum sediment volume for each DMMU is 40,000 cubic yards.

As discussed in depth in the Tier 1 Report, there have been several recent sediment sampling events in the project area. A sediment sampling and analysis event was conducted by GP at operating Outfalls 001 in the Columbia River and 002 in the Camas Slough in 2017-2018 to comply with National Pollutant Discharge Elimination System (NPDES) monitoring requirements (ESA 2018). Detailed results of those previous investigations are summarized in the Tier 1 Report (Tetra Tech 2023a), which included copies of those reports in an appendix.

The Tier 1 Report provides further discussion of the development of the conceptual sampling model for the project area.

2.2 Riverbank Final Surface Conditions

In the project area, most dredged surfaces will be backfilled with clean fill and provide no potential future exposure pathways. However, dredging and excavations along the Camas Slough north riverbank will expose areas of newly dredged surface. Riverbank reshaping following demolition will result in a new location of the OHWM. The OHWM elevation will move horizontally toward the upland such that new land area will be within the wetted area of the river because the reshaped riverbank would be topographically flatter than the existing steep riverbank, with newly regraded slopes ranging from 4-to-1 to 5-to-1.

At this time, the riverbank area is occupied by various large dock structures. To meet antidegradation requirements, and at the suggestion of the DMMP, GP proposes to sample final grades below OHWM following demolition to determine the condition of surface materials. Owing to some uncertainty in final grades and layout at this early design phase, a future *Sampling and Analysis Plan* for riverbank areas will be developed in coordination with DMMP, once the riverbank work is approaching final design approval.

Briefly, and as recommended, the approach for riverbank sampling for analysis and antidegradation evaluation would likely entail grab-type sampling at an appropriate number of locations to adequately survey the area. Assuming sampled final grade materials are found suitable, then the upper portion of the newly shaped riverbank area would be planted with native plant species. Sampling would occur prior to landscaping. If final grade materials were found to not be suitable to meet antidegradation requirements, then GP would work with agencies to determine appropriate actions, possibly including the extent of over-excavation that may be needed and appropriate replacement materials to establish suitable final grades. As stated, further details on sampling and analysis of the riverbank area would be provided in a future SSAP.

2.3 Columbia River Hydrograph

As described in the *Tier 1 Report*, the Columbia River hydrograph is strongly seasonal, with a spring high river stage reflecting large volumes of snowmelt runoff and a fall season with a low water river stage. In the project area, the change of water depth is about 15 feet between these seasons, and the timing and extent of change are variable by year. A general note: aerial photos used in the figures presented here show the river at a relatively low stage of about +2.0 feet relative to the Columbia River Datum (CRD), while ordinary high water is at 16.5 feet CRD.

2.4 Invasive Species

The Camas Slough is not documented as an area known or suspected of harboring aquatic invasive species (AIS) including the New Zealand mud snail (*Potamopyrgus antipodarum*). Equipment brought to the Camas Slough for this sampling event will be decontaminated in accordance with AIS decontamination standard operating procedure (Appendix B) to ensure AIS will not be transported to the slough. AIS decontamination procedures in this standard operating procedure follow the Washington State Department of Fish and Wildlife decontamination guidance (https://wdfw.wa.gov/species-habitats/invasive/prevention).

3.0 STUDY OBJECTIVES

This section summarizes the purpose and objectives of this sampling plan and provides an overview of the sampling design for the overall project. A more detailed description of the dredging activities and sampling design is presented in Section 4 for the Camas Slough.

3.1 Purpose and Objectives

Characterization of sediments is proposed to achieve the following objectives:

- Provide information needed for the DMMP to determine the suitability of dredged sediments for in-water and/or upland disposal.
- Characterize the post-dredged surface sediment quality at the Dock Warehouse Piers dredge prism to evaluate project compliance with antidegradation requirements where a new sediment surface will result.

As mentioned, a *Tier 1 Report* has been completed and provided:

- Detailed project description,
- Site history and existing conditions,
- Summaries of recent sampling,
- Management area rank, and
- Conceptual dredging design

This SSAP provides details on the following:

- Refined dredging design,
- Proposed DMMUs, sampling design, and sampling methods,
- Chemical analytes and analytical parameters,
- Approach to evaluate sediment characteristics, and
- Identification of components of the project Data Report to be generated following sampling and analysis.

3.2 Sampling Areas

For this project we propose a “Sampling Area” approach rather than the usual, more specific, sample points. In this approach, one core sample will be collected at a suitable location to be identified in the field from within the boundaries of each Sample Area designated for each DMMU. This “Sampling Area” approach allows for increased flexibility because a sample taken at any location within the approved Sampling Area will be acceptable to DMMP without further coordination. DMMP gave general approval for this approach, as well as for the general locations of the Sampling Areas, in comments provided in December 2020 on the Revised Tier 1 Report. Based on those comments, further refinements of Sampling Area locations have been made (see attached figures).

This approach was taken to increase the likelihood of sample success and to avoid the uncertainty and possible delays associated with failed sampling at a narrowly defined location.

3.3 Dredged Materials Management Units

The sampling effort will occur in the Camas Slough, a side channel of the Columbia River. The Slough is also the outlet of the Washougal River (**Figure 1**). **Table 3** provides the proposed DMMUs and summarizes the dredging volumes and sampling plan for each DMMU.

The Camas Slough has been designated a "Moderate Risk" area, and sediments are heterogeneous in this area. The regulatory maximum sediment volume represented by a DMMU in the Camas Slough is 40,000 cubic yards. Two DMMUs have been identified for the Camas Slough dredging to account for heterogeneity across the different work areas and sediment profiles. Volumes at each proposed DMMU are well below the maximum sediment volume guideline.

Table 3. Summary Information for Dredged Materials Management Units (DMMU)

	Camas Slough DMMUs		
	CS1-A: Dock Warehouse Piers, Surface Unit	CS1-B: Dock Warehouse Piers, Subsurface Unit	CS1-Z: Dock Warehouse Piers, Z-layer
Proposed Dredged Materials Volume (Cu. Yds.)	6,900	3,600	N/A
Maximum Sediment Volume Per DMMU (Cu. Yds.)	40,000	40,000	N/A
Sample Type	Core	Core	Core
Cores per DMMU	2	2	2
Analysis	1	1	2
Archive (Yes/No)	Yes	Yes	Yes

Abbreviations
Cu. Yds. = cubic yards
DMMU = Dredged Materials Management Unit

4.0 CAMAS SLOUGH SAMPLING

As stated in the Tier 1 Report, river conditions in the Camas Slough include:

- Abundant rock and cobble areas to be avoided as they cannot be readily sampled (log forms will include details of site conditions encountered);
- High river flow rates owing to the location at the mouth of the Washougal River;
- Shallow bedrock in some locations; and
- Abundant infrastructure that must be avoided.

4.1 Dredging Plans

Figure 3 provides plan and profile views of the dredge prisms for access in the Camas Slough. The estimated quantities to be dredged in the Camas Slough are provided in **Table 3**. The sampling design for each DMMU in the Camas Slough is provided in **Table 4**.

4.2 Camas Slough Sampling Design

As stated previously, difficult sampling conditions are present and thus we have identified "Sampling Areas" instead of more specific sampling points often utilized. This Sampling Area approach allows for

increased flexibility over an identified "point" approach because a sample taken at any location within the Sampling Area will be acceptable to DMMP without further coordination.

Table 4. Camas Slough Sample and Analysis Quantities

Camas Slough Locations	DMMU	Sample Quantities per DMMU			Analysis Quantity
		Surface	Subsurface	Z-layer	
Dock Warehouse Piers, Surface Unit	CS1-A	2			1
Dock Warehouse Piers, Subsurface Unit	CS1-B		2		1
Dock Warehouse Piers, Z-layer	CS1-Z			2	2
Total					**4**

Abbreviations
DMMU = Dredged Material Management Unit

The Camas Slough Sampling Areas are shown on **Figure 3**. Sampling Areas were identified using information from the 2020 bathymetric survey, infrastructure design drawings, available diver survey information, and a review of dredge prism location, shape, and anticipated thickness.

As described in the Tier 1 Report, the Camas Slough sediments are assumed to be heterogeneous, thus surface and subsurface DMMUs have been identified at each dredge prism. **Table 3** lists the proposed DMMUs. The effects are seen in the sampling depths and thickness of each Sampling Area, which are summarized in **Table 5**. As stated, the target within each of the Sampling Areas is the thickest, full profile, but avoiding areas likely to be rocky.

Table 5. Camas Slough DMMUs—Unit Elevations and Thickness

DMMU	Sampling Area[1]	Approximate Top Elevation (mudline) (feet CRD)[2,3]	Approximate Bottom Elevation (feet CRD)[3]	Total Thickness (feet)[3]	Sample Numbers[4]	Composite for Analysis
CS1-A (Surface)	CS1-A-1	-3.5	-7.5	4	CS1-A-1	CS1-A
	CS1-A-2	-2.5	-5	4	CS1-A-2	
CS1-B (Subsurface)	CS1-B-1	-7.5	-10	2.5	CS1-B-1	CS1-B
	CS1-B-2	-5	-10	5	CS1-B-2	
CS1-Z (Below Dredge Surface)	CS1-Z-1	-10	-12	2	CS1-Z-1	CS1-Z-1
	CS1-Z-2	-10	-12	2	CS1-Z-2	CS1-Z-2
			Maximum Core Length (feet)	11		

1. Sample area identifiers are based on DMMU identifier followed by sample area (e.g., CS1-A-1 is sample area 1 in DMMU CS1-A.
2. Top of "A" zone is mudline elevation.
3. Elevations and thicknesses given near centroid for each sampling area. Actual elevations and the thicknesses of the lower ("Zone B") sampling intervals vary along dredging areas.
4. Sample numbers are assigned to each 4 foot core length sampled to required depth.

For each Sampling Area, one core will be collected to the depth of dredging plus the depth required for the Z-layer sampling. Each core will be subdivided to reflect the surface and subsurface DMMUs, and Z-layer. The top 4-foot sediment layer (the surface DMMU) will be analyzed separately from the sediment located below 4 feet (subsurface DMMU).

As there are two Sampling Areas in the dredging area, the two samples from within the DMMU will be composited. While we plan on compositing materials from two cores for the DMMU, we also plan on archiving sediment samples without compositing for individual analysis, if warranted.

Z-Layer sampling will be performed to provide sediment quality characteristics to evaluate antidegradation requirements for the Dock Warehouse Piers area, as this area will retain a new surface following dredging. Z-Layer samples will be taken from the 2-ft of material immediately underlying the required dredge prism, and will represent the new surface to be exposed following project dredging. Z-Layer samples will be from two cores taken below the minus 10-ft CRD planned new sediment surface at the Dock Warehouse piers (i.e. from -10 to -12-ft CRD) and will not be composited.

5.0 TARGET ANALYTES

For Camas Slough samples, analytes include conventional parameters, along with a suite of chemicals of concern identified by the State Sediment Management Standards. No elutriate assays or biological assays are planned at this time. Archived sediment from each sampling DMMU would be used if it is determined that bioassessments are needed, assuming holding times can be met.

5.1 Conventional Analytes

Conventional analytes consist of total solids, total organic carbon, total sulfides, ammonia, particle size distribution, and total volatile solids (**Table 6**). Grain-size distribution for each composite sample will be determined following ASTM Method D-422 (modified). The modified U.S. Environmental Protection Agency (EPA) sieve series (U.S. sieve Nos. 4, 10, 18, 35, 60, 120, and 230 [cut off for clay]) will be used for the larger size fractions. Pipette analysis will be used for particle sizes finer than the 230 mesh. The cutoff for gravel from sand will be No. 10 sieve (2 millimeters). The silt/clay fractions will be classified by the Krumbein phi scale (+5, +6, +7, +8, >8). Total solids, ammonia, total volatile solids, and sulfides will be analyzed in the Camas Slough samples.

Table 6. Conventional Analytes

Analyte	Method	Reporting Units
Total solids	PSEP (1986)/ SM 2540G	% by dry weight
Total organic carbon	SM 5310B/ EPA 9060 (modified for sediments)	% by dry weight
Total sulfides	PSEP (1986)/Plumb (1981)/SM4500-S2	mg/kg
Ammonia	Plumb (1981)/SM4500-NH3	mg/kg
Sediment particle size distribution/Grain size	PSEP (1986)/ASTM D-422 (modified)	relative percent or class
Total volatile solids	PSEP (1986)/SM 2540G	% by dry Weight

Abbreviations
ASTM = ASTM International
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams per kilogram
PSEP = Puget Sound Estuary Program
SM = Standard Methods for the Examination of Water and Wastewater
SW-846 = U.S. Environmental Protection Agency, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

5.2 Sediment Compositing

The proposed sediment compositing scheme is shown in **Table 7**.

Table 7. Sediment Compositing Scheme

DMMU Number	DMMP Sample Designation	Sample Core Sections	Analyses to be Conducted			
			Conventional Analytes	DMMP Chemicals of Concern	Dioxins/ Furans	Additional Analyses
CS1-A	CS1-A	CS1-A-1, CS1-A-2	X	X	X	X
CS1-B	CS1-B	CS1-B-1, CS1-B-2	X	X	X	X
CS1-Z	CS1-Z-1	CS1-Z-1	X	X	X	X
	CS1-Z-2	CS1-Z-2	X	X	X	X

5.3 Chemicals of Concern

Testing procedures will be conducted in accordance with the DMMP User's Manual (DMMP 2021), and samples from the Camas Slough will be analyzed for the state's Freshwater Sediment Management Standards, Sediment Cleanup Objectives (SCO), which are equivalent to the DMMP guidance SLs, chemicals of concern and dioxins/furans (**Table 8**).

Table 8. Chemicals of Concern and Freshwater Sediment Management Standards

Chemical of Concern	CAS Number	Reporting Units—Dry Weight	Freshwater Sediment Management Standards (SMS SCO)		Laboratory PQL
			SL1	SL2	
Metals (EPA Method 3050B/6010/6020 except Mercury by EPA Method 7471)					
Arsenic	7440-38-2	mg/kg	14	120	1.0
Cadmium	7440-43-9	mg/kg	2.1	5.4	0.2
Chromium	7440-47-3	mg/kg	72	88	1.0
Copper	7440-50-8	mg/kg	400	1,200	2.0
Lead	7439-92-1	mg/kg	360	>1,300	0.2
Mercury	7439-97-6	mg/kg	0.66	0.8	0.08
Nickel	7440-02-0	mg/kg	38	110	2.0
Selenium	7782-49-2	mg/kg	11	>20	1.0
Silver	7440-22-4	mg/kg	0.57	1.7	0.2
Zinc	7440-66-6	mg/kg	3,200	>4,200	4.0
Organometallic Compounds (Krone et al. 1989)					
Monobutyltin ion (bulk)	78763-54-9	µg/kg	540	>4,800	3.0
Dibutyltin ion (bulk)	10-53-502	µg/kg	910	130,000	3.0
Tetrabutyltin ion (bulk)	1461-25-2	µg/kg	97	>97	3.0
Tributyltin ion (bulk)	36643-28-4	µg/kg	47	320	3.0
Polycyclic Aromatic Hydrocarbons (PAH) (EPA Method 3550/8270)					
Naphthalene	91-20-3	µg/kg	---	---	5.3

Chemical of Concern	CAS Number	Reporting Units—Dry Weight	Freshwater Sediment Management Standards (SMS SCO)		Laboratory PQL
			SL1	SL2	
Acenaphthylene	208-96-8	µg/kg	---	---	2.7
Acenaphthene	83-32-9	µg/kg	---	---	2.7
Fluorene	86-73-7	µg/kg	---	---	2.7
Phenanthrene	67580	µg/kg	---	---	2.7
Anthracene	120-12-7	µg/kg	---	---	2.7
1-Methylnaphthalene	90-12-0	µg/kg	---	---	5.3
2-Methylnaphthalene	91-57-6	µg/kg	---	---	5.3
Fluoranthene	206-44-0	µg/kg	---	---	2.7
Pyrene	129-00-0	µg/kg	---	---	2.7
Benz(a)anthracene	56-55-3	µg/kg	---	---	2.7
Chrysene	218-01-9	µg/kg	---	---	2.7
Benzofluoranthenes (b)	207-08-9	µg/kg	---	---	4.0
Benzofluoranthenes (j)	205-82-3	µg/kg	---	---	4.0
Benzofluoranthenes (k)	205-99-2	µg/kg	---	---	4.0
Benzo(a)pyrene	50-32-8	µg/kg	---	---	4.0
Indeno(1,2,3-c,d)pyrene	193-39-5	µg/kg	---	---	2.7
Dibenz(a,h)anthracene	53-70-3	µg/kg	---	---	2.7
Benzo(g,h,i)perylene	191-24-2	µg/kg	---	---	2.7
Total PAHs (sum of all listed above)	---	µg/kg	17,000	30,000	
Chlorinated Hydrocarbons (EPA Method 3550/8270)					
beta-Hexachlorocyclohexane	319-85-7	µg/kg	7.2	11	1.0
Phthalates					
Di-n-butyl phthalate	84-74-2	µg/kg	380	1,000	26.7
Bis(2-ethylhexyl) phthalate	117-81-7	µg/kg	500	22,000	26.7
Di-n-octyl phthalate	117-84-0	µg/kg	39	>1,100	26.7
Phenols (EPA Method 3550/8270)					
Phenol	108-95-2	µg/kg	120	210	5.3
4-Methylphenol	106-44-5	µg/kg	260	2,000	6.7
Pentachlorophenol	87-86-5	µg/kg	1,200	>1,200	26.7
Miscellaneous Extractables (EPA Method 3550/8270)					
Benzoic acid	65-85-0	µg/kg	2,900	3,800	333
Dibenzofuran	132-64-9	µg/kg	200	680	2.7
Carbazole	86-74-8	µg/kg	900	1,100	4.0
Pesticides & PCBs (EPA Method 3550/8081 and 3550/8082)					
2,4'-DDD and 4.4'-DDD 2,4'-DDE and 4,4'-DDE 2,4'-DDT and 4,4'-DDT	Various	µg/kg	310 21 100	860 33 8,100	1.0
Dieldrin	60-57-1	µg/kg	4.9	9.3	1.0
Endrin ketone	53494-70-5	µg/kg	8.5	>8.5	1.0

Chemical of Concern	CAS Number	Reporting Units—Dry Weight	Freshwater Sediment Management Standards (SMS SCO)		Laboratory PQL
			SL1	SL2	
Total PCBs (Aroclors)	Various	µg/kg	110	2,500	10
Bulk Petroleum Hydrocarbons (NWTPH-Dx)					
TPH – Diesel	Various	mg/kg	340	510	20
TPH – Residual	Various	mg/kg	3,600	4,400	40
Dioxins/Furans (EPA Method 1613B)					
17 Congeners	Various	ng/kg	Total TEQ	0.65 – 2.89[1]	0.4

Notes:
1 For non-Port projects on the Washington side of the Columbia River, dioxin concentrations in dredged material have been compared to background values for sediment taken downstream of Puget Island, which range from 0.65 to 2.89 ng/kg TEQ as of 2009.

Abbreviations:
µg/kg = micrograms per kilogram
PQL = practical quantitation limit
CAS = Chemical Abstracts Service
SL1 = screening level 1
mg/kg = milligrams per kilogram
SL2 = screening level 2
ng/kg = nanograms per kilogram
SCO = Sediment Cleanup Objectives
PAH = polycyclic aromatic hydrocarbons
TEQ = toxicity equivalency quotient
PCB = polychlorinated biphenyl

5.4 Additional Analytes

Samples will be analyzed for perfluorooctanoic acid compounds for if dredged material is considered to be used as backfill at the site. A liquid chromatography / tandem mass spectrometry (LC-MS/MS) method will be used to analyze for the perfluorooctanoic acid compounds listed in **Table 9**.

Table 9. Perfluorooctanoic Acid Compounds

PFOA Compounds	CAS Number	Reporting Units—Dry Weight	Laboratory PQL
Perfluorobutanoic Acid (PFBA)	375224	mg/kg	0.0005
Perfluorobutane Sulfonic Acid (PFBS)	375735	mg/kg	0.0005
Perfluorodecanoic Acid (PFDA)	335762	mg/kg	0.0005
Perfluorododecanoic Acid (PFDoDA)	307551	mg/kg	0.0005
Perfluoroheptanoic Acid (PFHpA)	375859	mg/kg	0.0005
Perfluorohexanoic Acid (PFHxA)	3707244	mg/kg	0.0005
Perfluorohexane Sulfonic Acid (PFHxS)	355464	mg/kg	0.0005
Perfluorononanoic Acid (PFNA)	375951	mg/kg	0.0005
Perfluorooctanoic Acid (PFOA)	335671	mg/kg	0.0005
Perfluorooctane Sulfonic Acid (PFOS)	1763231	mg/kg	0.0005
Perfluoroundecanoic Acid (PFUnDA)	2058948	mg/kg	0.0005
Hexafluoropropylene Oxide – Dimer Acid (HFPO-DA	13252136	mg/kg	0.0005

Abbreviations:
µg/kg = micrograms per kilogram
PQL = practical quantitation limit
CAS = Chemical Abstracts Service
mg/kg = milligrams per kilogram

5.5 Laboratory Limits of Detection

The laboratory practical quantitation limits (PQLs) will be below the lower of the DMMP screening levels, and are shown in **Table 8**. If the practical quantitation limits cannot be met, the analytical laboratory will be responsible for doing everything possible to lower the sample detection limits down to or below the lower of the Screening Levels.

6.0 FIELD SAMPLING PROCEDURES

6.1 Schedule

Sampling would occur during appropriate river conditions and as provided by Agencies and documented in permits and approvals for the project. Sampling is anticipated to occur soon after receipt of all permits and approvals, including approval of this sampling plan.

6.2 Sample Equipment

In the Camas Slough, sediment cores will be collected using a vibratory core sampler. Core samplers can generally collect up to a 20-foot-long core. Sediment cores will be collected with a vibracoring system deployed from an A-frame or quadrapod mounted on the sampling vessel. Cores will be collected using the submersible vibracore system with Lexan polycarbonate core barrels. If, after three attempts, the target depths are not achieved with a Lexan polycarbonate core barrel, an alternative aluminum or stainless steel core barrel will be employed to determine if better penetration could be achieved.

6.3 Horizontal Control: Datum and GPS Positioning

Horizontal coordinates are referenced to the Washington State Plan Coordinate System, South Zone (North American Datum 1983 [NAD 83]). The sampling vessel will be positioned using a Global Navigation Satellite System (GNSS) will be capable of positioning the sampling device within 10 feet horizontally of target sampling locations, maintaining position during sampling, and recording sample positions with a minimum of 3-foot accuracy. The Trimble R10 GNSS receiver, installed directly over the sampling equipment, will be integrated into the navigation software (HYPACK v. 2020) along with the sample locations to provide real-time positioning for accurate equipment deployment. (DMMP 2021).

Sampling Areas are roughly rectangular, and geographic coordinates for each of the four corner points of the area have been determined (using UTMs); these are tabulated in Appendix C.

6.4 Vertical Control: Datum, Water Depth Determination, and Tidal Levels

Vertical sampling data will be reported for the project area using the Columbia River Datum (CRD). A recently completed bathymetric survey for the project area will assist in evaluation of vertical measurements for sampling and to assist with interval calculations.

Water depths will be determined using an on-board instrumentation will include a 200-kilohertz HydroSystems CeeEcho single-beam echosounder, paired with a high accuracy Trimble R10 GNSS system. As explained in detail in the Tier 1 Report, while the project area is tidal, the tidal prism at this location 120 river miles upriver from the Columbia River's mouth at the Pacific Ocean is about 1 foot and only noticeable at low river levels. As river volume increase seasonally, tidal fluctuation is attenuated.

The National Oceanic and Atmospheric Administration's (NOAA) Vancouver, Washington, tidal gauge (Station 9440083) is located approximately 16 miles downriver on the Columbia River and provides historical, as well as current and predicted, tidal information.

River stage levels are measured by the U.S. Geological Survey (Station 14144700) at the Vancouver, Washington, station located 16 miles downriver on the Columbia River. River forecast stage data are issued routinely year-round by NOAA's Advance Hydrologic Prediction Service for Vancouver, Washington.

Mudline elevations will be estimated from water depths, water elevation at the tidal gauges and GPS positions. River water depth will be determined at each sampling location and recorded. River water depths will be measured using a contemporary high-accuracy acoustic depth sounder located on the sampling vessel. Mudline elevations will be determined and sampling interval depths listed in **Table 5** adjusted to meet the target elevations.

6.5 Sample Acceptance Criteria

After the sample is retrieved, the sample is carefully inspected against acceptance criteria before being accepted. If a sample does not meet these criteria, it will be rejected, and a subsequent sample made. Sample locations and failed acceptability criteria will be recorded for every failed sample. All sampling attempts will be recorded, including locations and conditions of refusals for core sampling. Waste sediment from rejected samples or extra sediment not processed as a sample or for archive will be retained on the vessel for disposal at an approved upland location. No sampled sediment will be returned to the water.

For core samples, the following acceptability criteria must be satisfied:

- Percent recovery must be at least 75 percent of the target characterization depth. Percent recovery will be calculated by the ratio of the length (feet) of sediment filled core to the depth of core penetration (feet).
- For sampling, the longest core collected will be used.
- For sampling, core depths will not be compaction corrected.
- The sample within the core appears to be largely undisturbed.
- The sample was not exposed to any contamination during handling.
- Core penetration depth will reach the lower limit of the sample design.

For each Camas Slough DMMU, the anticipated unit elevations in feet are summarized in **Table 5**. Within each sampled core, the sample unit will be determined by depth below the mudline for each

core based on the unit's elevations and thicknesses. Cores will be driven to depths that fully characterize the proposed dredge prism and the Z-layer, or to refusal. Bedrock is known to occur near or at the surface in some locations in the Camas Slough, and within 25 feet of the surface throughout the Camas Slough, so refusals are possible. If the core meets refusal before penetration is sufficient, the coring location may be moved. Per this sample design, the intent is to sample within the designated Sampling Areas, and if needed several cores may be taken within the sample area to fully characterize the dredge prism. Up to three cores will be collected if acceptance criteria listed above are not met. If core penetration and recovery are still insufficient to meet sampling requirements within the Sample Area, real-time consultation with the DMMP will be initiated.

The penetration of the core will be measured at the end of the core drive and recovery will be measure on-deck after the core has been retrieved. Recovered cores will not be compaction corrected for sampling intervals.

6.6 Sampling Logs and other Documentation

Sampling field logs will be completed for each sampling event. Field core logs will be completed for each core collected and will be kept with the core during transport and processing.

At a minimum, the following information will be recorded in the field/sampling logs.

- Elevation of each station sampled as measured from CRD at the time of sampling;
- Station location determined in latitude and longitude using GNSS;
- Date and time of collection of each sample;
- Names of field person(s) collecting and logging in the sample;
- Weather conditions;
- The sample station number as derived from this sampling plan, along with sequential number of the individual cores collected at the location;
- Penetration depth of each coring attempt;
- Percent recovery for each coring attempt;
- Note of core acceptance or discard; and
- Apparent resistance of the material to sampling based on the depth of penetration of the sampler.
- Notes on core refusal for hard material, including presence of rip-rap or rock.

Appendix D contains the field forms that will be used to document project field work.

Table 10 provides the information to be entered and retained in the sampling logs.

Table 10. Information Required to Be Collected for Core Sampling Logs

Information	Details
Date and time	Month, day, year, and time the sample is collected.
Recorder information	Names of vessel and vessel operators, field supervisors, and persons collecting and logging information.
Weather and river conditions	River conditions will include wave and current observations. Weather includes wind, temperature, and cloud cover as well as precipitation.
Project Name and Number	Project name along with a numeric or alphanumeric code identifying the project.
Core Sample Name	An alphanumeric code of up to 5 characters, using project-specific site codes identifying the location where the sample is collected.
Sampling Equipment	Equipment used for sampling (i.e., core sampler). For core samples, information includes total length of the core tube, for example.
Sample Observations	Penetration depth, refusal conditions, if needed. Information on sampling conditions and condition of the sample to determine if criteria for acceptance are met.
Sediment Description	Type of sediment (density, color, consistency, texture); plant, animals, or debris present; and presence of odors, oils, or sheen. Any other distinguishing feature.
Sample Determination	Information regarding status of sample—accepted or discarded.
Comments	Any deviations from the approved sampling plan along with general observations related to the sampling event.

Information will be recorded on a field form. As stated, all attempts at sampling will be recorded, documenting field conditions, even for refused or failed samples.

Field data undergo quality assurance procedures. All data and log forms are reviewed daily by the person recording the data so that any errors or omissions can be corrected. A second review is performed to verify the initial review.

6.7 Sample Identification

A unique sample number is assigned to each sample and recorded. Sample numbers are generated and pre-assigned but may be adjusted if needed during sampling. The sample numbering system does not identify a geographic location to ensure that samples sent to analytical laboratories are “blind” to the laboratory to prevent bias.

6.8 Chain of Custody Procedures and Transport

Chain of custody procedures will be followed. This procedure:

- Commences in the field, immediately upon sample acceptance;
- Is maintained throughout all sampling and sample processing activities; and
- Is continued by the analytical laboratory.

Chain of custody forms are completed to document information that verifies protocols have been followed and to keep essential information on the sample with the sample throughout its processing.

The procedure documents:

- Responsible parties,

Exhibit 9 SHOR23-01

- Sample identification number,
- Sample handling history, including transfers (date and times and including removal from and return to storage at the laboratory);
- Holding conditions, including temperature, location, and duration; and
- Final disposition of the sample.

Chain of custody forms are placed inside plastic bags to protect them from water damage and are stored with the samples. The samples listed on a chain of custody form are packed together with their form.

The chain of custody form is signed and dated at the time samples change custody. The form is never signed prior to, or in advance of, the actual transfer of the samples from one custodian to the next. Following sampling, samples remain in sight of the sampling crew or are stored in a secure, temperature-controlled location. After collection and processing, samples will be driven to the laboratory. If someone other than the sample collector transports samples to the laboratory, the collector signs and dates the chain of custody form and writes the name of the person or firm transporting the samples under “transported by” before sealing the container with a custody seal.

7.0 SAMPLE PROCESSING

Sample processing refers to the process to move sediments from sampling equipment into correctly identified containers in a manner that provides for appropriate analysis conditions, and follows a step-wise, formalized procedure to ensure that materials are managed correctly. Initial sample processing occurs on the field vessel. Depending on field conditions, additional processing may occur at the laboratory.

Tetra Tech will coordinate directly with a Washington State laboratory, certified for the analysis of solid samples by the required methods, in determining the amount of sediment and numbers and types of containers required to successfully analyze the suite of analytes. Tetra Tech will coordinate closely so that the laboratory receives samples of a quantity and condition to meet all analytical procedures. Approximately 2 to 3 liters total of sample will be required to provide adequate volume for testing of sediment conventional parameters and chemicals of concern; additional material will be collected as well as for archiving. Compositing will occur prior to subsampling. Z-Layer samples will not be composited. Samples will be held on ice from time of collection to composting and subsampling or sampling for the z-layer samples. Collected samples will be stored in coolers on ice until delivered to the laboratory. If held for an extended period of time (i.e., overnight), ice will be replenished as needed.

For core samples, the core tube will be split to expose the sediments. Observations will be made and documented. Following acceptance of the core, the sediment unit’s boundaries are measured, identified, and marked. Sediment in the core will be collected, containerized, and labeled, with a portion to be composted for analysis.

7.1 Decontamination Procedure

Standard decontamination procedure will be implemented so that no contamination occurs from one sample to the next or from outside sources. All equipment and instruments used to move sediment are stainless steel and are cleaned before each day's use and again between sampling or compositing events.

Equipment that may be used for sample management include the following:

- Stainless-steel bowls, tray, spoons, spatulas;
- Aluminum foil;
- Distilled water and soap; and
- Disposable gloves.

The decontamination procedure is as follows:

1. Prewash rinse with tap water.
2. First wash with solution of tap water and Alconox soap (brush).
3. Second rinse with tap water.
4. Second wash with solution of tap water and Alconox soap (brush).
5. First rinse with distilled water.
6. Second rinse with distilled water.
7. Coverage (no contact) of all decontaminated items with aluminum foil.
8. Storage in clean, closed container for next use.

The decontamination procedure does not use any acid or solvent rinses (the final rinse uses distilled water).

7.2 Sample Compositing

The collected sample intervals for each DMMU listed in **Table 5** will be composited in the field after the collection of all cores for each DMMU. Subsamples for all analyses will be collected from the composite sample representative of sediment from each DMMU.

Equal volumes of sample material from each core will be collected and composited into one DMMU sample for analysis. For each 4-foot core interval, a representative sediment volume along the length of the interval will be collected and thoroughly mixed. One liter of the homogenized sediment will be collected into a bowl for the DMMU composite. From the remaining homogenized material, samples will be collected to submit to the laboratory to archive for potential future chemical analysis, if needed. As material is collected from each core interval for the DMMU composite, the material will be mixed in the bowl used for the DMMU composite. After collection of the last core interval for a DMMU, the collected sediment will be thoroughly mixed and subsamples will be collected into the appropriate sample containers for delivery and analysis at the laboratory.

Exhibit 9 SHOR23-01

All sediment handling (extruding, mixing, and homogenizing) will be performed using stainless-steel or disposable spoons and bowls. All reusable sampling, mixing, and homogenizing equipment will be decontaminated prior to collection at each sampling station. Disposable latex/nitrile gloves will be used and will be rinsed with distilled water before and after handling each individual sample, as appropriate, to prevent sample contamination. Gloves will be disposed of between composites to prevent cross contamination. Containerizing for archive of sampled materials will also be implemented, which would make sediment available for additional analysis, if needed, as long as holding times and conditions were able to be met during archiving.

7.3 Subsamples for Total Sulfides

Samples for total sulfides will be collected in a 4-ounce jar with zinc acetate solution and filled to minimize head space . The sample container will be shaken to mix the zinc acetate solution and sediment. The total sulfides sampling jars will be clearly labeled to indicate that zinc acetate had been added as a preservative.

7.4 Archived Sediments

Approximately 1 liter of additional sediment from each DMMU and samples from the Z-layer is collected for archiving. These samples for chemical analysis are frozen and maintained at -18 degrees Celsius (°C). Sediment from archived samples may be used for re-analysis of selected analytes. Sediment for potential bioassays will be collected from the composite material and stored separately from the chemical samples collected and maintained at 4°C with no head space or under nitrogen.

8.0 LABORATORY ANALYSIS

For Camas Slough samples, analytes include conventional parameters along with a suite of chemicals of concern identified for fresh waters and dioxins/furans. Tiered results may indicate that bioassays or other tests should be subsequently made. Archived sediment from each DMMU would be used if it is determined that bioassessments are needed, assuming holding times can be met (**Table 11**).

8.1 Quality Assurance and Quality Control

The laboratory quality assurance procedures will be followed. All data packages will be verified at a Stage 2B validation level, and a Stage 4 data validation may be conducted if the results do not meet the acceptance criteria or if the summary validation shows problems with the quality control (QC) requirements.

A Stage 2B data review includes the following steps and evaluate the data using the measurement performance criteria noted in **Table 12**:

- Review sample holding times.
- Verify that the sample numbers and analyses match those requested on the chain-of-custody form.
- Verify that the required reporting limits have been achieved.

- Verify that that field duplicates, matrix spikes, laboratory duplicates, and lab-control samples were run at the proper frequency and met QC criteria.
- Verify that the surrogate compound analyses have been performed and have met QC criteria.
- Verify that the lab blanks are free of contaminants.
- Verify that initial and continuing calibrations have met criteria.

Testing procedures for dioxin/furan analysis will comply with the recommended methods utilizing isotope dilution high resolution gas chromatography/mass spectrometry procedures, with the Puget Sound standard reference material (PS-SRM) run alongside (USACE 2021). A Stage 2B data review will be completed on the PS-SRM sample data.

Calculation of the toxicity equivalence quotient (TEQ) will occur using toxicity equivalence factors for each of the 17 congeners/isomers. Per the DMMP User's Manual (2021), dioxin concentrations will be compared to background values for the Lower Columbia River, which range from 0.65 to 2.89 nanograms per kilogram TEQ.

8.2 Laboratory Sample Handling

The analytical laboratory provides EPA-approved containers for all samples and preservative where needed. The type of analysis to be performed is listed on the container label along with preservatives added.

Table 11. Analyte, Estimated Sample Volume Needed, and Holding Conditions

Sample Type	Prep/Extraction Method	Analytical Methods	Holding Time	Sample Size[1/]	Temperature[2/]	Container	Archive[3/]
Particle Size	NA	PSEP (1986)/ASTM D-422 (modified)	6 months	100-200 g (75-150 ml)	4°C	16 oz. glass jar	
Total Solids	NA	PSEP (1986)/ SM2540G	14 days	125 g (100 ml)	4°C	8 oz. glass jar*	X
Total Volatile Solids	NA	PSEP (1986)/ SM2540G	14 days	125 g (100 ml)	4°C	8 oz. glass jar*	X
Total Organic Carbon	NA	SM 5310B/EPA 9060 (modified for sediments)	14 days	125 g (100 ml)	4°C	8 oz. glass jar*	X
Ammonia	NA	Plumb (1981)	7 days	25 g (20 ml)	4°C	4 oz. glass jar	X
Metals (except Mercury)	3050B	6020	6 months	50 g (40 ml)	4°C	4 oz. glass jar	X
Semi-volatiles, Pesticides and PCBs	3541	8081/8082/8270	14 days until extraction 40 days after extraction	150 g (120 ml)	4°C	8 oz. glass jar	X
Total Sulfides	NA	PSEP (1986)/ Plumb (1981)	7 days	50 g (40 ml)	4°C[4/]	4 oz. glass jar	
Mercury	NA	7471	28 days (1 year if frozen)	50 g (40 ml)	4°C	4 oz. glass jar	X
Butyltin	NA	Krone et al 1989	6 months	50 g (40 ml)	4°C	4 oz. glass jar	X
TPH (DRO, RRO)		NWTPH-Dx	14 days until extraction 40 days after extraction	50 g (40 ml)	4°C	4 oz. glass jar	X
Dioxin/furan (PCDD/PCDF)	NA	EPA 1613	1 year	50 g (40 ml)	-18°C	4 oz. glass jar	X
PFAS	NA	LC-MS/MS	14 days	125 g (100 ml)	4°C	8 oz. glass jar*	X
Archive for potential bioassays	NA	NA	8 weeks	5 L	4°C (zero headspace or purged with nitrogen)	1 L glass or HDPE jars or Polyethylene Bags	

Notes:
1/ Recommended minimum field sample sizes for one laboratory analysis. Actual volumes to be collected have been increased to provide a margin of error and allow for retests.
2/ During transport to the lab, samples will be stored on ice. All temperatures are +1-2°C. The mercury and archived samples will be frozen immediately upon receipt at the lab.
3/ For every DMMU, I L will be frozen to run any or all of the analyses indicated.
4/ The sulfides sample will be preserved with 5 ml of 2 Normal zinc acetate for every 30 g of sediment.
* Analyses can be from the same container.

Abbreviations and Acronyms:
°C = degree Celsius
DRO = diesel-range organics
g = gram
LC-MS/MS = liquid chromatography / tandem mass spectrometry
ml = milliliter
NA = not applicable
PCB = polychlorinated biphenyl
PSEP = Puget Sound Estuary Program
RRO = residual range organics

Table 12. Recommended Measurement Performance Criteria

Analysis Type	Precision	Accuracy	Surrogate Limits	Completeness
Semivolatiles	±35% RPD	50%-150% R	Lab Limits	95%
Pesticides	±35% RPD	50%-150% R	Lab Limits	95%
PCBs	±35% RPD	50%-150% R	Lab Limits	95%
Metals	±20% RPD	75%-125% R	NA	95%
Ammonia	±20% RSD	75%-125% R	NA	95%
Total Sulfides	±20% RSD	75%-125% R	NA	95%
Total Organic Carbon	±20% RSD	75%-125% R	NA	95%
Total Solids	±20% RSD	NA	NA	95%
Total Volatile Solids	±20% RSD	NA	NA	95%
Grain Size	±20% RSD	NA	NA	95%
Tributyltin	±35% RPD	50%-150% R	Lab Limits	95%
Dioxins/Furans	±30% RPD	Method limits[1]	Method Limits[1/]	95%

Notes:
1/ Method 1613B (EPA, 1994a).
Abbreviations and Acronyms:
NA = not applicable
PS-SRM = Puget Sound Sediment Reference Material
RPD = relative percent difference
RSD = relative standard deviation
R = recovery
SRM = standard Reference material

8.3 Laboratory Reporting

A written report will be prepared by the analytical laboratory and will document all the activities associated with analysis of samples.

At a minimum, the following will be included in the Laboratory Report:

- Results of the laboratory analyses
- Laboratory quality control results
- All protocols used during analyses and documented exceptions
- Analytical procedures, including explanation of any deviation from them
- Run batch identification for each analytical method
- Digestion, extraction, and analysis dates for each QA/QC parameter corresponding to each batch definition (i.e., all QA/QC data will be batch specific)
- A case narrative describing analytical issues/problems.

8.4 Bioassay Laboratory Protocols

Bioassays will be conducted if one or more chemicals exceed the SL criteria (**Table 8**). Bioassay tests will be run for two test species, *Hyalella azteca* and *Chironomus dilutus*. Tests will be run for at least one chronic and one acute effects. At least three endpoints will be evaluated, including lethal and sublethal endpoints (**Table 13**).

Table 13. Bioassay Species, Tests and Endpoints

Species, Biological Test, and Endpoint	Acute Effects Biological Test	Chronic Effects Biological Test	Lethal Effects Biological Test	Sub-lethal Effects Biological Test
Amphipod: *Hyalella azteca*				
10-Day mortality	X		X	
28-Day mortality		X	X	
28-Day growth		X		X
Midge: *Chironomus dilutus*				
10-Day mortality	X			
10-Day growth	X			

Acute Effects Tests

- Hyalella azteca 10-day mortality: ASTM E1706-05 (2010)/EPA Method 100.1 (EPA, 2000) DMMP User Manual 9-98 July 2021 9.7 9.7.1 9.7.2 9.7.3
- Chironomus dilutus 10-day mortality: ASTM E1706-05 (2010)/EPA Method 100.2 (EPA, 2000)
- Chironomus dilutus 10-day growth: ASTM E1706-05 (2010)/EPA Method 100.2 (EPA, 2000)
- Chronic Effects Tests
- Hyalella azteca 28-day mortality: EPA Method 100.4 (EPA, 2000)
- Hyalella azteca 28-day growth: EPA Method 100.4 (EPA, 2000)

Negative bioassay control samples will be run with the test samples and meet the performance standards noted in **Table 13**. Each test sediment will be run with eight replicates along with the laboratory control samples. Water quality over the overlying water will be monitored at the initiation and termination of the tests for conductivity, hardness and alkalinity.

Bioassay tests will be based on comparisons to the laboratory control samples and compared to the performance guidelines noted in **Table 14**. Sediment that fails to meet the SL1/SCO criteria will be considered as unsuitable for unconfined open-water disposal.

Table 14. Bioassay Test Performance Standards and Screening Levels

Biological Test/Endpoint	Performance Standard		Screening level	
	Control	Reference	SL1	SL2
Amphipod: Hyalella azteca				
10-Day mortality	MC ≤ 20%	MR ≤ 25%	MT - MC > 15% and MT vs MC SD (p ≤ 0.05)	MT - MC > 25% and MT vs MC SD (p ≤ 0.05)
28-Day mortality	MC ≤ 20%	MR ≤ 30%	MT - MC > 10% and MT vs MC SD (p ≤ 0.05)	MT - MC > 25% and MT vs MC SD (p ≤ 0.05)
28-Day growth	MIGC ≥ 0.15mg/ind	MIGR ≥ 0.15 mg/ind	(MIGC - MIGT)/MIGC > 0.25 and MIGT vs MIGC SD (p ≤ 0.05)	(MIGC - MIGT)/MIGC > 0.40 and MIGT vs MIGC SD (p ≤ 0.05)
Midge: Chironomus dilutus				
10-Day mortality	MC ≤ 30%	MR ≤ 30%	MT - MC > 20% and MT vs MC SD (p ≤ 0.05)	MT - MC > 30% and MT vs MC SD (p ≤ 0.05)

Biological Test/Endpoint	Performance Standard		Screening level	
	Control	Reference	SL1	SL2
10-Day growth	MIGC ≥ 0.48 mg/ind	MIGR/MIGC ≥ 0.8	(MIGC - MIGT)/MIGC > 0.20 and MIGT vs MIGC SD (p ≤ 0.05)	(MIGC - MIGT)/MIGC > 0.30 and MIGT vs MIGC SD (p ≤ 0.05)

Notes:
M = Mortality; C = Control; R = Reference; T = Test; F = Final; MIG = Mean Individual Growth at time final; ind = individual; mg = milligrams; SD = statistically significant difference.

9.0 DATA REPORTING REQUIREMENTS

Following completion of sampling and analysis, a Sediment Quality Data Report for the project will be produced.

A QA discussion will identify any field and laboratory activities that deviated from the approved sampling plan and the referenced protocols, including overall assessment of the validity of the data generated.

Per the DMMP User's Manual (2021), at a minimum the following will be included in the data report:

- Explanation of any deviations from this approved SAP;
- Sampling equipment and protocols used to collect sediment samples;
- Procedures used to locate sampling positions;
- Table with coordinates of actual sampling locations, measured water depth at each location, real-time tidal stage at the time of sampling each station, and mudline elevations (tide-corrected to CRD);
- Figure showing target and actual sampling locations with DMMU outlines;
- Penetration and recovery data;
- Compositing scheme with actual core lengths and depths (referenced to both CRD and the mudline);
- Analytical QA/QC section, including case narrative describing any analytical problems;
- Table of analyzed concentrations for all DMMP contaminants of concern (COC), lab and validation qualifiers, method reporting limits, and method detection limits, with DMMP guideline exceedances highlighted;
- Table of analyzed concentrations for all SMS COCs, laboratory and validation qualifiers, method reporting limits, and method detection limits, with SMS guideline exceedances highlighted;
- PS-SRM required deliverables: data validation report, electronic data deliverable, and SRM sample data summary report;
- Chemistry QA review and validation results;
- Sampling/field log as an appendix;
- Core logs as an appendix, including any relevant photos;
- Chemistry data report (including a case narrative) as an appendix;

Exhibit 9 SHOR23-01

- Validation report as an appendix;
- EIM-ready data, with data validation qualifiers, to be submitted to DMMO for QA review (electronic submittal only);
- Comprehensive laboratory data package data for Ecology (electronic submittal only); and
- Chain-of-custody forms as an appendix.

10.0 ANTIDEGRADATION EVALUATION

As stated, planned dredging is associated with the demolition of in-water and overwater infrastructure.

Post-dredge sediment surfaces would remain exposed at the following locations:

- Access dredging at the Dock Warehouse Piers
- Along the reshaped Camas Slough riverbank.
  - Old sediments would be uncovered in place by removal of structures and piling.
  - Riverbank reshaping will result in a new horizontal location for the OHWM and thus new surface area previously above OHWM becomes exposed to the aquatic environment.

As stated, future analysis of the sediments at the riverbank below the new OHWM has been recommended by DMMP to evaluate antidegradation criteria. GP plans to provide a plan addressing that sampling and analysis late in the design process.

Following the recommendation of the DMMP (2021), antidegradation analysis would be conducted for the newly exposed sediment layer at the Dock Warehouse dredge prism if:

- Testing shows the overlying materials are determined to be unsuitable for unconfined aquatic disposal,
- Other sampling in the Camas Slough showed evidence of subsurface sediments with greater contamination than surface sediments, or
- If in DMMO's judgement other site-specific conditions indicate the newly exposed surface could fail to meet antidegradation policy. (DMMP 2021)

Currently, the DMMP has indicated that analysis of the Z-layer samples in this location should proceed given the prior industrial activities at this location. The Z-layer samples will be analyzed for the same analytes as the overlying sediment samples.

In general, if the results of analysis show that the sediment meets the Sediment Management Standards, Sediment Quality Standards, then the protective conditions for antidegradation of water quality are met.

11.0 REFERENCES

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Exhibit 9 SHOR23-01

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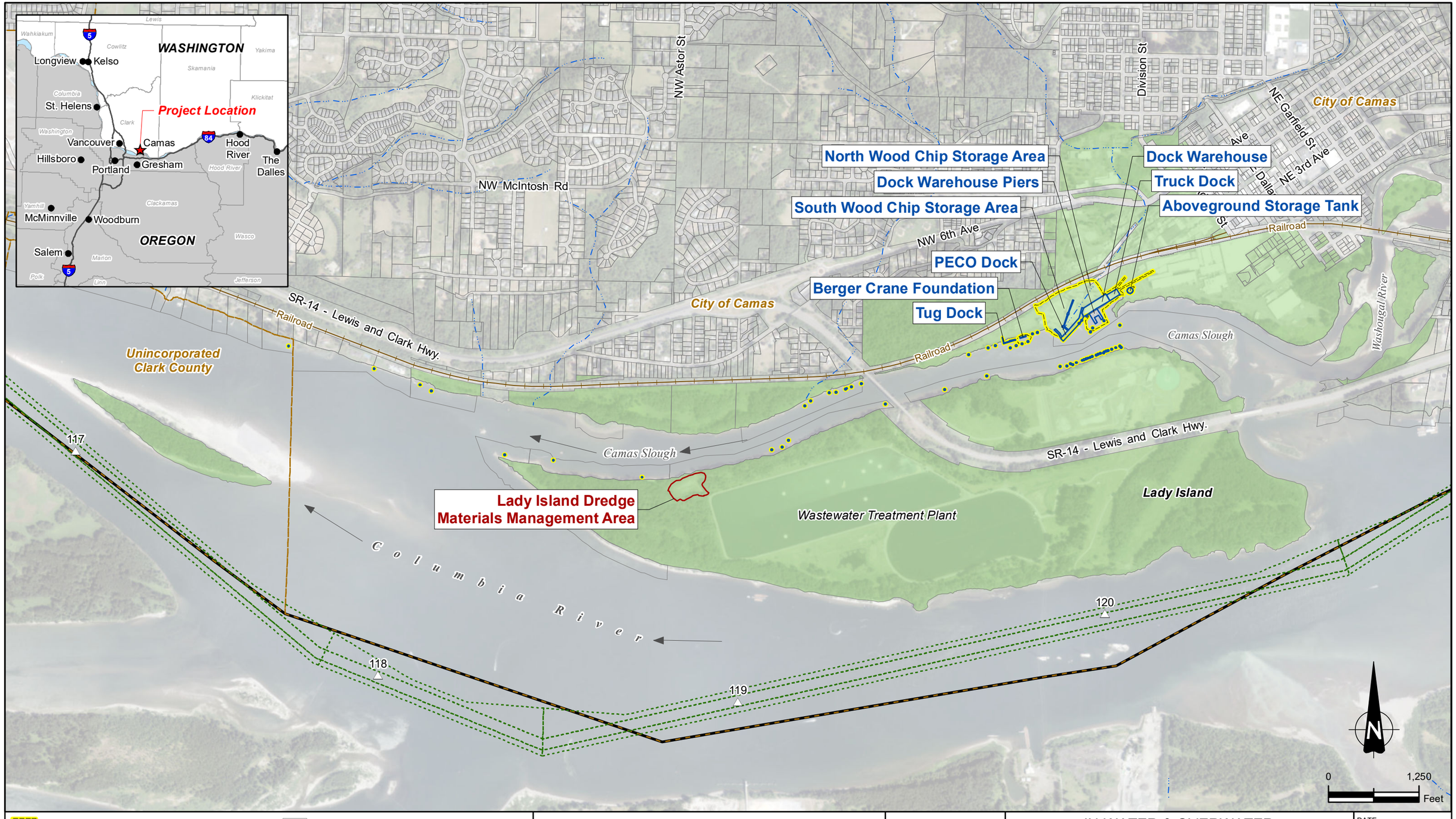
FIGURES



Project Limits	Tax Lot
Columbia River Mile Marker	Tax Lot Owned by Georgia-Pacific
Stream/River	City Boundary
Structure To Be Removed	County Boundary
Dolphin To Be Removed	Federal Navigation Channel
Lady Island Dredge Materials Management Area	

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

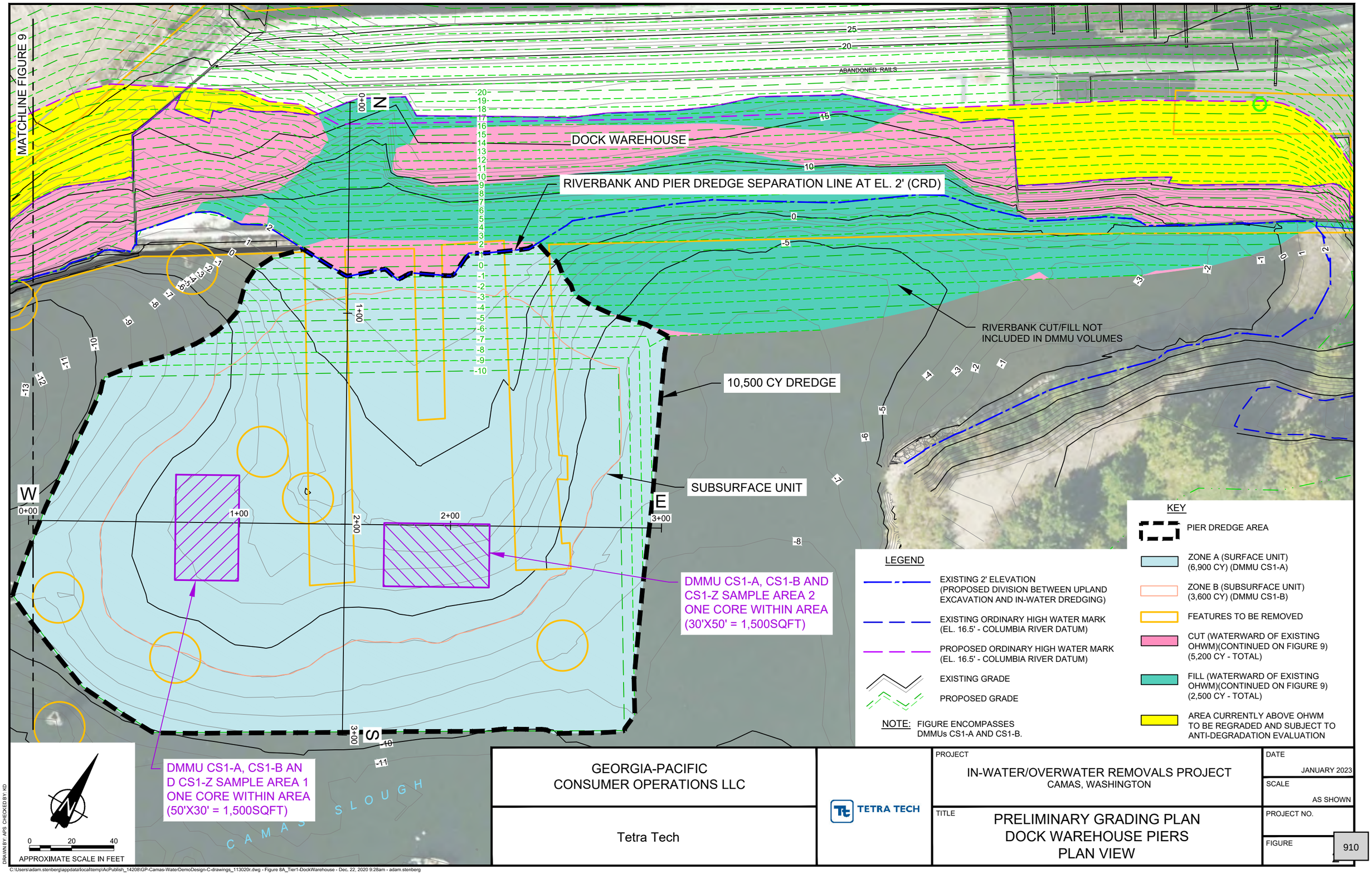
TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

PROJECT LOCATION

DATE: OCTOBER 2022
SCALE: 1 " = 1,250 '
PROJECT NO.
FIGURE: 909

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 1 - Project Location.mxd - sierra.marrs - 10/19/2022 - 3:37:33 PM



GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

PROJECT
IN-WATER/OVERWATER REMOVALS PROJECT
CAMAS, WASHINGTON

TITLE
PRELIMINARY GRADING PLAN
DOCK WAREHOUSE PIERS
PLAN VIEW

DATE
JANUARY 2023

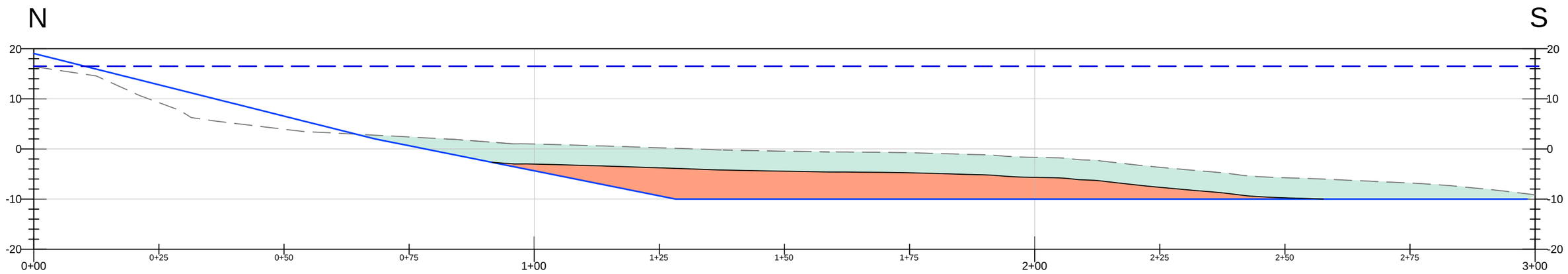
SCALE
AS SHOWN

PROJECT NO.

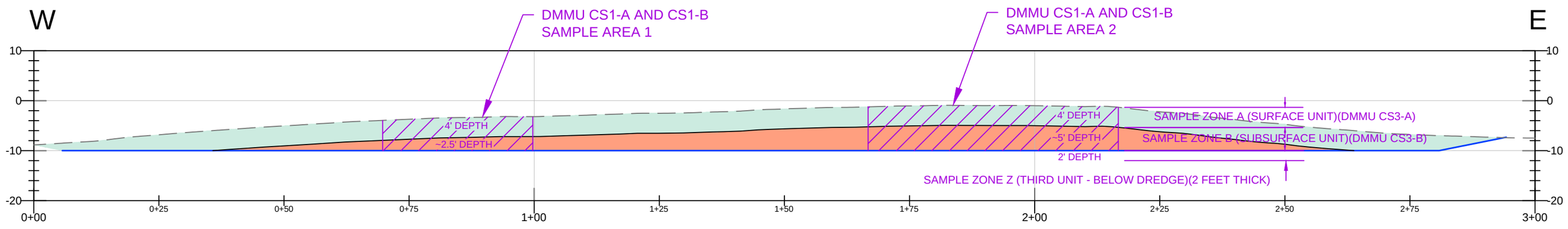
FIGURE
910

DRAWN BY: APS CHECKED BY: KD

C:\Users\adam.stenberg\appdata\local\temp\AcPublish_14208\GP-Camas-WaterDemoDesign-C-drawings_113020r.dwg - Figure 8A_Tier1-DockWarehouse - Dec. 22, 2020 9:28am - adam.stenberg



CROSS SECTION N-S



CROSS SECTION W-E

CROSS SECTION LEGEND

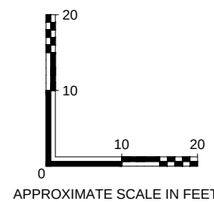
- ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- EXISTING GRADE
- DREDGING EXTENT

CAMAS SLOUGH - DMMU CS3 DETAIL

SAMPLED WITH TWO CORES.
SUBSAMPLES TAKEN FROM
ZONES A & B DEPTHS AND
COMPOSITED FOR 3 ANALYSES.

KEY

- ZONE A (SURFACE UNIT) (6,900 CY)
- ZONE B (SUBSURFACE UNIT) (3,600 CY)



APPROXIMATE SCALE IN FEET

CLIENT: GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	PROJECT: IN-WATER/OVERWATER REMOVALS PROJECT, CAMAS, WASHINGTON	DATE: JANUARY 2023
			SCALE: AS SHOWN
Tetra Tech		TITLE: DOCK WAREHOUSE PIERS DREDGE PRISM CROSS SECTIONS	PROJECT NO.
			FIGURE: 911

DRAWN BY: PM CHECKED BY: JKH

C:\Users\adam.stenberg\Documents\PS18200620\DredgePrisms\tier1-Figures\GP Camas-Tier1-DredgePrisms_120920.dwg - Figure 8B_DockDredge (3) - Dec. 20, 2020 1:29pm - adam.stenberg

LEGEND

- EXISTING 2' ELEVATION (PROPOSED DIVISION BETWEEN UPLAND EXCAVATION AND IN-WATER DREDGING)
- EXISTING ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- PROPOSED ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- EXISTING GRADE
- PROPOSED GRADE

KEY

- CUT (WATERWARD OF EXISTING OHWM)(CONTINUED ON FIGURE 8A) (5,200 CY - TOTAL)
- FILL (WATERWARD OF EXISTING OHWM)(CONTINUED ON FIGURE 8A) (2,500 CY - TOTAL)
- AREA CURRENTLY ABOVE OHWM TO BE REGRADED AND SUBJECT TO ANTI-DEGRADATION EVALUATION
- PIER DREDGE AREA (10,500 CY)
- FEATURES TO BE REMOVED

MATCHLINE FIGURE 8A

PECO DOCK

PECO CRANE

RAILS

RAILS

CAMAS SLOUGH

4:1

5:1

6:1

0 40 80

APPROXIMATE SCALE IN FEET

DRAWN BY: APS CHECKED BY: KD

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CLIENT GEORGIA-PACIFIC CONSUMER OPERATIONS LLC		PROJECT IN-WATER/OVERWATER REMOVALS PROJECT CAMAS, WASHINGTON	DATE JANUARY 2023
	TETRA TECH		SCALE AS SHOWN
Tetra Tech		TITLE PRELIMINARY GRADING PLAN PECO DOCK	PROJECT NO.
			FIGURE 912

APPENDIX A: HEALTH AND SAFETY PLAN (TO BE SUBMITTED WITH FINAL PLAN TO DMMO)

Exhibit 9 SHOR23-01

APPENDIX B: AQUATIC SPECIES DECONTAMINATION PROCEDURES

Tetra Tech Inc.
19803 North Creek Pkwy
Bothell, WA 98011

Standard Operating Procedure to Mitigate the Movement of Marine Invasive Species Through Boat and Equipment Decontamination

Purpose

This document references and outlines procedures to mitigate potential movement of marine invasive species between bodies of water, within the State of Washington and other states, and the Hood Canal where NAVBASE Bangor, Bremerton, WA, is located.

Roles

While it is the responsibility of all Tetra Tech staff to oversee the proper decontamination of boats and equipment between movements, the hierarchy of management is as follows:

1. **Captain** – One of Tetra Tech's USCG licensed captains will conduct or oversee and sign off on the decontamination effort.
2. **Surveyor** – Survey/Science staff may participate and assist the captain during decontamination effort.
3. **Warehouse Manager** – It is the responsibility of the Warehouse Manager to maintain a clean storage space for boats and equipment and to catalog the need for boats and equipment to be decontaminated.

Procedure

Tetra Tech will deploy vessels and sediment sampling equipment which have been stored on land and not moved directly from one body of water to another. In accordance with the Washington Department of Fish and Wildlife (WDFW) methods for preventing the spread of invasive species (Attachment 1) and as further defined in WDFW Invasive Species Management Protocols Part II Section C (Attachment 2), Tetra Tech will carry out Level 2 Decontamination Protocol. The steps for Level 2 protocol, are as follows:

1. **Clean** - Using a sturdy bristle brush, all boats and equipment will be cleaned using potable water. Following cleaning, the brush will be thoroughly rinsed as well. Additional cleaning tools for include a boot pick or other device for removing visible traces of sediment or other debris collected from previously entered water bodies.
    a. Whenever possible, Tetra Tech will perform Level 2 Decontamination immediately upon exit from the area.
    b. For the NAVBASE Bangor project decontamination will be conducted prior to the boat(s) and equipment being mobilized to Hood Canal, WA.
2. **Drain** – All boats and equipment will be given adequate time to drain and dry not less than 48 hrs prior to redeployment. Boats and other sealed equipment will be left unplugged when possible to ensure thorough evacuation
3. **Rinse** – Boats and equipment will be rinsed with potable water following cleaning and draining.
4. **Dry** – Let boats and equipment fully dry for 48 hrs or more.

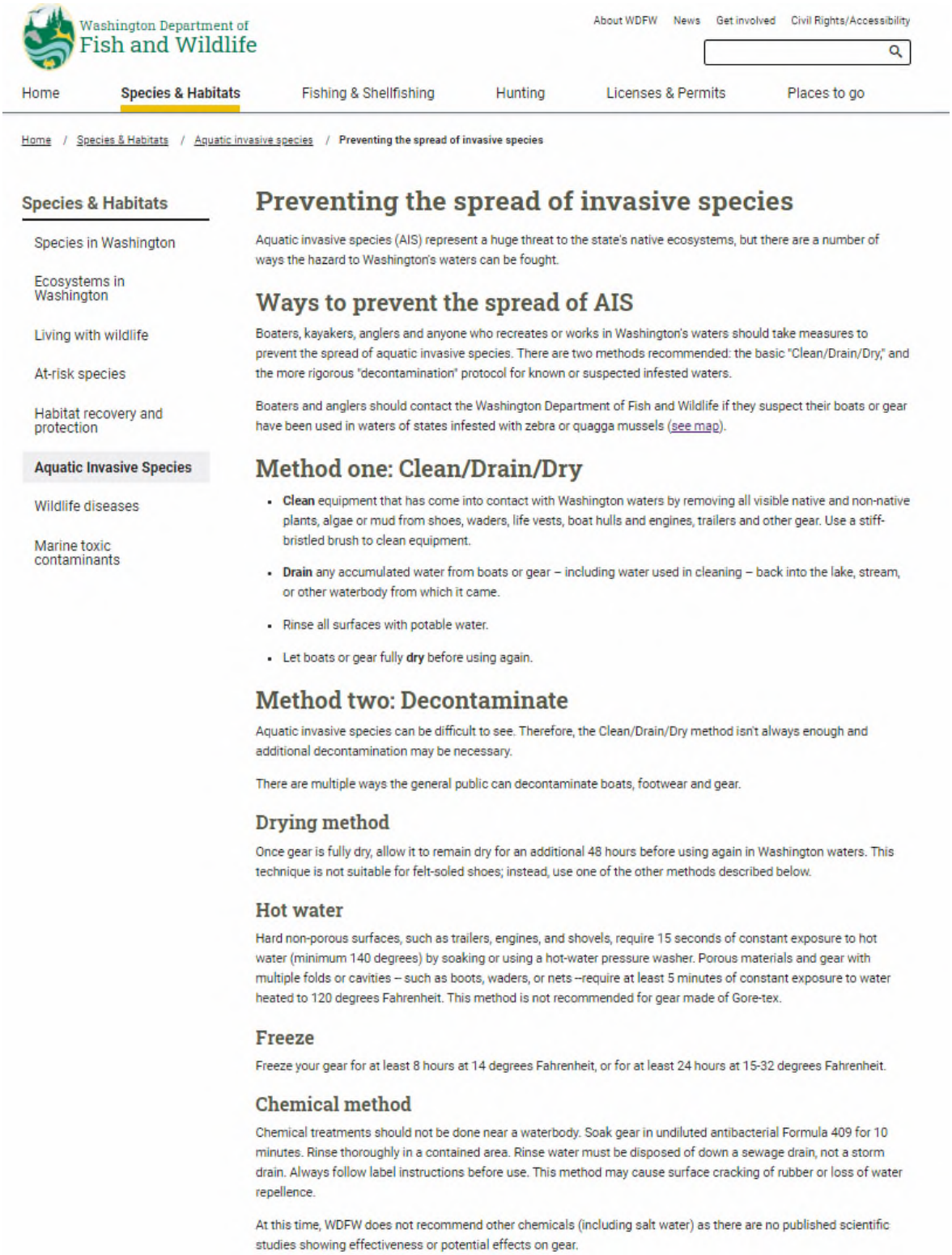
Tetra Tech Inc.
19803 North Creek Pkwy
Bothell, WA 98011

Tetra Tech Inc.
19803 North Creek Pkwy
Bothell, WA 98011

Attachment 1
WDFW Preventing the Spread of Invasive Species

May 2021

Tetra Tech Inc.
19803 North Creek Pkwy
Bothell, WA 98011



Washington Department of Fish and Wildlife

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Home | Species & Habitats | Fishing & Shellfishing | Hunting | Licenses & Permits | Places to go

Home / Species & Habitats / Aquatic invasive species / Preventing the spread of invasive species

Species & Habitats

- Species in Washington
- Ecosystems in Washington
- Living with wildlife
- At-risk species
- Habitat recovery and protection
- **Aquatic Invasive Species**
- Wildlife diseases
- Marine toxic contaminants

Preventing the spread of invasive species

Aquatic invasive species (AIS) represent a huge threat to the state's native ecosystems, but there are a number of ways the hazard to Washington's waters can be fought.

Ways to prevent the spread of AIS

Boaters, kayakers, anglers and anyone who recreates or works in Washington's waters should take measures to prevent the spread of aquatic invasive species. There are two methods recommended: the basic "Clean/Drain/Dry," and the more rigorous "decontamination" protocol for known or suspected infested waters.

Boaters and anglers should contact the Washington Department of Fish and Wildlife if they suspect their boats or gear have been used in waters of states infested with zebra or quagga mussels (see map).

Method one: Clean/Drain/Dry

- **Clean** equipment that has come into contact with Washington waters by removing all visible native and non-native plants, algae or mud from shoes, waders, life vests, boat hulls and engines, trailers and other gear. Use a stiff-bristled brush to clean equipment.
- **Drain** any accumulated water from boats or gear – including water used in cleaning – back into the lake, stream, or other waterbody from which it came.
- Rinse all surfaces with potable water.
- Let boats or gear fully **dry** before using again.

Method two: Decontaminate

Aquatic invasive species can be difficult to see. Therefore, the Clean/Drain/Dry method isn't always enough and additional decontamination may be necessary.

There are multiple ways the general public can decontaminate boats, footwear and gear.

Drying method

Once gear is fully dry, allow it to remain dry for an additional 48 hours before using again in Washington waters. This technique is not suitable for felt-soled shoes; instead, use one of the other methods described below.

Hot water

Hard non-porous surfaces, such as trailers, engines, and shovels, require 15 seconds of constant exposure to hot water (minimum 140 degrees) by soaking or using a hot-water pressure washer. Porous materials and gear with multiple folds or cavities – such as boots, waders, or nets --require at least 5 minutes of constant exposure to water heated to 120 degrees Fahrenheit. This method is not recommended for gear made of Gore-tex.

Freeze

Freeze your gear for at least 8 hours at 14 degrees Fahrenheit, or for at least 24 hours at 15-32 degrees Fahrenheit.

Chemical method

Chemical treatments should not be done near a waterbody. Soak gear in undiluted antibacterial Formula 409 for 10 minutes. Rinse thoroughly in a contained area. Rinse water must be disposed of down a sewage drain, not a storm drain. Always follow label instructions before use. This method may cause surface cracking of rubber or loss of water repellence.

At this time, WDFW does not recommend other chemicals (including salt water) as there are no published scientific studies showing effectiveness or potential effects on gear.

Sourse: [Preventing the spread of invasive species | Washington Department of Fish & Wildlife]

Tetra Tech Inc.
19803 North Creek Pkwy
Bothell, WA 98011

Attachment 2
WDFW Invasive Species Management Protocols*

*Draft Version 3, February 2016, has been confirmed as WDFW current document in May 2021.

May 2021

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

Invasive Species Management Protocols

DRAFT Version 3

February 2016

WDFW Invasive Species Management Committee:
Bill Tweit, Allen Pleus, Dave Heimer, Marc Hayes, Carl Klein, John Kerwin, Jesse Schultz, Larry Phillips, Bill Hebner, Annette Hoffmann, Mike Schmuck, Stacie Kelsey, and Rachel McDaniel

Table of Contents

INTRODUCTION 2
A. Policy Background 2
B. Adaptive Management 2
C. Phase In and Funding Constraints 2

PART I. PROTOCOLS FOR FIELD WORK IN TERRESTRIAL AREAS 3
A. Internal Consultation/Approval 3
B. Protocols for Purchasing Hay 3
C. Protocols for Purchasing Seeds and Rootstock for Revegetation 4

PART II. PROTOCOLS FOR FIELD WORK ON ALL WATERS 5
A. Geographic Management Areas 5
Freshwater Ecosystems 5
Marine and Estuary Ecosystems 5
B. Decontamination Protocols – General Precautions 5
C. Level 1 Decontamination Protocol – Basic 6
In General 6
Level 1 Decontamination Equipment 6
D. Level 2 Decontamination Protocol – High-Risk Situations 7
In General 7
Virkon Aquatic Treatment 7
Hot Water Treatment 8
Freezing Treatment 8
Formula 409 Solution Treatment 9
E. Special Situations 9
Felt Soled Waders/Boots 9
Wading Wet 9
Boats and Other Large Aquatic Conveyances Transported Overland 10
Moored Boats and Other Typically Stationary Large Aquatic Conveyances 10
Nets 11
Vehicles 11
Fish Tankers 11
Heavy Equipment When Used in Aquatic Environments 12
Stream Restoration Guidelines 12
Diving Equipment 12

INTRODUCTION

A. Policy Background

Policy 5310, Managing Invasive Species, commits the Department to "adopt and actively maintain science-based protocols for minimizing the risk that field and property management activities will contribute to the spread of invasive species." The accompanying Procedure established the Invasive Species Management Committee (ISMC), with responsibility for developing and updating these protocols, monitoring their implementation, and ensuring that training needs are met.

B. Adaptive Management

The ISMC relies upon best available science in developing these decontamination protocols. However, the science regarding effectiveness of decontamination protocols (either chemicals or procedures) on the entire suite of undesirable or invasive aquatic organisms remains incomplete. In particular, protocols known to be effective on selected undesirable organisms remain untested or poorly understood on others. Ultimately, science can adaptively fill these gaps. However, where effectiveness of a protocol on a specific undesirable organism is unknown and alternatives for control are lacking, protocol application must be viewed as exploratory and experimental, and control is not guaranteed. The ISMC will keep abreast of scientific developments, as well as monitoring implementation issues, and will adaptively modify these protocols as necessary to ensure they remain science-based, effective and safe.

C. Phase In and Funding Constraints

Policy 5310 stipulated that "Fiscal impacts may be phased in based on available revenue." Full implementation of these protocols, in terms of purchase of materials and establishing proper decontamination stations, may take several years. However, all staff are expected to comply with these protocols to the extent feasible, within existing budget and staff constraints. Basic techniques of Clean, Drain and Dry can be followed at little or no additional cost to the agency and should be implemented immediately. Much of this is already required by existing statutes prohibiting transport of aquatic plants, noxious weeds or prohibited aquatic animal species.

PART I.
PROTOCOLS FOR FIELD WORK IN TERRESTRIAL AREAS

A. Internal Consultation/Approval

1. When any acquisition, habitat enhancement/restoration, or construction projects are proposed, the Regional Director will be notified to disseminate the information to ensure that staff can review for invasive species management issues.
2. Before conducting field work, determine whether those activities will occur in an area with invasives, and ensure that work plan allows for suitable decontamination and that appropriate decontamination equipment is available.
3. On Department lands, follow the requirements of the local Weed Management Plan located in the Wildlife Area Management Plan specific to that site. Consult with the Wildlife Area Manager or Access Site Manager prior to conducting of field work.
4. On other public lands, determine whether any local requirements exist and comply with those rules.
5. Employ basic weed-free precautions prior to entering the field by ensuring equipment, vehicles and clothing are free of invasives. Regularly check clothing and boots for attached weed seeds, remove them immediately to avoid distributing to new areas. Before exiting the field, visually inspect clothing and vehicles for plant hitchhikers and remove. Carry zip lock bags for this purpose, and dispose of them where they will not get reintroduced into the environment. Thoroughly wash vehicles in a contained area before moving to a new site, paying special attention to the flooring, undercarriage, grill and wheel wells.
6. Ensure that any wildlife translocation or relocation efforts comply with pathogen/disease screening criteria[1].
7. Observe special precautions for field work at bat roosts/caves (for example, where white-nose syndrome may be present) and other special circumstances[2].

B. Protocols for Purchasing Hay

Hay purchased for wildlife feeding must meet certain nutritional requirements and be available in bale sizes that are compatible with agency feeding equipment. To reduce the risk of introducing weeds through hay, the following procedure should be followed:

1. Feed certified weed-free hay when available with a target of using 50% weed-free hay for wildlife feeding operations by 2017. In addition, *weed-free* hay should be free of other weeds that are not currently listed as “noxious weeds” but pose a threat to agency lands (e.g. *Ventenata dubia*, cheatgrass, etc.).
2. Hay that is not certified weed-free must include bid and contract language addressing noxious weeds/unwanted plants. Bales, or hay fields that do not

[1] Contact Kristin Mansfield (WDFW Veterinarian) 509-892-1001 Ext 326, Kristin.Mansfield@dfw.wa.gov.

[2] Decontamination protocols for white nose syndrome available at: http://www.fws.gov/WhiteNoseSyndrome/Research.html

meet the standards will be cause for terminating the contract and rejecting the hay.
3. Feeding of wildlife will occur in established feed sites to reduce the potential spread of weeds to wild lands. These feed sites will be surveyed and treated annually for new weeds.

C. Protocols for Purchasing Seeds and Rootstock for Revegetation

The agency purchases seeds and rootstock to implement restoration/enhancement, plant forage crops and as an element of construction projects. Eliminating noxious weeds seeds and propagules in vegetation purchased by the agency will help reduce the potential for infestations on agency and adjacent lands. Revegetation plantings will be consistent with ecological integrity goals and objectives identified for the site. To accomplish this, the following procedure should be followed:

1. Purchase native plant seeds and rootstock adapted to the project area, when appropriate.
2. Ensure that the bid and contract language for seeds and rootstock meet quality standards for noxious weeds/unwanted plants; pathogens; or disease. Request appropriate certification documentation when applicable.
3. Restoration/enhancement and agricultural fields must be revisited and treated for weeds.
4. Refer to the *WDFW Restoration Manual* (currently in draft), *Landscaping for Wildlife in the Pacific Northwest*, and *PNW Weed Management Handbook* for information regarding planting and weed control.

PART II.
PROTOCOLS FOR FIELD WORK ON ALL WATERS

A. Geographic Management Areas

Freshwater Ecosystems – Management areas are based on Watershed Resource Inventory Area (WRIA) boundaries as follows:
Level 1 Decontamination protocols are required whenever moving from one waterbody to another, regardless if in the same WRIA.
Level 2 Decontamination is required whenever:

- Moving across WRIA boundaries, or
- When leaving known infested waters, or
- Before entering protected or highly sensitive sites, or
- When moving between still-water habitats (lakes, marshes or ponds) that have no surface water connection to streams or other aquatic habitats.

Each region is responsible for reviewing the WRIA boundaries, and determining whether additional delineation to the sub-basin level is necessary: either to contain known infestations or to protect vulnerable ecosystems or native populations. Maps delineating WRIA boundaries are available on the WDFW website image gallery[3] or on the SalmonScape website[4]. Sub-basin boundaries will be available on maps on the agency intranet.

Marine and Estuarine Ecosystems - Level 1 Decontamination is required whenever moving from one waterbody to another, regardless if in the same WDFW marine area. See Special Protocols section for moored boats and other typically stationary large aquatic equipment. Level 2 Decontamination is required whenever equipment or vessels are transported between:

- Major oceanographic basins (Outer coast and Strait of Juan de Fuca, Georgia/Haro Strait, Hood Canal, South Puget Sound, and North/Central Puget Sound), or
- When moving from known infested waters (eg., based on local knowledge, as available on the agency AIS website, or other sources), or
- Before entering protected or highly sensitive areas.

B. Decontamination Protocols – General Precautions

In General - All staff are encouraged to apply basic precautionary principles to control invasive species including:

[3] http://wdfw.wa.gov/gallery/index.php/Maps/album28

[4] http://fortress.wa.gov/dfw/gispublic/apps/salmonscape/default.htm

1. Prevent/Minimize - Field staff should be aware of infestations in their management areas and assess whether in-water work is necessary. If in-water work is unavoidable:
    - Arrange sampling plans to progress from the least to the most likely to be contaminated areas within a waterbody.
    - Sample from upstream to downstream in a watershed or from areas of less weed growth to dense weed growth.
    - Minimize wading and avoid running boats into sediment.
    - Consider using bank sampling poles instead of wading.
    - Consider purchase of wading gear and boots with the fewest places for organisms and debris to become attached. Best are one-piece systems with full rubber material and open cleat soles. Riskiest are the multi-piece wading systems with fabrics, detachable boots and felt soles. Mud/rock guards are recommended for all stocking-foot wades to minimize contamination on inside surfaces.
    - Reduce the amount of plants, sediment, or organisms that are removed from the water into boats or sampling gear.
    - Get in the habit of regularly inspecting and cleaning gear while working.
2. Dedicated equipment - When working in infested water bodies, field staff should maintain unique sets of dedicated equipment and clothing such as waders, nets, and other sampling tools to prevent the transfer of AIS to uncontaminated areas. Dedicated equipment does not need to be cleaned or decontaminated after each use if labeled and kept isolated from other equipment to avoid cross-contamination. Dedicated equipment must be decontaminated prior to use in another water body.

C. Level 1 Decontamination Protocol - Basic

In General - The basic steps in decontamination for all types of gear and equipment in all situations are Clean, Drain, and Rinse. Immediately upon leaving a water body, clean off any attached sediment, organisms or debris from surface areas that were in contact with the water, the bottom or the wetted perimeter. You can use local water source to help remove heavy deposits. Drain any water back into the water body from which it came. Rinse all surface areas with potable water. Equipment that comes into contact with a water body must also be decontaminated including stadia rods, measuring tapes, backpack shockers, temperature loggers, etc.

Level 1 Decontamination Equipment - The basic Level 1 Decontamination cleaning equipment is a sturdy bristle brush, a boot pick, and potable rinse water. After exiting the water, remove debris from waders/boots and raingear. Clean thoroughly, especially the often complex gripping soles that tend to gather material. When decontaminating multi-piece gear, it is critical to remove attachments and boots to allow for full cleaning coverage. Once all debris has been removed, rinse off equipment with potable rinse water. Rinse water can be kept in a 3-5 gallon (10.5-17.5 L) water tank in your field vehicle (e.g., water cooler, pressurized tank sprayer; solar shower).

Level 1 Decontamination that is conducted immediately after leaving the water does not require any further containment of rinse liquids or removed debris. If the Level 1 procedures cannot be done in the field, gear must be placed in a plastic bag or tote for transportation to a proper decontamination station.
Note on Scrub Brush: Once you have completed a Level 1 Decontamination on field gear, clean and rinse the brush as well. If conducting a Level 2 Decontamination, make sure you include the brush at the end.

D. Level 2 Decontamination Protocol - High Risk Situations

In General - Level 2 Decontamination treatments are designed to kill/eradicate invasive species. Level 1 Decontamination protocols must be conducted prior to starting Level 2 protocols to ensure the effectiveness of the Level 2 treatments. The use of physical and chemical treatments for Level 2 Decontamination is based on best available science and best professional judgment. Criteria for each treatment are applicable to gear or equipment types as noted. Protocols for each treatment are footnoted to identify the scientific literature the method follows and the species of organisms for which it was tested.
Field gear must be decontaminated every day (excluding gear used solely in one water body or sub-basin, which is a recommended approach for minimizing risk of transmission). When decontaminating multi-piece gear, it is critical to remove attachments and boots to allow for full exposure to all potentially contaminated surfaces. Chemical agents or physical treatments must maintain contact with the entire surface for the duration of the treatment to be effective. Exposure times start when equipment is fully saturated or reaches appropriate temperatures. Safety glasses and waterproof gloves are required for all treatments except freezing.

Virkon® Aquatic Solution Treatment - This is the Level 2 Decontamination **Agency-Preferred Method** for most gear and species:

- Decontamination for bacteria and viruses (micro-organisms) requires soaking gear thoroughly with 1% solution so that it is completely saturated for a minimum of 10 minutes[5].
- Decontamination for larger aquatic organisms such as New Zealand Mudsnails and zebra/quagga mussels requires soaking gear thoroughly with 2% solution so that it is completely saturated for a minimum of 20 minutes[6].
- Rinse thoroughly in a contained area and dispose of rinse water down a sewage drain, not a storm drain.

[5] Criteria based on Johnson et al. 2003 (Chytrid fungus), VESO 1991, Frerichs 1990, Hellstrom and Johansson 1990, Bennett 1997, and Rainnie 2002 on multiple fish bacteria and viruses – NOT tested on whirling disease.

[6] Stockton 2011 for eradicating New Zealand mudsnails and quagga mussels in fish hatcheries.

Note on Mixing and Use of Virkon® Aquatic - Must be mixed in a well-ventilated area, preferably outdoors. A splash apron, gloves and safety goggles must be used. The powder should be mixed with clean water according to the dilution instructions for a 1% or 2% solution. Do not apply the powder directly on the surface you are trying to disinfect. Mix the solution in a clean container of known volume. Measure the correct amount according to the dilution table (1 quart, 1 gallon, 10 gallons or 50 gallons). Refer to the Virkon® Aquatic instructions and MSDS sheets for further information. Information can also be obtained by going to:
http://www.wchemical.com/VIRKON-AQUATIC-P44C11.aspx

Virkon® Aquatic solutions can last up to seven days or more and will need to be checked regularly. Test strips can be purchased to test your solution. Not known to damage gear or equipment materials. Wear protective gear, eye protection and gloves, when using.

Hot Water Treatment[7] – Hot water treatment can be by soaking or applying with a hot water pressure washer. A hot water pressure washer capable of 140°F (60°C) is currently available at every regional office. Note: 140°F (60°C) and higher temperatures cannot be achieved using most hot water heaters that are installed for domestic uses, which should be kept at 120°F to avoid burns.

- Hard non-porous surfaces require constant exposure for a minimum of 140°F (60°C) at a minimum of fifteen (15) seconds.
- Porous materials and gear with multiple folds/cavities require constant exposure at a minimum of 140°F (60°C) for a minimum five minutes or at 120°F (49°C) for a minimum of 30 minutes.
- If whirling disease is a possibility, you must use at a minimum of 167°F (75°C) for a minimum of five minutes.

CAUTION: These temperatures can burn exposed skin. Do not use this method for Gortex or other materials cannot hold up to high temperatures.

Freezing Treatment[8] - Expose gear to 14°F (-10°C) or colder for a minimum of 8 hours or 15°F to 32°F (-9°C to 0°C) for 24 hours. If gear has been used in marine or estuary situations, rinse thoroughly in freshwater before freezing. Do not use for whirling disease or fish virus decontamination.

[7] Maximum temperatures based on Johnson et al. 2003 under laboratory conditions for Chytrid fungus. Supports other decontamination studies for juvenile and adult New Zealand Mudsnails, zebra and quagga mussels, and Didymo species by Medhurst 2003, Morse 2009, and USFS Fire Guidance 2008 respectively. Whirling disease criteria from Wagner et al. 2003.

[8] Minimum temperatures based on Bergendorf 2004 for adult New Zealand Mudsnails and Kilroy et al. 2006 for Didymo. Using conservative criteria as literature studies show high variability in effectiveness. Effectiveness of freezing for whirling disease questioned by Hedrick et al. 2008 as may not completely inactivate cells.

Formula 409® Solution Treatment[9] – Must use anti-bacterial version. Expose gear thoroughly to 100% solution for a minimum of 10 minutes. Rinse thoroughly in a contained area. Rinse water must be disposed of down a sewage drain, not a storm drain.

E. Special Protocols

Felt Sole Waders/Boots - Felt soles are one of the largest risk factors for transmission of invasive species since they are extremely difficult to decontaminate fully. Consequently, WDFW policy is that all alternatives should be explored before deciding to use felt soles. The primary challenge with decontaminating felt soles is the porosity and depth of the material making it very difficult for treatments to effectively decontaminate throughout the porous matrix. For this reason, chemical decontamination treatments are inadequate for this protocol and exposure times for hot water must be sufficient to ensure that target temperatures are attained throughout the porous matrix. Some manufacturing companies are also phasing out felt-sole boots from their lines and offering rubber sole/cleat combinations in their place.

Felt sole waders/boots may only be used under the following conditions:

1. With the approval of the Program AD, based on their determination that no other suitable alternatives exist.
2. The **Agency Preferred Method** is that staff use dedicated felt sole waders/boots within an area of known infested waters not to exceed a single WRIA. A Level 1 Decontamination must still be conducted between uses.
3. If felt sole waders/boots must be used between different known infested waters within the same WRIA or between different WRIAs, a Level 2 Decontamination must be conducted using one of the following treatments[10] (NOT suitable for Whirling Disease or fish viruses):
    - Hot water treatment[11] using standard soaking in constant 120°F (49°C) for a minimum of 30 minutes protocol; or
    - Freezing treatment using standard protocols.

Wading "Wet" - Any gear or clothing that gets wet from a water body are potential vectors for spreading invasive species. Crews that prefer not to wear regular wading

[9] Criteria based on Schisler et al. 2008 on adult New Zealand Mudsnails only. No data on effectiveness for other species.

[10] Based on Kilroy et al 2006. Studies on the survivability of the invasive diatom Didymosphenia geminate under a range of environmental and chemical conditions. NIWA Client Report CHC2006-116. For Biosecurity New Zealand. 110p. Revised May 2007. http://www.biosecurity.govt.nz/pests/didymo/cleaning

[11] Unsure of effects of higher temperatures on glue used to adhere felt to boot, but if ≥ 140°F (60°C) treatment applied, must be for a minimum of 10 minutes (best professional judgment) to allow full penetration.

gear must launder their clothing for decontamination.

Boats and Other Large Aquatic Conveyances Transported Overland - State law requires that boats and other trailered equipment used in an aquatic environment should be free of aquatic animals and plants whenever removed from a water body in order to avoid transport of invasive species to a new water body[12].

When removing or before transporting boats and other large aquatic equipment:

1. Conduct a Level 1 Decontamination. This is required every time you remove the boat from a body of water. No exceptions. Thoroughly inspect both the equipment and trailer for attached or loose organisms such as weeds, algae, barnacles, mussels, snails, etc. A hand mirror and flashlight are important tools to help you see into otherwise hard to reach areas. Scrape or otherwise remove all organisms and put into a secure trash receptacle for upland disposal.
2. Pull drain plug at the boat ramp. Drain all water in bilges and live wells that could hold water from the site and rinse with tap water. Reinsert the drain plug unless you have a good system for remembering before re-launching!
3. If Level 2 Decontamination is indicated, using a self-service commercial car wash with hand operated pressure wands, pressure wash boat and trailer inside (deck or internal areas that get contaminated with aquatic debris) and out. Make sure you wash out raw water storage areas, get behind and under trim tabs, engine mounts and raw water intake ports. Use the hot water and soap setting. OR;
4. Use a department hot water pressure washer to apply constant exposure at a minimum of 140°F (60°C) for a minimum of fifteen (15) seconds on hard/non-porous surfaces; and
5. Flush engine cooling system with fresh tap water at 140^0F (60°C) for a minimum of 5 minutes, or at ambient temperature for 10 minutes – no chemicals, if hot water is not available.
6. Cross-Rinsing Not Allowed. Taking a boat or equipment from a marine environment into a freshwater environment or from a freshwater to a marine environment without decontaminating does not meet decontamination requirements and is not allowed.

Moored boats and other typically stationary large aquatic equipment - Boats and other large aquatic equipment shall not be transported on the water between different WRIAs on larger rivers or lakes, or major oceanographic basins (described above) until a thorough inspection ensures that no aquatic organisms are attached to the hulls, docks, nets, or other submerged equipment being moved. Boats that travel between different ecological regions frequently must have their hulls, running gear, and other niche areas (water intakes, prop shaft, trim tabs, etc.) cleaned using the protocols above on at least a quarterly basis or more often during high growth periods.

[12] RCW 77.15.253 and 77.15.290

As with boots, nets and other gear, dedicating boats to a body of water is a desirable approach. However, even boats that remain in a single body of water should be checked quarterly as described above to minimize hull fouling.

Nets - When possible use water-body specific nets and gear. If this is not possible, nets must be decontaminated before use in a new area. If possible, before leaving the sampling area, hang or stretch the net, and use a pressure washer and hand-picking to remove excess mud, debris and plant matter. If field decontamination is not possible or effective, upon return to the office, or before deploying at another sampling location in a different water body, follow the decontamination guidelines for waders/boots above and either hang the nets to allow clear access to all parts, or soak it in a large tub that allows the solution to fully penetrate the material before starting minimum exposure time.

Vehicles - Determine which vehicles will be used in bodies of water (i.e., hatchery trucks that have to back down into the water to off load fish). Also determine which vehicles will be moving in between established geographic sampling areas. Follow protocols for aquatic conveyances transported overland, including determination whether a Level 1 or 2 Decontamination is indicated.

Fish Tankers - It is vital that fish transfer tanks be disinfected when used between watersheds. Liquid chlorine bleach, which is available in several concentrations, is the preferred disinfectant for this use. Chlorine in solid form is also an effective disinfectant, but is difficult to dissolve completely and has high human health risks, and therefore not recommended. To properly disinfect tankers, use the following protocol.

1. Fill the tanker approximately half full with water at the shipping station. Add enough liquid chlorine bleach to achieve a 20-ppm active ingredient solution (30 ppm if water is noticeably dirty or discolored), Table 1.
2. Recirculate this solution for at least 10 minutes in the tanker and fish pump so that all surfaces are wetted.
3. Following recirculation add the appropriate amount of sodium thiosulfate, (Table 1.) to the tanker and circulate another 10 minutes to neutralize the chlorine and make it safe to discharge.
4. As a precaution, prior to discharge, check the water in the tanker with a test kit to make sure the chlorine is COMPLETELY neutralized.
5. Empty the tank where the discharged water will not contact fish.
6. Rinse thoroughly and refill with clean uncontaminated water for fish hauling.

Table 1. Chemical quantities required for tanker disinfection.

TANKER SIZE IN GALLONS	AMOUNT OF WATER	AMOUNT OF 12% BLEACH FOR 20 PPM	AMOUNT OF 12% BLEACH FOR 30 PPM	POUNDS OF SODIUM THIOSULFATE TO NEUTRALIZE 20 PPM[1] / 30 PPM
6000	3000 gal.	1811 ml	2717 ml	3.8 / 5.7
2500	1250 gal.	764 ml	1160 ml	1.6 / 2.4
1800	900 gal.	566 ml	849 ml	1.1 / 1.7
1000	500 gal.	311 ml	481 ml	0.6 / 0.9

[1] 5.6 grams sodium thiosulfate per 10 gallons of 20-ppm chlorine.

Heavy Equipment when used in water - To be added later.

Stream Restoration Guidelines - To be added later.

Diving Equipment - To be added later.

PART III.
CONDITIONS FOR AQUATIC INVASIVE SPECIS MANAGEMENT ON DEPARTMENT HYDRAULIC PROJECT APPROVAL (HPA), SCIENCE COLLECTION (SCP), AND AIS MONITORING OR CONTROL PERMITS IN ALL WATERS

A. All HPA conditions provided herein meet protection of fish life criteria under RCW 77.55.021(7). The conditions address the threat of detected and undetected aquatic invasive species (AIS) that have the potential to negatively affect fish life by direct or indirect factors including predation, food source competition, habitat displacement, and transmission of diseases and pests.

B. AIS management requirements apply to all gear, equipment, organic and inorganic materials that have come into contact with raw water at another location prior to use in a new location, or come into contact with raw water at the current work location. The following definitions apply:

1. "Raw water" as defined under RCW 77.135.010 means "water from a water body and held on or within property…[but] does not include water from precipitation that is captured in a conveyance, structure, or depression that is not intended to function as a water body, or water from a potable water supply system, unless the water contains visible aquatic organisms."
2. "Water body" as defined under RCW 77.135.010 means "an area that carries or contains a collection of water, regardless of whether the feature carrying or containing the water is natural or nonnatural. Examples include basins, bays, coves, streams, rivers, springs, lakes, wetlands, reservoirs, ponds, tanks, irrigation canals, and ditches."
3. "Gear" means wearable articles such as gloves, boots, raingear, etc.
4. "Equipment" means tools to machinery such as shovels, measuring tapes, backhoes, vehicles, etc.
5. "Organic materials" means mitigation articles such as seeds, dirt, rootstock, natural logs, etc.
6. "Inorganic materials" means construction and structural articles such as silt fencing, culverts, gravel, boulders, treated wood, etc.
7. "Properly dispose" means…

C. To prevent the introduction and spread of AIS into an HPA/SCP work location, or the removal and spread of AIS from a work location:

1. **General provisions** – follow Part I(A) protocols for internal consultation/approval and follow Part II general and applicable special protocols unless further conditioned or waived in permit.

2. **Level 1 decontamination protocols** – applies to all HPA/SCP work locations before arriving at or leaving the site:
   a) Remove all visible dirt and organic debris from gear, equipment (on heavy equipment this includes drive mechanisms, wheels, tires, tracks, buckets and undercarriage), and inorganic materials.
   b) Drain all raw water from site trapped in or on gear, equipment, and inorganic materials.
   c) Rinse all gear, equipment, and inorganic materials with potable water to the greatest extent possible.
   d) Properly dispose of any water used to clean gear, equipment, and inorganic materials.
   e) Refer to Part II(C) for more information.

3. **Level 2 decontamination protocols** – applies to all HPA/SCP work locations identified by the Department under this permit as infested:
   a) Refer to Part II(D) Level 2 Decontamination protocols.
   b) Select and apply preferred treatment method.
   c) Properly dispose of any water and chemicals used to clean gear, equipment, and inorganic materials.

4. **Off-site alternative decontamination plan required (HPA only).**

5. **Organic material protocols (HPA only) -**
   a) Organic materials may be sourced from the HPA work location or from the same uninfested watershed as the work location.
   b) Organic materials sourced from outside (1) should come from dry upland locations or if previously exposed to raw water, have been stored at a dry upland location for a minimum of 3 months unless otherwise conditioned by the Department.
   c) Organic materials should be certified as weed-free where possible.
   d) Follow Part I(C) protocols for purchasing seeds and rootstock for revegetation.
   e) No organic materials collected from a Department-designated AIS infested area may be used at another aquatic work location.

D. To control AIS collected at an HPA/SCP work location -

1. Permit holders are required to humanely euthanize all collected AIS classified as "Prohibited aquatic animal species" under WAC 220-12-090 except as allowed under bullet 5 below for transport purposes.

2. Detection or collection of all Prohibited level 1 species[13] must be reported immediately to WDFW using one of the methods in subpart D below with photos of the species and specimens saved until provided to WDFW or where directed to dispose.
3. Unless otherwise directed by WDFW, all prohibited AIS must be humanely euthanized before being removed from the immediate vicinity of the water body where collected and then disposed of in a public landfill system or chemically preserved.
4. Information on collection (i.e. how, where, number, species, etc), humane euthanizing, and disposal of prohibited AIS must be included in a report submitted to WDFW within 30 days using the online reporting form link under subpart D below.
5. Permit holders may transport live prohibited AIS outside the immediate vicinity of the water body where collected only under the following conditions:
    a. Transport to nearest WDFW regional office or headquarters for purpose of identification; AND
    b. Transported in a secure container to prevent release of either the AIS or any associated water, plant, sediment, animal, or other materials; OR
    c. Transported as authorized by a separate WDFW AIS Permit secured prior to collection.

E. Additional Information -

- Contact WDFW Regional Habitat or other WDFW Biologist listed on HPA or SCP permit
- Online reporting form: www.wdfw.wa.gov/ais/reporting
- Toll-Free reporting phone line: 1-888-933-9247

[13] Includes: Zebra mussels (Dreissena polymorpha), quagga mussels (Dreissena rostriformis bugensis), European green crab (Carcinus maenas), and all members of the genus Eriocheir (including Chinese mitten crab), all members of the walking catfish family (Clariidae), all members of the snakehead family (Channidae), silver carp (Hypophthalmichthys molitrix), largescale silver carp (Hypophthalmichthys harmandi), black carp (Mylopharyngodon piceus), and bighead carp (Hypophthalmichthys nobilis).

APPENDIX C: SAMPLING AREA COORDINATES

Table C1. Sampling Areas – Corner Coordinates

DMMU	Sample Area	NW Corner		NE Corner		SE Corner		SW Corner	
		Northing	Easting	Northing	Easting	Northing	Easting	Northing	Easting
CS-3	1	96,059.3	1,150,783	96,074.0	1,150,809.2	96,030.3	1,150,833.7	96,015.7	1,150,807.5
	2	96,088.7	1,150,880	96,113.2	1,150,923.6	96,087	1,150,938.2	96,062.6	1,150,894.6

Datum: Washington State Plane NAD 83 South US FT.
Note: Actual Sample Location will be recorded.

APPENDIX D: FIELD FORMS

Tetra Tech
CORE LOGGING FORM

Project _____

SAMPLING STATION: _____ Date_____Deployment Time:_____

Core Attempt_____Station Description:_____

DEPTH TO MUDLINE:_____Feet LOCATION: N _____ E _____

Predicted Tide :_____ Water Surface Elevation:_____ Mudline Elevation:_____

TYPE OF CORE ____VIBRACORE_____
MODEL _____ Samplers_____
TUBE LENGTH:_____Feet Tube Type:_____ Liner Type:_____

Core Penetration: _____ (ft below mudline) Recovered Core length:_____ Percent Recovery: _____

Compacted Core sections: _____to_____ _____to_____

Expanded Core sections: _____to_____ _____to_____

NOTES: _____

Length Sample Depth	Description(soil type, color, MC, odor etc)	Other notes, Insitu tests
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Tetra Tech
CORE LOGGING FORM

Project _____

SAMPLING STATION: _____ Date_____

STATION DESCRIPTION:_____

Length Sample Depth	Description(soil type, color, MC, odor etc)	Other notes, Insitu tests
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Preliminary Stormwater Management Plan

Construction Stormwater General Permit

GP In-Water/Over Water Structures Removal Project

Prepared for

Washington State Department of Ecology
Southwest Region
401 NE Adams Street
Camas, WA 98607

Prepared by

TETRA TECH
19803 North Creek Pkwy
Bothell, WA 98011

Permittee

Georgia-Pacific

Georgia-Pacific Consumer Operations LLC (GP)
401 NE Adams Street
Camas, WA 98607
(Permit No.)

Operator / Contractor

Georgia-Pacific Consumer Operations LLC (GP)
401 NE Adams Street
Camas, WA 98607

Owner

Georgia-Pacific Consumer Operations LLC (GP)
401 NE Adams Street
Camas, WA 98607

Certified Erosion and Sediment Control Lead (CESCL)

Name	Organization	Contact Phone Number
TBD	TBD	TBD

SMP Prepared By

Name	Organization	Contact Phone Number
Joel Cameron, PE	Tetra Tech	425-482-7600

SMP Preparation Date

March 2023

Project Construction Dates

Activity / Phase	Start Date	End Date
Demolition/Construction	2023	2025

Exhibit 10 SHOR23-01

Table of Contents

1.0 INTRODUCTION 1
1.1 Background 1
1.2 Purpose and Basis 2
1.3 Organization 2
2.0 PROJECT OVERVIEW AND DESCRIPTION 3
2.1 Project Location 5
2.2 Soils 6
2.3 Climate 6
2.4 Topography 6
2.5 Vegetation 7
2.6 Drainage 7
2.6.1 Floodplain 8
2.7 Groundwater 8
2.7.1 Critical Aquifer Recharge Area 8
2.8 Sensitive Areas 8
2.9 Proposed Construction Activities 8
2.9.1 In-Water Dredging Areas 8
2.9.2 In-Water Structures to be Removed 10
2.9.3 Over Water Structures to be Removed 11
2.9.4 Other Structures to be Removed 12
3.0 STORMWATER MANAGEMENT 13
3.1 MR1 – Preparation of Stormwater Site Plans (“SSP”) 14
3.2 MR2 – Construction Stormwater Pollution Prevention Plan (“Construction SWPPP”) 15
3.2.1 SWPPP 13 Elements 15
3.3 MR3 – Source Control of Pollution 27
3.4 MR4 – Preservation of Natural Drainage Systems and Outfalls 27
3.5 MR5 – On-Site Stormwater Management 27
4.0 POLLUTION PREVENTION TEAM 28
5.0 MONITORING AND SAMPLING REQUIREMENTS 29
5.1 Site Inspection 29
5.2 Stormwater Quality Sampling 29
5.2.1 Turbidity Sampling 29
5.2.2 pH Sampling 31

Exhibit 10 SHOR23-01

6.0 DISCHARGES TO 303(D) LISTED AND TOTAL MAXIMUM DAILY LOAD (TMDL) WATERBODIES .31
6.1 303(d) Listed Waterbodies 31
6.2 TMDL Waterbodies 32
7.0 REPORTING AND RECORDKEEPING REQUIREMENTS 32
7.1 Record Keeping 32
7.1.1 Site Logbook 32
7.1.2 Record Retention 32
7.1.3 Updating the SWPPP 32
7.2 Reporting 33
7.2.1 Discharge Monitoring Reports 33
7.2.2 Notification of Noncompliance 33
8.0 REFERENCES 34

List of Figures

Figure 1. Flow Chart for Determining Requirements for Redevelopment 14
Figure 2. Flow Chart for Determining MR5 Requirements 28

List of Tables

Table 1. Parcels Included in the Project Area 5
Table 2. Sensitive Areas 8
Table 3. Dredging Locations and Descriptions 9
Table 4. Summary of In-water Structures to be Removed 10
Table 5. Locations of Dolphins and Piles for Removal 11
Table 6. Summary of Over Water Structures to be Removed 12
Table 7. Other Structures to be Removed in Shoreland Zone 13
Table 8. Stabilize Soil Dates West of the Cascade Mountains Crest 19
Table 9. Example Pollutants/Sources to Control 22
Table 10. pH-Modifying Sources 22
Table 11. Dewatering BMPs 25
Table 12. Management BMPs 26
Table 13. BMP Implementation Schedule 26
Table 14. Team Information 29
Table 15. Turbidity Sampling Method 30
Table 16. pH Sampling Method 31

List of Attachments

Appendix A: Site Maps
Appendix B: BMP Details
Appendix C: Site Inspection Form

1.0 INTRODUCTION

Georgia-Pacific Consumer Operations, LLC (GP), is planning to abate, remove, and demolish several structures associated with the mill prior operations in the City of Camas and in unincorporated areas of Clark County, Washington. The structures to be removed are located in-water and/or over water on the Columbia River and Camas Slough and are located within the City of Camas or Clark County Shoreline Management Zones.

This Preliminary Stormwater Management Plan (SMP) addresses management of stormwater runoff during construction activities associated with the Project. This SMP does not address spills of materials used during construction; as a separate Spill Prevention, Control, and Countermeasures Plan (SPCC) will be developed by the Contractor.

This project is considered to be within the Columbia River and Camas Slough waterways and is subject to the Section 404 Permit administered by the U.S. Army Corps of Engineers. Separate drainage reports have not been prepared.

1.1 Background

GP's mill in Camas has been in operation since the 1880s making pulp and paper through a variety of technologies. The mill covers approximately 190 acres adjacent to the north bank of the Camas Slough, as well as a portion of the approximate 450 acres of Lady Island. Currently, the mill is an active industrial site operating a single paper production line. The mill no longer manufactures pulp, does not perform any significant on-site chemical manufacturing/processing, nor does the mill utilize the river for shipping or log transport/storage.

GP plans to abate, remove, deconstruct, and demolish several structures that are located in and/or over water on the Columbia River and Camas Slough. The project footprint includes areas along the shoreline within the GP site, and several other locations in the Camas Slough and extending approximately 3 miles downriver from the mill.

GP's In-water and Over water Structures Removal Project is located at 401 NNE Adams Street, Camas. In **Attachment A**, Figure 1 shows the project location and Figures 2A-2E shows the area of the proposed demolition and removal of structures.

The In-water and Over water Removal Project will remove:

- A warehouse,
- Five docks/piers,
- Conveyor housings,
- An aboveground oil storage tank,
- Crane foundation, and
- Approximately 3,000 pilings that are associated with the above structures, serve as mooring dolphins, or are abandoned.

The structures to be removed are located adjacent to the shoreline or entirely or partly below the ordinary high-water mark (OHWM) of the Camas Slough/Columbia River and are located within the City of Camas Shoreline Management Zone or Clark County Shoreline Management Zone. Many of the structures (dolphins and pilings) to be removed are located on State-owned land and are currently leased by GP through the Washington Department of Natural Resources (WDNR). The Project will include removal of soils and sediments from the shoreline and intertidal zones on the GP property and within the Camas Slough waterway, demolition of building slabs and support pilings, and regrading to achieve final design slopes and contours in support of habitat restoration.

1.2 Purpose and Basis

The purpose of this SMP is to describe the proposed construction activities and all temporary erosion and sedimentation control (TESC) measures, pollution prevention measures, inspection/monitoring activities, and record keeping that will be implemented during construction. The objectives of the SMP are to:

- Describe the best management practices (BMPs) to be followed to prevent erosion and sedimentation and to identify, reduce, and eliminate or prevent stormwater contamination and water pollution arising due to construction activities.
- Describe measures to protect surface water quality and groundwater quality.
- Describe measures to control peak volumetric flow rates and velocities of construction stormwater discharges.

The SMP addresses the intents of the Clark County Code (Clark County Code 13.26A and 40.386) and the City of Camas (Camas Municipal Code Chapter 14.02) for implementing restoration activities. This SMP was prepared using Ecology's Construction Stormwater Pollution Prevention Plan Template downloaded from the Ecology website on August 17, 2020, as a starting point. The template was modified to address requirements of the City of Camas and Clark County requirements as needed.

The primary BMPs that will be implemented during construction of the corrective measures are specified in the BMPs from the Stormwater Management Manual for Western Washington (SWMMWW) (Ecology 2019). Additionally, the Clark County Stormwater Manual (2021) and Camas Stormwater Design Standards Manual (2016) were applied in the development of this SMP. The construction contractor hired by GP to conduct the various components of the Project will also develop a Stormwater Pollution Prevention Plan (SWPPP) specific to their means and methods to complete the work prior to initiating work consistent with the concepts presented in this SMP.

1.3 Organization

This SMP was prepared based on the requirements set forth in the SWMMWW. This SMP is divided into the following eight main sections:

- **Section 1.0 – Introduction.** This section describes the objectives and organization of this SMP.
- **Section 2.0 – Project Overview and Description.** This section describes the project location, existing conditions in the work area, and proposed construction activities.

- **Section 3.0 – Stormwater Management.** This section provides details regarding stormwater management compliance with applicable Ecology SWMMWW Minimum Requirements (MRs). It also provides detailed descriptions of the BMPs to be implemented based on the 13 key elements specified in the SWMMWW for a Stormwater Pollution Prevention Plan (SWPPP).
- **Section 4.0 – Pollution Prevention Team.** This section identifies the appropriate contact names (emergency and non-emergency), monitoring personnel, and on-site temporary erosion and sedimentation control inspector.
- **Section 5.0 – Monitoring and Sampling Requirements.** This section provides a description of the inspection, monitoring and sampling requirements for managing pollutant discharge from disturbed areas.
- **Section 6.0 – Discharges to 303(d) Listed and Total Maximum Daily Load (TMDL) Waterbodies.** This section summarizes the 303(d) Listed and Total Maximum Daily Load (TMDL) waterbodies applicable to the project.
- **Section 7.0 – Reporting and Recordkeeping Requirements.** This section describes the requirements for documentation of BMP implementation, site inspections/monitoring, and BMP modifications during construction.
- **Section 8.0 – References.** This section provides complete citations for references cited in the text.

2.0 PROJECT OVERVIEW AND DESCRIPTION

The In-water and Over water Structures Removal project site lies along the Columbia River and its shoreline at Camas, Washington, and includes aquatic portions and shorelines of the Columbia River, including the Camas Slough; Lady Island; and the developed Mill Site within the City of Camas and Clark County, Washington. The project area is within Water Resources Inventory Area (WRIA) 28. The overall facility footprint including Lady island is approximately 700 acres with approximately 10.8 acres to be disturbed due to this demolition project.

The project is located between approximate Columbia River Mile (RM) 117 and 121 (National Oceanic and Atmospheric Administration [NOAA] 2017), with much of the proposed activity at approximately RM 119 to 120 located in the Camas Slough. The Camas Slough branches from the mainstem Columbia River, forming the northern extent of Lady Island and the southern shore of the City of Camas. The Washougal River flows into the Camas Slough outside of the project area, in the eastern portion of the city near the BNSF Railway Company railroad tracks and State Route (SR) 14 bridges.

The project area also includes terrestrial portions of Lady Island. Lady Island is approximately 510 acres in size and includes both developed and undeveloped areas, including wastewater treatment facilities for GP, a dredged materials landfill, and overhead electrical infrastructure. SR 14 crosses the northeast portion of the island, connecting to the City of Camas via bridges across the Camas Slough to the north and east. Undeveloped portions of Lady Island are mainly forested. Lady Island is designated as Industrial land use and is classified as Medium Intensity and High Intensity shoreline designations (City of Camas 2015, 2016; Clark County 2019).

The Camas Slough forms the aquatic portions of the project area. Much of the project area has been previously altered by development (see **Attachment A** for Figures 2A through 2E). The project site will include the removal of several in-water and over water structures. This would occur in a manner that is not disruptive to on-going operations at GP. Because completion of the demolition will result in reduced river access from GP, in-water structures will be completed first, followed by demolition of over water structures, which will approximately take place in the following order:

1. In-water piles and dolphins,
2. Berger Crane foundation,
3. Dock warehouse piers and dock warehouse's upper stories,
4. PECO Dock and dock warehouse lower floor and foundation,
5. Tug Dock and piles,
6. Truck Dock and conveyer housing, and
7. Aboveground storage tank.

All activities will occur during work periods approved by regulatory agencies. Currently, it is understood that all in-water demolition activities would occur during the open in-water work period. Work activities below the OHWM would occur during the approved construction work window for the Camas Slough and Columbia River in this location. Input from multiple agencies with jurisdiction over these activities will be incorporated in the permit process to establish an approved work window for in-water and overwater work activities. The currently published in-water work window for this reach of the Columbia River is November 1 to February 28 in any year.

To minimize construction duration, the project is proposing an in-water work window to occur from August 1 to February 28 in any year (pending regulatory approval). Upland work involves establishment of on-site staging areas and construction access, traffic control, installation of new stormwater facilities, and on-site restoration and enhancement. Due to the large number of features to be removed, the project will require about eight months in total and will likely span two to three years of in-water work periods. Actual work timing would depend on weather, river flows, contractor logistics, equipment availability, and regulatory constraints.

Existing or known contamination identified in the NOI:

Washington Department of Ecology (Ecology) notified GP in 2020 of credible evidence of liability for previous releases of hazardous substances under the state's Model Toxics Control Act (MTCA) based on previously known spills (no new or recent occurrences). Ecology assigned soils on the main GPGP parcel to Site No. 15156 and did not assign groundwater, surface waters, or sediments. The presence of contaminants has not been confirmed and no site actions have been identified at this time. GP is currently working with Ecology to evaluate surface water and sediments separately from the upland soils. No other sites are listed in the project vicinity.

Permitted construction outfalls identified in the NOI:

During demolition, all stormwater that is impacted from uplands demolition activities will be contained and discharged to the Lady Island Wastewater Treatment plant under the existing Industrial Stormwater NPDES Permit No. WA0000256. The Columbia River is 303(d) listed for temperature and dissolved oxygen. No TMDL exists for the river's reach in the vicinity of the Camas Slough or the Lady Island Outfalls (Lady Island range). Stormwater from the project site already discharges to Columbia River and will continue to throughout the project.

2.1 Project Location

The project area lies within the City of Camas, Washington, except for one dolphin to be removed on the Columbia River that is located outside the City limits within unincorporated Clark County, Washington. **Attachment A**-Figure 1 shows the project location.

The project area lies within Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16, Willamette Meridian.

The project area consists of a portion of the Camas Slough, which runs between Lady Island and the City of Camas, Washington located on the north bank of the main channel, lower Columbia River. Lady Island lies between the Camas Slough and the Columbia River main channel. The project is between RM 117 and 121, with the majority of activity at approximately RM 119 to 120.

The project would primarily occur on property owned or leased by GP from the State of Washington. The structures to be removed are located adjacent to the riverbank or entirely or partly below the ordinary high-water mark (OHWM) of the Camas Slough/Columbia River and are located within either the City of Camas Shoreline Management Zone or Clark County Shoreline Management Zone. Some of the structures to be removed are located on State-owned land and are currently leased by GP through the Washington State Department of Natural Resources (DNR). Table 1 indicates the parcel numbers and owner of the land where the work will occur.

Table 1. Parcels Included in the Project Area

Assessor Number	Owner 1/	Parcel Type Description / Zoning
08370-0000	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/ Lady Island
09104-4013	Georgia-Pacific Corporation	Manufacturing—lumber and wood products/Heavy Industrial
09104-4015	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/ Main Mill Parcel
09104-4027	Specialty Minerals Inc.2/ (GP)	Storage warehouse/Heavy Industrial
50090-1000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-2000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-3000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4001	Fort James Camas, LLC (GP)	Tidelands/Water
50081-7000	Fort James Camas, LLC (GP)	Tidelands/Water

Assessor Number	Owner 1/	Parcel Type Description / Zoning
50081-8000	Fort James Camas, LLC (GP)	Tidelands/Water
08370-0000	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/ Lady Island

1/ The previous corporate name, Fort James Camas LLC, is shown on County's tax parcel information.
2/ Specialty Minerals was a part of Fort James Camas, LLC.

2.2 Soils

Soils comprising the Camas Slough shoreline bank along the main mill area within the project consist primarily of fill materials representing developed areas with non-native materials. Other riverbanks in the project area are mapped as either Newburg silt loam or Sauvie silt loam series (NRCS 2018). The north Columbia riverbank and the north shore of Lady Island were mapped as Newburg silt loam series, while the western extent of Lady Island were mapped as Sauvie silt loam series.

Newberg silt loam series soils are somewhat excessively drained and located on floodplains with slopes of 3 to 8 percent. They are formed in loamy and sandy alluvium derived from mixed sedimentary and basic volcanic rocks. The soils are subject to frequent-to-occasional flooding from December through March.

Deep, poorly drained Sauvie silt loam series soils are also mapped on floodplains. This hydric soil is saturated to the surface in most years from December to March and subject to river overflow and tidal flooding. Sauvie soils form in mixed alluvium with volcanic ash on flat to 3 percent slopes. When artificially drained and protected from flooding, both soils may be used for agriculture. Mapping of Sauvie series soils on Lady Island by NRCS largely coincides with provisional identification of wetland areas by the City of Camas.

2.3 Climate

Climate and precipitation data were collected from a National Weather Service station at the Vancouver Pearson Field Airport, located approximately 12 miles west of the project area. The project area is characterized by 36.60 inches of annual precipitation, average annual mean air temperature of 54.1 degrees Fahrenheit (°F), and average summer air temperature of 66.5°F (NRCS 2019). As with most of western Washington, the highest monthly precipitation generally occurs between October 1 and March 31 of each year, with summer rainfall accounting for about 30 percent of annual precipitation.

2.4 Topography

Prior to industrial development in the late 1800s, the Columbia River within the project area included extensive riparian habitat which lead to gradual slopes along the shoreline and riverbanks. Industrial development, dam development, and channelization along the Columbia River to provide river transport and hydroelectricity resulted in infrastructure to harden riverbanks, create and stabilize navigational channels, and isolate floodplains behind levees. These river channel modifications have greatly altered the river's channels and associated riparian habitats. Structures to be removed at the GP site are built on or into an artificially formed terrace created from fill materials, with the terrace

elevation of approximately 35-38 feet (NAVD88). Depending on the river level, pilings and dolphins are present in water depths not usually greater than 30 feet, and often between 10 and 15 feet.

Additionally, local volcanic activity at the basin's margins has resulted in volcanic cones, vents, and flows, including Prune Hill, a volcanic cone that rises from the riverbank of the project area. In general, basaltic bedrock is found at the surface to no deeper than about 30 feet below surface throughout the project area. Importantly, some of the features scheduled to be demolished are embedded in this basalt bedrock.

2.5 Vegetation

Most of the nearby GP site is covered with buildings or paved roads and parking areas. In the vicinity of the project site, vegetation is generally sparse to absent around the structures to be removed and wherever plant communities are present are comprised of predominantly weedy and invasive species. The riverbanks consist primarily of fill, are generally steep, and are armored with bounder-sized riprap. Areas are either vegetated with non-native plants and few native species present or are unvegetated. Highly altered riverbank also includes the areas at the Mill where structures are built out over water, completely removing the natural riverbank. Most of the buildings that are to be removed are supported by timber or steel pilings; however, concrete does support the Truck Dock, Dock Warehouse, and Berger Crane footing.

Lady Island is the location of the wastewater treatment plant for mill operations and consists of buildings, settling basins, and unpaved roads. The majority of Lady Island's riverbanks do consist of native soils and sediments, and is relatively undisturbed by development. Above the ordinary high-water mark (OHMW) the riverbanks are forested with a mix of deciduous and coniferous trees, along with native understory trees and shrubs. Below the OHWM, a zone of shrubs extends downslope transitioning to beach-like conditions in some areas at the lower shore and if vegetation does persist it is typically continuously submerged.

2.6 Drainage

The Columbia River is one of the largest rivers in North America, extending approximately 1,240 miles, draining approximately 258,000 square miles, and emptying into the Pacific Ocean (Kammerer 1990 as cited by Clark County 2011). The project area is within the Lower Columbia Reach, approximately 120 river miles from the Pacific Ocean.

The Camas Slough branches from the mainstem at the tip of Lady Island forming the northern extent of Lady Island and the southern shore of the City of Camas. The Camas Slough is an approximately 2.4-mile-long side channel. The confluence with the Washougal River occurs at the far upriver end of the Camas Slough. In the project vicinity, SR 14 crosses the slough twice on bridges, initially near the head of the slough onto Lady Island, then approximately through the middle of the slough's length back to the north riverbank (**Attachment A** Figure 1). The project area is within WRIA 28 which is the Washougal-Salmon sub-basin.

Within the project area, the Columbia River and the Camas Slough are tidal, with a mean daily tidal range of approximately 1.19 feet (NOAA 2019a). Tidal influence extends upriver to the Bonneville Dam,

located approximately 20 river miles upstream from the project area. Water elevations in the project area are primarily controlled by releases at the Bonneville Dam; however, at low water levels, the diurnal tidal fluctuation is readily observed. In general, tidal influence decrease as the volume of water increases in this system.

2.6.1 Floodplain

Proposed removals would occur entirely within the Columbia River and Camas Slough's regulatory floodway (Zone AE), with the 100-year floodplain (areas with a 1 percent annual chance of flooding) water surface elevation of between 34 feet (western project area extent) and 35 feet (FEMA 2019).

2.7 Groundwater

2.7.1 Critical Aquifer Recharge Area

The Project is within the Clark County Critical Aquifer Recharge Area (CARA). A portion of the main mill site reside within a Category II CARA.

2.8 Sensitive Areas

The project area resides between the Camas Slough and Columbia River, both of which contain fish habitat. Additionally, Table 2 lists all of the wetlands within the project limits, though none are directly affected by the project work, along with their receiving waterbody, wetland rating, and associated buffer:

Table 2. Sensitive Areas

Sensitive Area	Receiving Waterbody	Wetland Rating	Buffer
Wetland 1	Columbia River/Camas Slough	Category II	180 feet
Wetland 2	Columbia River/Camas Slough	Category II	180 feet
Wetland 3	Columbia River/Camas Slough	Category II	180 feet
Wetland 4	Columbia River/Camas Slough	Category II	180 feet
Wetland 5	Columbia River/Camas Slough	Category II	180 feet
Wetland 6	Columbia River/Camas Slough	Category II	180 feet
Wetland 7	Columbia River/Camas Slough	Category II	180 feet

2.9 Proposed Construction Activities

This section describes the construction activities that will occur as a result of this project.

2.9.1 In-Water Dredging Areas

The in-water dredging areas encompass areas where dredging will occur using excavators operating from barges. The following location and activities are proposed for dredging:

- Barge access to enable removal of the Dock Warehouse piers and portion of the Camas Slough riverbank will require dredging of sediments.

- Structures and approximately 3,000 piles would be removed, including those along approximately 1,000 feet of Camas Slough riverbank where portions of the riverbank would be reshaped to slope of approximately 3 horizontal to 1 vertical.

Table 3 provides details on the proposed activities that will involve dredging. Figure 1 of **Attachment A** shows the overall project locations indicating structures to be removed. The shaded area on Figure 5 (**Attachment A**) shows the approximate boundary where the proposed sediment dredging will be performed.

Table 3. Dredging Locations and Descriptions

Location	Structure	Description of location and activity
Camas Slough	Access dredging for Dock Warehouse Pier removals	Sediment would be removed at the three piers at the Dock Warehouse to create draft for demolition barges. Several known occurrences of previous dredging immediately adjacent to the area at the PECO dock (Attachment A Figure 2E).
Camas Slough	Structure/pile removal and bank reshaping	Piles and structures to be removed along approximately 1,000 feet of riverbank. Currently, the area supports various docks/piers. Removals of piles and riverbank shaping would occur.

Abbreviations:
RM = river mile

An estimated 10,500 CY of dredge materials is to be dredged from the Camas Slough. Dredging will be performed using an enclosed bucket, and dredged material will consist of both sediment and water. The water will be actively pumped from dredged material barges to the degree practical, processed to remove excess suspended sediment, and returned to the Camas Slough as dredging return water.

Following dredging, GP proposes that dredged materials would be managed according to the requirements of the WDNR lease agreement (Lease No. 20-B1285) and according to the following protocol:

1. If found suitable for in-water disposal and reuse, sediments would be beneficially reused by this project for:
    a. Fill for riverbank and riverbed shaping following structure removal in the Camas Slough, or
    b. Fill for other holes created by removals on other portions of the project, including on Camas Mill property and in other locations.
2. If found suitable for in-water disposal but not able to be beneficially reused, then sediments would be disposed of in-water.
3. If found suitable as fill for upland areas, use where needed, including on the Camas Mill property and in other locations.
4. If the material is found not to be suitable for in-water disposal and not usable in upland locations, then sediment material would be barged to the upland disposal site at the Lady Island dredged materials area (DMA).

5. If materials are found not to be suitable for storage at the DMA or for other upland reuse, then the material would be disposed of at another appropriate approved upland location.

Transportation to the Lady Island DMA would be via barge in the Camas Slough to the Lady Island north shore to a landing where materials would be off-loaded and conveyed to the DMA via a short dirt access road. The material would be moved from the barge by a clamshell crane. As dredged materials are placed for storage, the material will be spread and sorted to remove extraneous material that may have been recovered incidental to dredging. The piles will be shaped with 2:1 sloping sides for stability.

Dredged materials will be managed throughout the process in a manner that prevents the return of sediment to the water. Best management practices will be implemented during transportation and placement so that material does not wash from barges during transfer to the site or from the site after placement.

2.9.2 In-Water Structures to be Removed

In-water structures are those that completely lie below the River's OWHM and are located throughout the Camas Slough and within the Columbia River. In-water structures to be removed are indicated in Table 4 and are located within approved state aquatic lands lease areas (LAs) or within easements from the state. Because these structures are built in water, removal requires access by barge at river stages that enable safe access.

Table 4. Summary of In-water Structures to be Removed

Structure to be Demolished	Aquatic Lands Lease Area Number or Easement	Filling or Dredging Planned?	Estimated Disturbance Area (SF)	Quantity of Fill or Dredge (Cubic Yards)
Dolphins and piles	LAs: 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19	Filling of voids	890	-0-
Downriver dolphin in Clark County	LA 1	Filling of voids	30	-0-
Dock Warehouse piers	LA 17	Dredging	58,710	-10,500
Berger Crane foundation	LA 17	Filling	19,370	+3,500
Tug Dock	LA 17	None	-0-	-0-

Abbreviations:
DNR = Washington State Department of Natural Resources
LA = DNR Lease Area
SF = square feet

Additionally, a substantial portion of the project includes removal of approximately 3,000 timber and steel piles and several dolphins (see Table 5). They will be extracted using a vibratory hammer and log chokers. If a pile cannot be extracted in its entirety, it would be cut off as determined by the BMPs for the removal of derelict piling (DNR 2017, EPA 2016). All extract piles and attached sediment would be contained on a barge deck until they could be off-loaded to an upland location, per state requirements for creosote pile and BMPs. Any cavities remaining following the extraction would be backfilled to the mud line with clean sand.

Table 5. Locations of Dolphins and Piles for Removal

Location	In-water or Overwater	Approximate Number of Pilings 1/
Open-water dolphins and pilings	In-water	250
One downriver dolphin in Clark County	In-water	9
Piling at riverbank that is associated with in-water structures2/	In-water	200
Piling associated with overwater structure foundations 3/	Overwater	2,500
Estimated Total Number of Pilings		Approximately 3,000

1/ Numbers of pilings are estimates and the total estimated number has been rounded up.
2/ In-water pilings include pilings associated with mooring dolphins, remnant riverbank pilings, sheet pilings, and pilings supporting the Dock Warehouse Piers, and pilings at the Tug Dock.
3/ Overwater pilings include pilings associated with the foundations supporting the Dock Warehouse, PECO Dock, and Truck Dock along the riverbank.

The Berger Crane foundation removal may require several demolition methods which may include mechanical approaches using demolition claws and/or expanding demolition grouts, for example. One suggested method will be removed using a hoe-ram operation to break up the reinforced concrete structure that below the OWHM, which is approximately +2 Columbia River Datum (CRD). It would probably not be possible to remove the interior piles that extend through the foundation deep into the bedrock. These would be exposed by removing the exterior concrete and then cutting them off and fill will be placed to cover the retained lower columns, creating bottom contours that match the natural riverbed in this previously dredged location. A floating debris boom would be placed around the piers to retain any debris that might fall from the piers. Additionally, if a hole were created during demolition, clean fill materials will be specified at the minimum size to be stable for this river location. To finish the site, the adjacent nearly vertical riverbank could be reshaped to a shallower slope extending 40 feet to cover the remains of the foundation, thus creating nearshore habitat.

Concrete piers from the dock warehouse would be extracted or excavated using a vibratory hammer to rock the pilings out. If by chance the piling breaks during this process, saw cutting would be utilized to remove the remainder of the pile. Piers would be removed from river barges after dredging occurs to allow for access. A floating debris boom would be placed around the piers to retain any debris that might fall from the piers.

2.9.3 Over Water Structures to be Removed

The Overwater structures are located on the north bank of the Camas Slough. Table 6 summarizes the overwater structures to be removed. The removal of several non-operational structures on-site will occur from the adjacent asphalted upland area of the project site.

Table 6. Summary of Over Water Structures to be Removed

Structure to be Demolished	Filling or Excavation/Dredging	Ground Disturbance Area (SF)	Fill (+)/Excavate (-) Quantity (Cubic Yard)	
			Below existing OHWM	Above existing OHWM
Riverbank Structures: Truck Dock, Dock Warehouse & PECO Dock	Excavation/dredging and filling	40,450	+1,230 / -2,990	+18,300 / -17,100
Approximate net change in fill or dredge at Riverbank			- 1,760	+1,200

Note:
Together, the Truck Dock, Dock Warehouse, and PECO Dock cover approximately 1,055 lineal feet along the riverbank. Given the contiguous nature of the structures, removal activities are summarized for all three structures together.

Abbreviation:
OHWM = ordinary high water mark
SF = square feet

Several riverbank structures that would be removed include the Dock Warehouse, Truck Dock and PECO Dock. All demolition would be conducted from the land, with demolition staging at the Truck Dock. Hazardous materials would be abated prior to building demolition, except for any lead-containing paint passing the toxicity characteristic leaching procedure. All miscellaneous materials would be removed prior to the beginning of structure demolition. It would occur in phases, starting from the initial phase of demolishing and removing the wooden structure itself, while leaving the foundation in place. The second phased would involve demolishing and removing the buildings piling support system and foundation. The final phase would involve removal or cutting of the pilings along the riverbank. Once removed, the riverbank would be reshaped to a maximum 4:1 slope and be revegetated.

The PECO Dock would be demolished by removing the crane and all utilities and miscellaneous supporting materials on the dock. For the Truck Dock and PECO Dock, asphalt and concrete decking would be cut or broken up and removed, followed by removing piling caps, and support beams would then be rigged and removed. The Dock Warehouse will be demolished from the upland side first toward the riverbank, leaving the riverside wall being the last piece to be removed to reduce the risk of materials entering into the river. A floating silt fence would be placed around the dock to filter turbidity and also retain any debris that might fall. The dock's decking would be cut, rigged, and removed. Piling caps would then be rigged and removed. After these steps, pilings would then be removed as described above for piling and dolphins from the upland or river barge and the riverbank would be reshaped to shallower slopes (5 to 1 and 4 to 1), grading to slopes that match existing grades on either end. and revegetated.

2.9.4 Other Structures to be Removed

The final structures to be removed and deconstructed will be an aboveground tank, conveyor housings, and associated utilities (Table 7). Additionally, the south wood chip storage area would be backfilled to design grades. All of the work would occur entirely on land.

Table 7. Other Structures to be Removed in Shoreland Zone

Structure	Filling or Excavation	Total Ground Disturbance (SF)	Notes
Aboveground Oil Storage Tank	None	-0-	Demolition is to slab, and no ground disturbance planned
South Wood Chip Storage Area	Excavate remaining wood chips and backfill to previous grade	155,580	Approximately 11,100 CY of fill for restoration of area topography (all located landward of OHWM)
Product Conveyor Housing[1]	None	-0-	Elevated housing
Wood Chip Conveyor Housings[1/]	None	-0-	Elevated housing

Note:
1/ Conveyor housings are elevated and cross over the Wood Chip Storage Areas and the Truck Dock area. The adjacent North Wood Chip Storage Area is approximately 3.0 acres of upland habitat outside of the shoreline zone, but will be graded and reclaimed collectively with activities proposed in the South Wood Chip Storage Area.

Abbreviations:
CY = cubic yard
OHWM = ordinary high water mark
SF = square feet

3.0 STORMWATER MANAGEMENT

In Accordance with Camas Municipal Code Chapter 14.02, the Stormwater Management Manual for Western Washington (SWMMWW) (Ecology 2019) was utilized as basis for stormwater management for this project in the upland areas. Since this project proposes to disturb an area over 7,000 SF, it was determined via SWMMWW definitions that this project is considered a Redevelopment.

Minimum Requirement (MR) criteria prescribed by Ecology's SWMMWW were followed in development of this Stormwater Management Plan. For the applicable Ecology MR criteria, the SWMMWW flowchart shown in Figure 1 below was utilized to determine that MRs 1 through 5 apply.

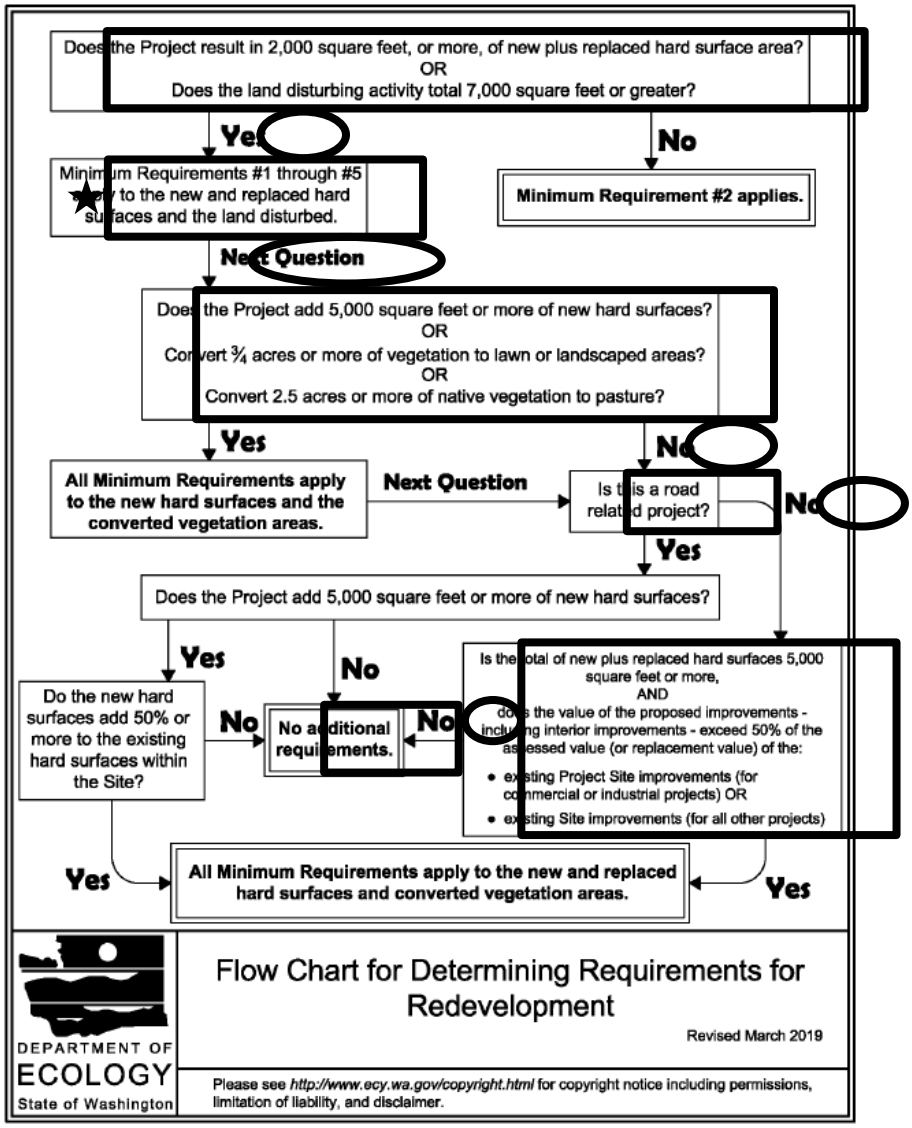


Figure 1. Flow Chart for Determining Requirements for Redevelopment

The below subsections detail MRs 1 through 5 and include details regarding compliance with each of the MR criteria provided by the Ecology SWMMWW.

3.1 MR1 – Preparation of Stormwater Site Plans ("SSP")

The Stormwater Site Plan (SSP) consist of drawings including a grading plan to facilitate stormwater conveyance. Also included in the SSP is a Temporary Erosion and Sediment Control Plan (TESC Plan) sheet. See **Attachment A** for the project SSP.

3.2 MR2 – Construction Stormwater Pollution Prevention Plan ("Construction SWPPP")

The SWPPP is a living document reflecting current conditions and changes throughout the life of the project. These changes may be informal (i.e., hand-written notes and deletions). Update the SWPPP when the Certified Erosion and Sediment Control Lead (CESCL) has noted a deficiency in BMPs or deviation from original design.

The SWPPP prepared for this project includes this report narrative, and construction plans/details attached. In addition to the report narrative and construction plans/details, key Elements of Construction Stormwater Pollution Prevention (Elements 1 through 13) are listed and described in detail within this section.

3.2.1 SWPPP 13 Elements

BMPs will be implemented prior to the initiation of the project. BMPs are included in **Attachment B** (BMP Detail) as a quick reference tool for the on-site inspector in the event the BMPs listed for the elements below are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit (CSWGP). To avoid potential erosion and sediment control issues that may cause a violation(s) of the CSWGP, the Certified Erosion and Sediment Control Lead (CESCL) will promptly initiate the implementation of one or more alternative BMPs listed in **Attachment B** after the first initial sign that existing BMPs are ineffective or failing.

3.2.1.1 Element 1: Preserve Vegetation/Mark Clearing Limits

To protect adjacent property, protect workers at the job site, and reduce the area of soil exposed to construction, the limits of construction will be clearly marked before land-disturbing activities begin. However, because work will occur in a tidal area, the construction area will not be marked on the waterward (generally north) side of the work area. Figure 1 (**Attachment A**) shows the project limits. The construction documents require the contractor to install temporary fencing at the upper project limits, which will demarcate areas where soil may be exposed to construction. No natural vegetation in the work area will be retained, and therefore BMP C101 (Preserving Natural Vegetation) is not applicable. The Columbia River and Camas Slough may be considered a sensitive area; however, because construction activities occur within the tidal zone, the placement of BMP C102 (Buffer Zones) is impracticable.

- High Visibility Fence (BMP C103)
- Silt Fence (BMP C233)

Within the Project limits, all environmentally sensitive areas and the buffers of environmentally sensitive areas will be fenced with high visibility construction fence (HVF) where possible prior to commencing construction activities, including equipment staging, materials storage, and parking of workers' vehicles.

- The HVF will be applied, as stated above, prior to commencing construction activities for each stage of the Project.

- All field staff will be trained to recognize HVF and understand its purpose.
- HVF will be maintained until all work is completed for each stage of the Project.
- All clearing limits, stockpile sites, staging areas, and trees to be preserved will be clearly marked prior to commencing construction activities.
- All clearing limits, stockpile sites and staging areas will be maintained until all work is completed for each stage of the Project.
- No equipment will enter, operate, be stored, or be parked within any sensitive area except as specifically provided for in permits issued for the Project.
- Where HVF is not appropriate (such as over water), the environmentally sensitive areas will be clearly marked by other means to ensure that these areas are protected.

Existing sensitive areas will be preserved as shown on the Temporary Erosion and Sediment Control (TESC) Plan in Figure 6 in **Attachment A**, and as described herein. Marking the perimeter of areas to be preserved will occur before clearing and grubbing operations in each area commences. Within disturbed areas compost soil amendment will be incorporated upon completion of grading consistent with BMP T5.13: Post-Construction Soil Quality and Depth.

3.2.1.2 Element 2: Establish Construction Access

Construction access or activities occurring on unpaved areas will be minimized, yet where necessary, access points will be stabilized to minimize the tracking of sediment onto public roads. Once equipment enters excavation areas, equipment will be brushed or shoveled off prior to leaving the excavations, and street sweeping and street cleaning will be employed to prevent sediment from entering state waters.

The specific BMPs related to establishing construction access that could be used on this project include:

- Stabilized Construction Entrance (BMP C105)
- Construction Road/Parking Area Stabilization (BMP C107)

A stabilized construction entrance will be constructed as shown on the TESC Plans and as described here and in the Project Specifications. Stabilized construction entrances will be installed at each access location used by construction vehicles. A paved staging area is available for use during the project; construction road/parking area and stabilization area BMPs would be implemented only if the contractor's means and methods warrant use of areas that are currently unpaved.

3.2.1.3 Element 3: Control Flow Rates

Will you construct stormwater retention and/or detention facilities?

☐ Yes ☒ No

Will you use permanent infiltration ponds or other low impact development (example: rain gardens, bio-retention, porous pavement) to control flow during construction?

☐ Yes ☒ No

As part of the project, many areas that are currently above the OHWM will be converted to intertidal lands. This project also includes extensive in-water work, including dredging and pile removal, within the Camas Slough and Columbia River to remove treated timber piles and other structures. Stormwater from the intertidal areas will be managed as dredge return water consistent with a United States Army Corp of Engineers (USACE) Section 10/404 permit. Dredge return water requiring processing to clarify the water and the water will be returned to the waterways. Furthermore, the water quality goals for the Columbia River and Camas Slough waterways set forth in the Joint Aquatic Resources Permit Application (JARPA) Permit will be met during all aspects of the construction. The water quality goals are reviewed by multiple agencies and are deemed to be protective of these waterways. Therefore, meeting the water quality requirements of the JARPA Permit should be adequate and appropriate to protect downstream properties and receiving waters.

In addition to meeting the requirements of the JARPA Permit, a floating turbidity curtain will be installed along the toe of the shoreline excavation for the duration of major earthwork to protect the intertidal zone as tide levels rise and fall each day. This turbidity curtain will act, in effect, as a temporary sediment pond. A conventional sediment pond or basin built within the intertidal zone would have no additional benefit; as a result, a temporary sediment Pond (BMP C241) will not be constructed in the intertidal zone (see Elements #4 and #9 for details).

For the portions of work that occur up slope of the intertidal zone, construction runoff from disturbed areas in those locations where runoff can be intercepted will be collected in sumps and pumped to the dredge return water processing system for treatment (see Element #4).

Additionally, to protect properties and waterways downstream while construction occurs on land, stormwater discharges from the demolition area will be contained as shown in the TESC Plans and conveyed via the existing Process Sewer Line to the Lady Island Wastewater Treatment facility.

The specific BMPs related to controlling flow rates that will be used on this project include:

- Water Bars (BMP C203)
- Straw Wattles (BMP C235)

Several locations are proposed for the temporary stormwater collection points prior to discharge to the process sewer line. Collection points will be located and moved, as appropriate based on the site activities and locations best suited for collection. Additionally, water bars will be implemented to direct stormwater towards receiving inlets where the stormwater will be pumped to the Process Sewer line.

3.2.1.4 Element 4: Install Sediment Controls

Within the demolition area, all stormwater runoff from disturbed areas will pass through an appropriate sediment-removal BMP before collection and discharge into the Process Sewer line. Soil stockpiles will be placed on plastic sheeting, surrounded by berms, and covered with plastic.

During precipitation events, stormwater will fall on disturbed areas that are sloped toward the Camas Slough waterway or Columbia River waterway. Because the majority of construction will take place in the intertidal zone, BMPs would become inundated by daily rising tides and would be damaged or otherwise rendered ineffective. However, construction will not cause water quality impacts in the Camas Slough and Columbia River waterways that do not meet the water quality goals set forth in the JARPA Permit. When feasible, erosion controls, such as filter berm (BMP C232) or straw wattles (BMP C235), will be placed on cut slopes to reduce surface water velocities and sediment entrainment.

Runoff and sediment generated during interim excavation will remain within the isolated area. A sediment catchment area will be constructed so that sediment-laden stormwater can be collected and pumped to the Lady Island wastewater treatment facility prior to discharge into the Columbia River. Stormwater collected during in-water work will be routed to the dredge return water processing system for treatment prior to discharge.

The dredge return water processing system will be designed, implemented, maintained, and operated by the dredging contractor. This system will meet the requirements of the project water quality permits (JARPA and Section 10/404).

The specific BMPs to be used for controlling sediment on this project include:

- Plastic Covering (BMP C123)
- Silt Fence (BMP C233)
- Straw Wattles (BMP C235)
- Dredge return water processing system,
- Filter Berms (BMP C232)

Other BMPs that could be used for controlling sediment on this project include:

- Sediment Trap (BMP C240)
- Construction Stormwater Filtration (BMP C251)
- Portable Water Storage Tanks (e.g., Baker Tank)
- Materials on Hand (BMP C150) may also be applicable

Sediment control BMPs will be constructed as shown on the TESC Plan and prescribed within the SMP. BMPs will be installed prior to start of demolition activities. Stormwater drains in the surrounding areas, including on nearby public roads, will be protected by inlet inserts.

All existing stormwater drains will be blocked, and stormwater collection points established where stormwater can be captured and discharged into the Process Sewer line for conveyance to the Lady Island Treatment facility. Straw wattle or coir log will be placed around major demolition areas to control possible flow of loose debris. Silt fence and a temporary containment berm will be installed around the perimeter of the limit of work. In addition, sediment may be removed from paved areas in and adjacent to demolition work areas manually, or using mechanical sweepers, as needed, to minimize tracking of sediments on vehicle tires away from the site and to minimize wash-off of sediments from adjacent streets.

Imported earthen material for berms will be stockpiled on paved areas and protected against erosion while not in use. Per Project Specifications, materials will not be stored within 50 feet of any open water conveyance and will not be deposited or stored in or alongside wetlands, wetland buffers, streams, or watercourses where the materials can be eroded by high water or storm runoff.

Damaged controls will be repaired when they are observed. Removal of sediment will occur from silt fence and storm drain inlet protection when sediment reaches 30 percent of the height of the BMP. Removed sediment will be disposed off-site in an approved location as described in Section 2.9.1.

3.2.1.5 Element 5: Stabilize Soils

Table 8. Stabilize Soil Dates West of the Cascade Mountains Crest

Season	Dates	Number of Days Soils Can be Left Exposed
During the Dry Season	May 1 – September 30	7 days
During the Wet Season	October 1 – April 30	2 days

Soils must be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

Anticipated project dates: **Start date:** 2023 **End date:** 2026

Will you construct during the wet season?

☒ Yes ☐ No

Construction of this project will be implemented under a Section 10/404 permit, and all materials excavated will be considered dredged material. An exception will be the over water structure removal that will occur outside of the in-water work window. This work will be under a Construction Stormwater permit obtained from Ecology. Construction within the intertidal zones will be sequenced such that work will be conducted during low tides in the "dry." Above this zone, surface roughening ("track walking") will be performed, and mulching will be used once final grades are achieved. Final grade conditions will be consistent with BMP T5.13: Post-Construction Soil Quality and Depth with an approved seed mix for disturbed areas. Soil stockpiles will be covered in plastic. Soil stockpiles outside excavation footprints will be stored on bermed plastic sheeting and covered in plastic. Water will be applied to control airborne dust.

Exposed and unworked soils will be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs for soil stabilization that could be used on this project include:

- Post-Construction Soil Quality and Depth (BMP T5.13)
- Nets and Blankets (BMP C122)
- Plastic Covering (BMP C123)
- Temporary and Permanent Seeding (BMP C120)
- Mulching (BMP C121)

- Surface Roughening (BMP C130)
- Dust Control (BMP C140)

Other BMPs for soil stabilization that could be used on this project include:

- Sodding (BMP C124)
- Topsoiling (BMP C125)
- Early application of gravel base on areas to be paved.
- Materials on Hand (BMP C150) may also be applicable

Soil stabilization BMPs will be installed as shown on the TESC Plan and as described herein. Soil removed by excavation will be temporarily stockpiled on-site. Plastic covering will be used, as necessary, to protect stockpiles. In general, stockpiled soils will be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from waterways and drainage channels.

Temporary mulching (e.g., straw) or plastic covering will be used to stabilize exposed soils and protect against erosion, as necessary. All soil stabilization BMPs will be installed as soon as practicable after soil disturbance. No topsoil removal is proposed; however, should any need to be removed, native topsoil will be stockpiled for reuse on site.

3.2.1.6 Element 6: Protect Slopes

Will steep slopes be present at the site during construction?

☒ Yes ☐ No

Where adjacent areas shed stormwater toward the construction area, diversion dikes, perimeter berms, and swales will be used to prevent run-on.

The specific BMPs for slope protection that may be used on this project include:

- Slope Protection Mulch (Standard Specification Section 9-14.4(1))
- Temporary and Permanent Seeding (BMP C120)
- Mulching (BMP C121)
- Nets and Blankets (BMP C122)
- Plastic Covering (BMP C123)
- Surface Roughening (BMP C130)

Slope protection BMPs will be installed as shown on the TESC Plans and as described here and in the Project Specifications. The existing slopes throughout the project are expected to remain in place and will be protected against erosion, however where needed to ensure proper drainage of stormwater post-construction slopes will be graded, as necessary.

3.2.1.7 Element 7: Protect Drain Inlet

No storm drain inlets are present in or downgradient of the construction areas. However, several inlets are located along off-site travel paths. All storm drain inlets and culverts operable during demolition will be protected to prevent unfiltered or untreated water from entering the drainage conveyance system.

The specific BMPs to protect the nearby storm drain system include:

- Storm Drain Inlet Protection (BMP C220)
- Stormwater discharge from the mill is regulated under an Industrial NPDES stormwater permit issued by Ecology. Stormwater system sampling, pollutant control, management, and maintenance are conducted in accordance with GP's Stormwater Pollution Prevention Plan (SWPPP).

Inlet protection BMPs will be installed as shown on the TESC Plans and as described in the Project Specifications. Prior to starting demolition in each work area, drop and/or curb inlet protection will be installed in catch basins and curb-inlets that could potentially be impacted by sediment-laden runoff on.

BMPs will be inspected and maintained frequently, especially after storm events. Catch basin filters will be cleaned or replaced if sediment has filled the device by one third, or as specified by the manufacturer. Sediment, debris, trash, and all other material collected will be properly disposed of off-site at an approved location.

3.2.1.8 Element 8: Stabilize Channels and Outlets

Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches, will be installed at the outlets of all conveyance systems.

The project site is located along the shoreline of the Columbia River and Camas Slough Waterways, and a large portion of stormwater flows are expected to travel as sheet flow. Temporary channels may be used during construction, particularly during the over water structure removal on the south shoreline of the GP site. For temporary channels used to manage stormwater during construction (BMP 200), check dams (BMP 207) will be installed to provide additional settling and sediment retention capacity.

The specific BMPS to be used for protecting temporary channels on this project include:

- Interceptor Dike and Swale (BMP C200), and
- Check Dams (BMP 207).

Other BMPs for channel and outlet stabilization that could be used on this project include:

- Channel Lining (BMP C202)
- Triangular Silt Dike (Geotextile-Encased Check Dam - BMP C208)
- Materials on Hand (BMP C150)

The project site is located west of the Cascade Mountain Crest. As such, any temporary on-site conveyance channels will be designed, constructed, and stabilized to prevent erosion from the expected peak 10-minute flow rate from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff simulation model, increased by a factor of 1.6, shall be used. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent streambanks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.

3.2.1.9 Element 9: Control Pollutants

Table 9. Example Pollutants/Sources to Control

Pollutant	Source to Control
Petroleum and other chemical products	Equipment, Vehicles, and Refueling
Turbid dewatering water	Clearing/grading activities, Excavations, and Dredging
Concrete debris	Sawcutting, and Demolition

Will maintenance, fueling, and/or repair of heavy equipment and vehicles occur on-site?

☒ Yes ☐ No - Only in a designated area and on contained paved surfaces.

Will wheel wash or tire bath system BMPs be used during construction?

☐ Yes ☒ No

Will pH-modifying sources be present on-site?

☒ Yes ☐ No - Only demolition debris will be removed from the site.

Table 10. pH-Modifying Sources

☐	None
☐	Bulk cement
☐	Cement kiln dust
☐	Fly ash
☐	Other cementitious materials
☐	New concrete washing or curing waters
☒	Waste streams generated from concrete grinding and sawing
☐	Exposed aggregate processes
☐	Dewatering concrete vaults
☐	Concrete pumping and mixer washout waters
☐	Recycled concrete
☐	Recycled concrete stockpiles
☐	Other (i.e., calcium lignosulfate) [please describe:]

Will uncontaminated water from water-only based shaft drilling for construction of building, road, and bridge foundations be infiltrated provided the wastewater is managed in a way that prohibits discharge to surface waters?

☐ Yes ☒ No – Not applicable

All pollutants, including waste materials and demolition debris, which occur on-site will be handled and disposed of in a manner that does not cause contamination of stormwater. Good housekeeping and preventative measures will be taken to ensure that the site will be kept clean, well-organized, and free of debris. If required, BMPs to be implemented to control specific sources of pollutants are discussed below.

Vehicles, Construction Equipment, and/or Petroleum Product Storage/Dispensing:

Camas Mill has an existing SPCC plan and the demolition activities will be compatible with the existing plan. All vehicles, equipment, and petroleum product storage/dispensing areas will be inspected regularly to detect any leaks or spills, and to identify maintenance needs to prevent leaks or spills. On-site fueling tanks and petroleum product/chemical storage containers shall include secondary containment. Secondary containment means placing materials within an impervious structure capable of containing 110% of the volume contained in the largest container. Spill prevention measures, such as drip pans and absorbent pads, will be used when conducting maintenance and repair of vehicles or equipment.

To perform emergency repairs on site, temporary plastic will be placed beneath and, if raining, over the vehicle. A sufficient quantity of stocked spill response kits will be available on-site, including smaller portable spill kits carried within equipment and construction vehicles.

In addition, the following steps are required:

- Contain and clean up spills immediately.
- Spills and contaminated surfaces shall be cleaned immediately following any discharge or spill incident, using dry cleanup measures.
- Eliminate the source of the spill to prevent a discharge.

Demolition debris will be handled in a manner that does not cause contamination of stormwater. Debris will not be processed on site, and handling will only occur on existing slabs or adjacent asphalted areas. Good housekeeping and preventative measures will be taken to ensure that the site will be kept clean, well-organized, and free of debris. Site access is fully controlled by fencing and patrolled to eliminate vandalism. All debris will be removed from the site and disposed at an approved location.

The following measures are required to provided best management practices for waste management:

Concrete and Grout BMPs:

- Dust Control (BMP C140).
- Storm Drain Inlet Protection (BMP C220 as described above for Element 7: Protect Drain Inlets).

- Saw cutting and surfacing Pollution Prevention (BMP C152)—Collection of wastewater will include vacuuming during cutting operations if wet cutting is employed.

Contaminated Soil or Sediment:

- The following precautions will be taken to minimize exposure of stormwater to contaminated soils:
  - Suspected contaminated soils will be loaded directly into trucks or stockpiled appropriately.
  - Suspected contaminated soils will be stockpiled on bermed plastic sheeting and covered in plastic sheeting in according with BMP C123 to prevent exposure to stormwater and mobilization of contaminated soils.
  - Water accumulating from stockpiled soils suspected of contamination will be treated through the Lady Island wastewater treatment facility prior to discharge.

Chemical Storage: All chemicals shall have cover, containment, and protection provided on site, in accordance with BMP C153.

Sanitary Wastewater: Portable sanitation facilities will be firmly secured, regularly maintained, and emptied when necessary.

Solid Waste: Solid waste will be stored in secure, clearly marked containers.

Wheel wash wastewater: The use of a Wheel Wash (BMP C106) on-site is not anticipated, but if installed, wastewater will be discharged to the Lady Island Treatment Plant.

Spill Prevention Control and Countermeasures Plan: Per Project Specifications, a separate Spill Prevention, Control, and Countermeasures Plan will be developed by the Contractor.

3.2.1.10 Element 10: Control Dewatering

Dewatering will not be required during this project. However, if dewatering is required, a sediment catchment area will enable the contractor to collect and pump water if needed to the Lady Island wastewater treatment facility prior to discharge. The effluent will be tested in accordance with the requirements stipulated in the Industrial Wastewater Discharge Approval.

The specific BMPs applied to dewatering on this project include:

- Concrete Handling (BMP C151)
- Dredge return water processing system.
- Ecology Construction Stormwater Permit BMPs and water pretreatment system.

Other dewatering treatment or disposal methods may include:

- Infiltration.
- Transport off-site for legal disposal in a manner that does not pollute state waters.

Clean, non-contaminated, non-turbid dewatering water, such as well-point groundwater, will not be routed through stormwater sediment traps, and will be discharged to systems tributary to the

receiving waters of the State in a manner that does not cause erosion, flooding, or a violation of State water quality standards in the receiving water.

The anticipated treatment and disposal options for dewatering water to be used on the project are included in Table 11.

Table 11. Dewatering BMPs

☒	Infiltration
☒	Transport off-site in a vehicle (vacuum truck for legal disposal)
☒	Ecology-approved on-site chemical treatment or other suitable treatment technologies
☐	Sanitary or combined sewer discharge with local sewer district approval (last resort)
☐	Use of sedimentation bag with discharge to catch basin, ditch or swale (small volumes of localized dewatering)

3.2.1.11 Element 11: Maintain BMPs (Permit Condition S9.D. 11)

All temporary and permanent Erosion and Sediment Control (ESC) BMPs shall be maintained and repaired as needed to ensure continued performance of their intended function.

Maintenance and repair shall be conducted in accordance with each particular BMP specification. See **Attachment B** including the BMP specifications from the SWMMWW.

Visual monitoring of all BMPs installed at the site will be conducted at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site. If the site becomes inactive and is temporarily stabilized, the inspection frequency may be reduced to once every calendar month.

All temporary ESC BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be stabilized on-site or removed. Disturbed soil resulting from removal of either BMPs or vegetation shall be permanently stabilized.

No ground disturbance will occur, and therefore no permanent BMPs are anticipated. In the event BMPs are installed for the permanent control of stormwater from sediment and compaction, protection must be provided for these BMPs. BMPs that are to remain in place following completion of construction shall be examined and restored to full operating condition. If sediment enters these BMPs during construction, the sediment shall be removed, and the facility shall be returned to conditions specified in the construction documents.

3.2.1.12 Element 12: Manage the Project

The project will be managed based on the following principles:

- Projects will be phased to the maximum extent practicable and seasonal work limitations will be taken into account.
- Inspection and monitoring:

  - Inspection, maintenance and repair of all BMPs will occur as needed to ensure performance of their intended function.
  - Site inspections and monitoring are required in accordance with Special Condition S4 of the CSWGP. All stormwater generated during demolition activities will be contained and diverted to the existing wastewater treatment facility on Lady Island. As such, no stormwater monitoring is required, and no sampling locations have been designated. Should monitoring be required, sampling station(s) would be located in accordance with applicable requirements of the CSWGP.
- Maintain an updated SWPPP.
  - The SWPPP will be updated, maintained, and implemented in accordance with Special Conditions S3, S4, and S9 of the CSWGP.

As site work progresses the SWPPP will be modified routinely to reflect changing site conditions. The SWPPP will be reviewed monthly to ensure the content is current.

Management BMPs that apply to the site are shown in Table 12 and the BMP implementation schedule is provided in Table 13.

Table 12. Management BMPs

☒	Design the project to fit the existing topography, soils, and drainage patterns
☒	Emphasize erosion control rather than sediment control
☒	Minimize the extent and duration of the area exposed
☒	Keep runoff velocities low
☒	Retain sediment on-site
☒	Thoroughly monitor site and maintain all ESC measures
☒	Schedule major earthwork during the dry season
☒	Other (please describe) – Leave paved surfaces intact.

The construction project is being phased to the extent practicable to prevent soil erosion, and, to the maximum extent possible, the transport of sediment from the site during construction.

Excavation activities in the intertidal zone will be phased such that excavations will be conducted during low tide (“in the dry”).

The BMP implementation schedule shown below in Table 13 will be driven by the construction schedule. BMPs will be installed in each demolition area prior to any soil-disturbing activity.

Table 13. BMP Implementation Schedule

Phase of Construction Project	Stormwater BMPs	Date	Wet/Dry Season
Prior to Construction	Clearing Limit BMPs	Upon Receipt of Permit Approvals—Expected late 2023	Wet and Dry
	Stabilized Construction Entrance		
	Delineate Construction Staging and Parking Areas		

Phase of Construction Project	Stormwater BMPs	Date	Wet/Dry Season
	Control Flow Rate BMPs		
	Sediment Controls BMPs		
	Protect Storm Drain Inlets		
	Manage Materials		
During/After construction or as needed.	Stabilize Soils BMPs	Immediately following preconstruction BMP implementation	Wet and Dry
	Protect Slopes BMPs		
	Manage Demolition Materials		
	Repair/modification/replacement of BMPs as needed.		
	Install additional BMPs as needed		

3.2.1.13 Element 13: Protect Low Impact Development Facilities

Not applicable as no LID occurs on the site or is proposed by the project.

3.3 MR3 – Source Control of Pollution

Source control BMP's should be implemented where applicable. The Ecology SWMMWW Volume IV lists a number of BMP's for source control of pollutants. The source control BMP's applicable to this project include:

- S410 BMP - Correcting Illicit Discharges to Storm Drains;
- S453 BMP - Formation of a Pollution Prevention Team;
- S454 BMP - Preventive Maintenance / Good Housekeeping;
- S455 BMP - Spill Prevention and Cleanup;
- S456 BMP - Employee Training;
- S457 BMP - Inspections; and
- S458 BMP - Record Keeping.

See **Attachment B** for details regarding the above source control BMPs.

3.4 MR4 – Preservation of Natural Drainage Systems and Outfalls

The majority of the proposed areas of disturbance currently drain into an onsite stormwater collection, conveyance, and treatment system with an outfall to the Columbia River. This project proposes to demo and regrade approximately 10.8 acres of the area currently being routed through the stormwater treatment system. See Figure 5 in **Attachment A** for a plan view of this area. The native natural drainage system for this area consisted of sheet flow to the Columbia River. The proposed grading plan shown on Figure 5 in **Attachment A** restores sheet flow to the Columbia River and restores the natural drainage system and sheet flow outfall.

3.5 MR5 – On-Site Stormwater Management

Based on the Ecology SWMMWW, this project requires MR 1-5 criteria to be met with stormwater design and management. These specific MRs and flow control exemption criteria lead to certain MR5

requirements. Figure 2 below shows a flow chart to determine the requirements of MR5 for this project.

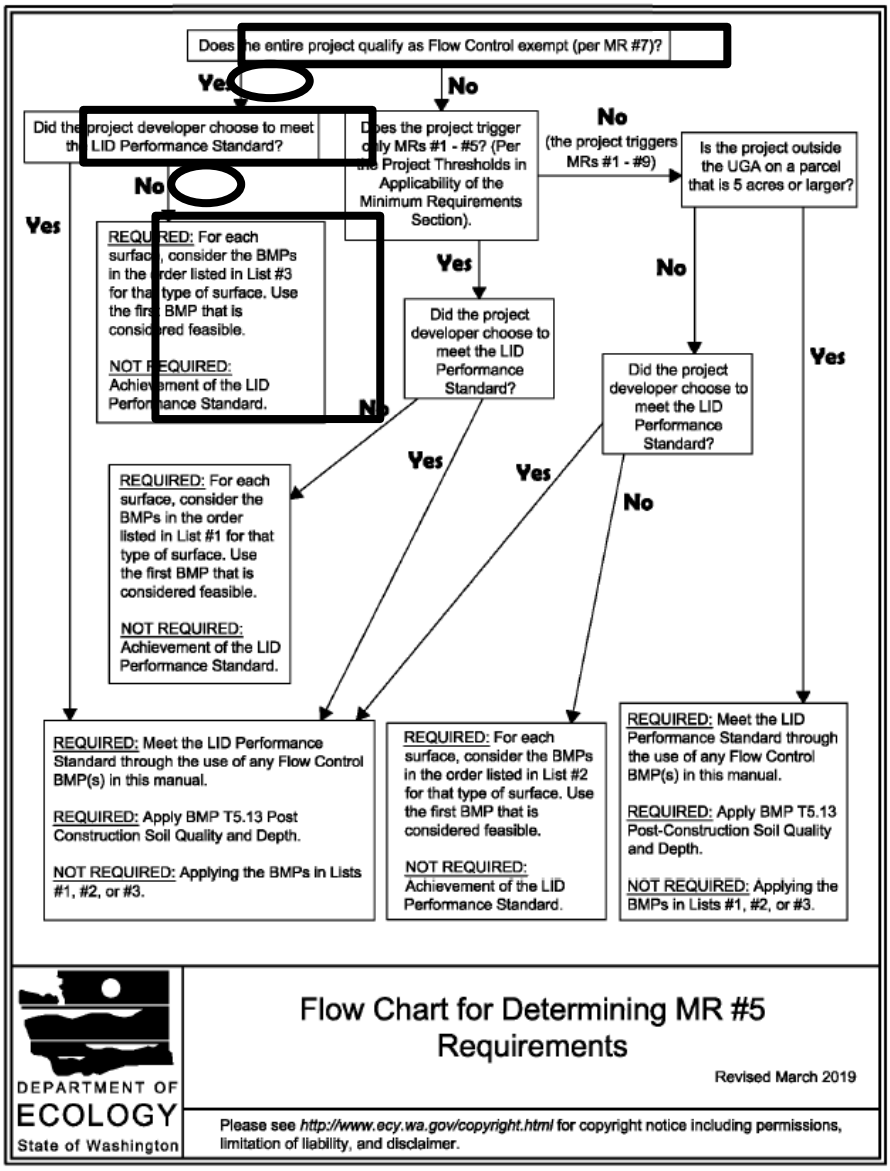


Figure 2. Flow Chart for Determining MR5 Requirements

List #3 from the Ecology SWMMWW was referenced to determine what BMP to implement for new, replaced and disturbed land surfaces for the project. List #3 prescribes BMPs for three types of surfaces including lawn and landscaped areas, roofs areas, and other hard surfaces. For this project, there will be no new or replaced roofs or other hard surfaces. All new, replaced, or disturbed land surfaces for this project are proposed to be lawn or landscaped areas for final conditions. Based on List #3, BMP T5.13: Post-Construction Soil Quality and Depth applies to these areas.

4.0 POLLUTION PREVENTION TEAM

The pollution prevention team listed in Table 14 is responsible for implementation of the SWPPP.

Table 14. Team Information

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)	TBD	TBD
Resident Engineer	TBD	TBD
Emergency Ecology Contact	Southwest Region Office	(360) 407-6300
Emergency Permittee/ Owner Contact	TBD	TBD
Non-Emergency Owner Contact	TBD	TBD
Monitoring Personnel	TBD	TBD
Ecology Regional Office	Southwest Region Office Permit Administrator (Clark County): Joyce Smith	(360) 407-6300 (360) 407-6858

5.0 MONITORING AND SAMPLING REQUIREMENTS

Monitoring includes visual inspection, sampling for water quality parameters of concern, and documentation of the inspection and sampling findings in a site logbook. A site logbook will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements.
- A record of Site inspections.
- Stormwater sampling data, where needed.

A Construction Stormwater Site Inspection Form is included in **Attachment C**.

The site logbook must be maintained on-site within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

5.1 Site Inspection

Site inspections will be conducted at least once every calendar week. For sites that are temporarily stabilized and inactive, the required frequency is reduced to once per calendar month. Note that no surface discharge points are proposed at the site as the stormwater will be routed to Lady Island for treatment.

5.2 Stormwater Quality Sampling

There are no requirements for stormwater sampling as all stormwater in the project area will be treated off-site. The treatment facility has regulated discharges under existing NPDES permits.

5.2.1 Turbidity Sampling

Requirements include calibrated turbidity meter or transparency tube to sample site discharges for compliance with the CSWGP. Sampling will be conducted at all discharge points at least once per calendar week.

Method for sampling turbidity:

N/A: Sampling for turbidity will not occur since cumulative soil disturbance on this project is less than one (1) acre.

Table 15. Turbidity Sampling Method

☒	Turbidity Meter/Turbidimeter (required for disturbances 5 acres or greater in size)
☐	Transparency Tube (option for disturbances less than 1 acre and up to 5 acres in size)

The benchmark for turbidity value is 25 nephelometric turbidity units (NTU) and a transparency less than 33 centimeters.

If the discharge's turbidity is 26 to 249 NTU **or** the transparency is less than 33 cm but equal to or greater than 6 cm, the following steps will be conducted:

1. Review the SWPPP for compliance with Special Condition S9. Make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
3. Document BMP implementation and maintenance in the site logbook.

If the turbidity exceeds 250 NTU **or** the transparency is 6 cm or less at any time, the following steps will be conducted:

1. Telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) within 24 hours.
   - **Southwest Region** (Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, or Wahkiakum): (360) 407-6300 or http://www.ecy.wa.gov/programs/spills/forms/nerts_online/NWRO_nerts_online.html
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
3. Document BMP implementation and maintenance in the site logbook.
4. Continue to sample discharges daily until one of the following is true:
   - Turbidity is 25 NTU (or lower).
   - Transparency is 33 cm (or greater).
   - Compliance with the water quality limit for turbidity is achieved
     - 1 - 5 NTU over background turbidity, if background is less than 50 NTU

- 1% - 10% over background turbidity, if background is 50 NTU or greater
- The discharge stops or is eliminated.

5.2.2 pH Sampling

pH monitoring is required for "Significant concrete work" (i.e., greater than 1000 cubic yards poured concrete over the life of the project). The use of recycled concrete or engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD] or fly ash) also requires pH monitoring.

For significant concrete work, pH sampling will start the first day concrete is poured and continue until it is cured, typically three (3) weeks after the last pour.

For engineered soils and recycled concrete, pH sampling begins when engineered soils or recycled concrete are first exposed to precipitation and continues until the area is fully stabilized.

If the measured pH is 8.5 or greater, the following measures will be taken:

1. Prevent high pH water from entering storm sewer systems or surface water.
2. Adjust or neutralize the high pH water to the range of 6.5 to 8.5 su using appropriate technology such as carbon dioxide (CO_2) sparging (liquid or dry ice).
3. Written approval will be obtained from Ecology prior to the use of chemical treatment other than CO_2 sparging or dry ice.

Method for sampling pH:

N/A, as sampling for pH will not occur because significant concrete work is not part of this project.

Table 16. pH Sampling Method

☐	pH meter
☒	pH test kit
☐	Wide range pH indicator paper

6.0 DISCHARGES TO 303(D) LISTED AND TOTAL MAXIMUM DAILY LOAD (TMDL) WATERBODIES

6.1 303(d) Listed Waterbodies

Is the receiving water 303(d) (Category 5) listed for turbidity, fine sediment, phosphorus, or pH?

☐ Yes ☒ No

List the impairment(s): N/A - There are no listed impairments for the receiving waters.

Exhibit 10 SHOR23-01

6.2 TMDL Waterbodies

Waste Load Allocation for CWSGP discharges: N/A, as there are no waste load allocations for discharges to the receiving waters.

List and describe BMPs: N/A

7.0 REPORTING AND RECORDKEEPING REQUIREMENTS

7.1 Record Keeping

7.1.1 Site Logbook

A site logbook will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements.
- Site inspections.

7.1.2 Record Retention

Records will be retained during the life of the project and for a minimum of three (3) years following the termination of permit coverage in accordance with Special Condition S5.C of the CSWGP.

Permit documentation to be retained on site:

- CSWGP
- Permit Coverage Letter
- SWPPP
- Site Logbook

Permit documentation will be provided within 14 days of receipt of a written request from Ecology. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with Special Condition S5.G.2.b of the CSWGP.

7.1.3 Updating the SWPPP

The SWPPP will be modified if:

- Found ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site.
- There is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

The SWPPP will be modified within seven (7) days if inspection(s) or investigation(s) determine additional or modified BMPs are necessary for compliance. An updated timeline for BMP implementation will be prepared.

7.2 Reporting

7.2.1 Discharge Monitoring Reports

Cumulative soil disturbance is less than one (1) acre; therefore, Discharge Monitoring Reports will not be submitted to Ecology because water quality sampling is not being conducted at the site. Moreover, stormwater impacted by uplands demolition activities will be routed to treatment during demolition and managed under separate NPDES permits.

If there was no discharge during a given monitoring period the DMR will be submitted as required, reporting "No Discharge." The DMR due date is fifteen (15) days following the end of each calendar month.

DMRs will be reported online through Ecology's WQWebDMR System (http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html).

7.2.2 Notification of Noncompliance

If any of the terms and conditions of the permit are not met, and the resulting noncompliance may cause a threat to human health or the environment, the following actions will be taken:

1. Ecology will be notified within 24-hours of the failure to comply by calling the applicable Regional office ERTS phone number (Regional office numbers listed below).
2. Immediate action will be taken to prevent the discharge/pollution or otherwise stop or correct the noncompliance. If applicable, sampling and analysis of any noncompliance will be repeated immediately, and the results submitted to Ecology within five (5) days of becoming aware of the violation.
3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Anytime turbidity sampling indicates turbidity is 250 NTUs or greater, or water transparency is 6 cm or less, the Ecology Regional office will be notified by phone within 24 hours of analysis as required by Special Condition S5.A of the CSWGP.

- **Southwest Region** at (360) 407-6300

Include the following information:

1. Your name and phone number
2. Permit number
3. City / County of project
4. Sample results
5. Date / Time of call
6. Date / Time of sample
7. Project name

8.0 REFERENCES

Ecology 2019, Stormwater Management Manual for Western Washington, Department of Ecology, July 2019

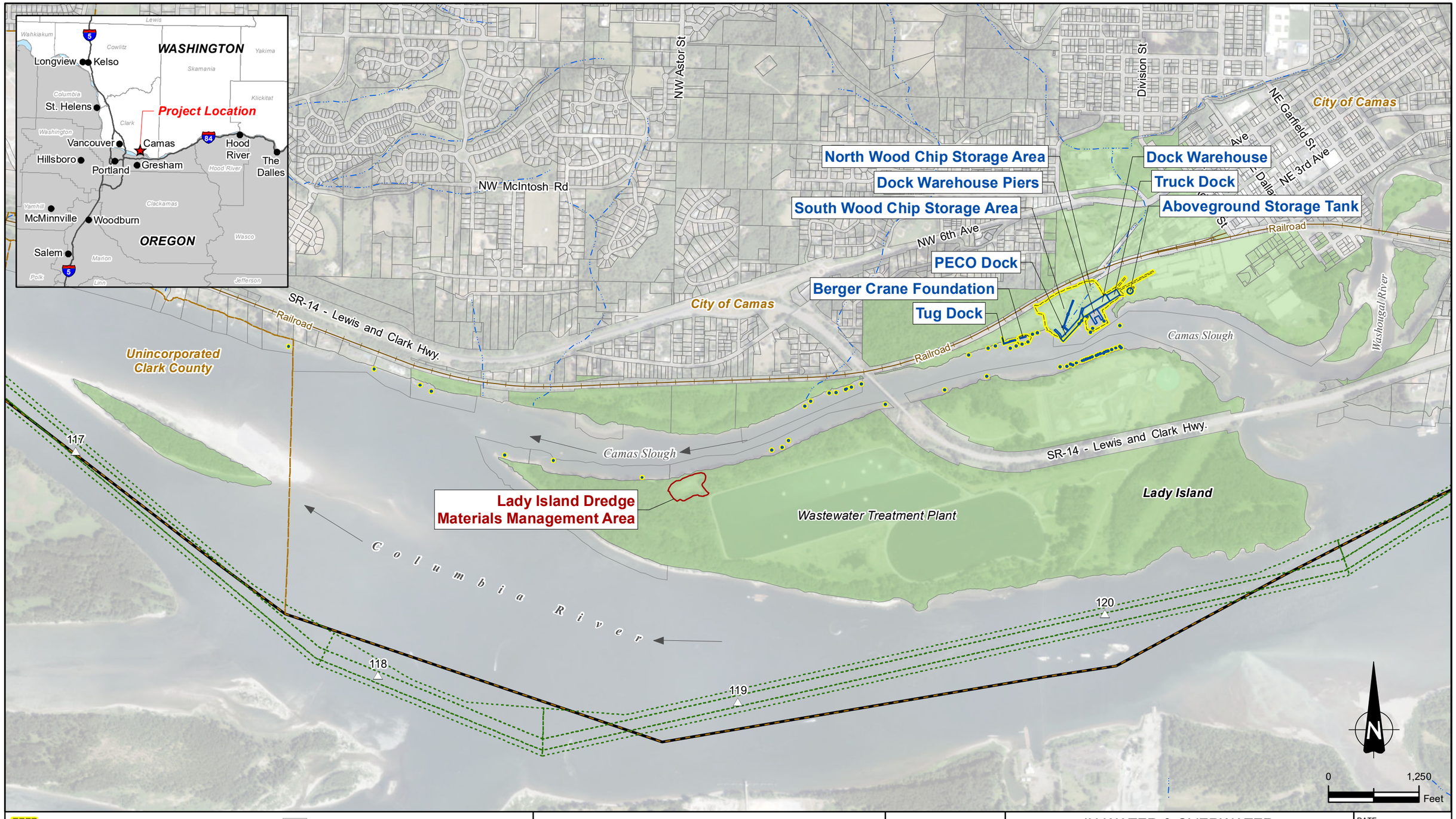
Clark County 2015, Clark County Stormwater Manual, November 2021.

City of Camas 2016, Camas Stormwater Design Standards Manual, November 2016.

DNR 2017, Washington Department of Natural Resources, Derelict Creosote Piling Removal Best Management Practices for Pile Removal & Disposal, January 2017.

EPA 2016, EPA Region 10, Best Management Practices for Piling Removal and Placement in Washington State, February 2016.

Appendix A: Site Maps



Project Limits	Tax Lot
Columbia River Mile Marker	Tax Lot Owned by Georgia-Pacific
Stream/River	City Boundary
Structure To Be Removed	County Boundary
Dolphin To Be Removed	Federal Navigation Channel
Lady Island Dredge Materials Management Area	

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

PROJECT LOCATION

DATE: OCTOBER 2022
SCALE: 1 " = 1,250 '
PROJECT NO.
FIGURE: 981

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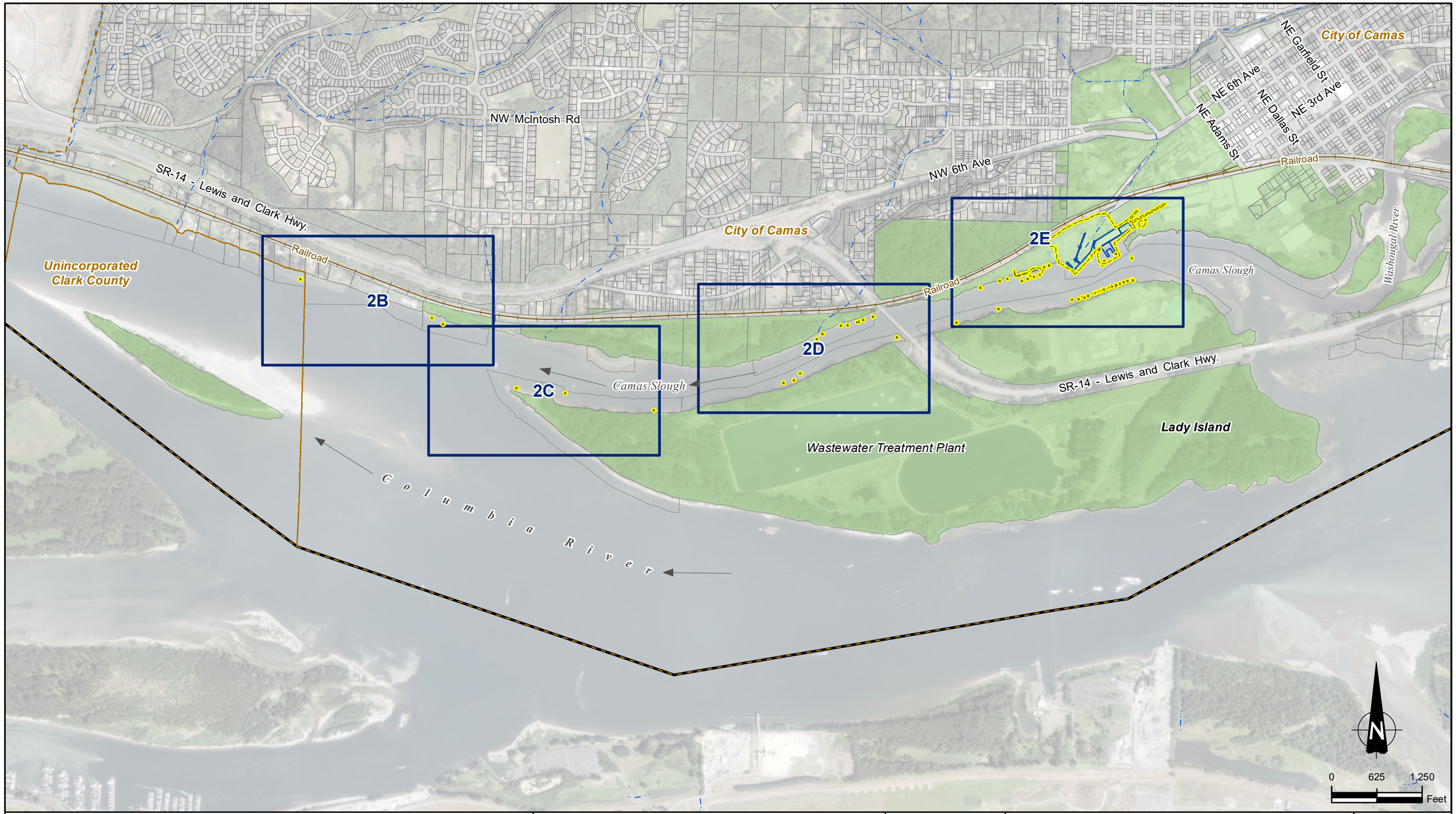

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Stream/River
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary
County Boundary

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

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IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP
OVERVIEW

DATE
OCTOBER 2022

SCALE
1 " = 1,250 '

PROJECT NO.

FIGURE
982

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2A - Study Area Map - Overview.mxd - sierra.marrs - 10/19/2022 - 3:36:05 PM

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary

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IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE: OCTOBER 2022
SCALE: 1 " = 200 '
PROJECT NO.
FIGURE: 983

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2B-2E - Study Area Map - Mapbook.mxd - sierra.marrs - 10/19/2022 - 3:36:17 PM

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

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IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE
OCTOBER 2022

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
984

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Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

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CONSUMER OPERATIONS LLC

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TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE
OCTOBER 2022

SCALE
1 " = 200 '

PROJECT NO.

FIGURE
985

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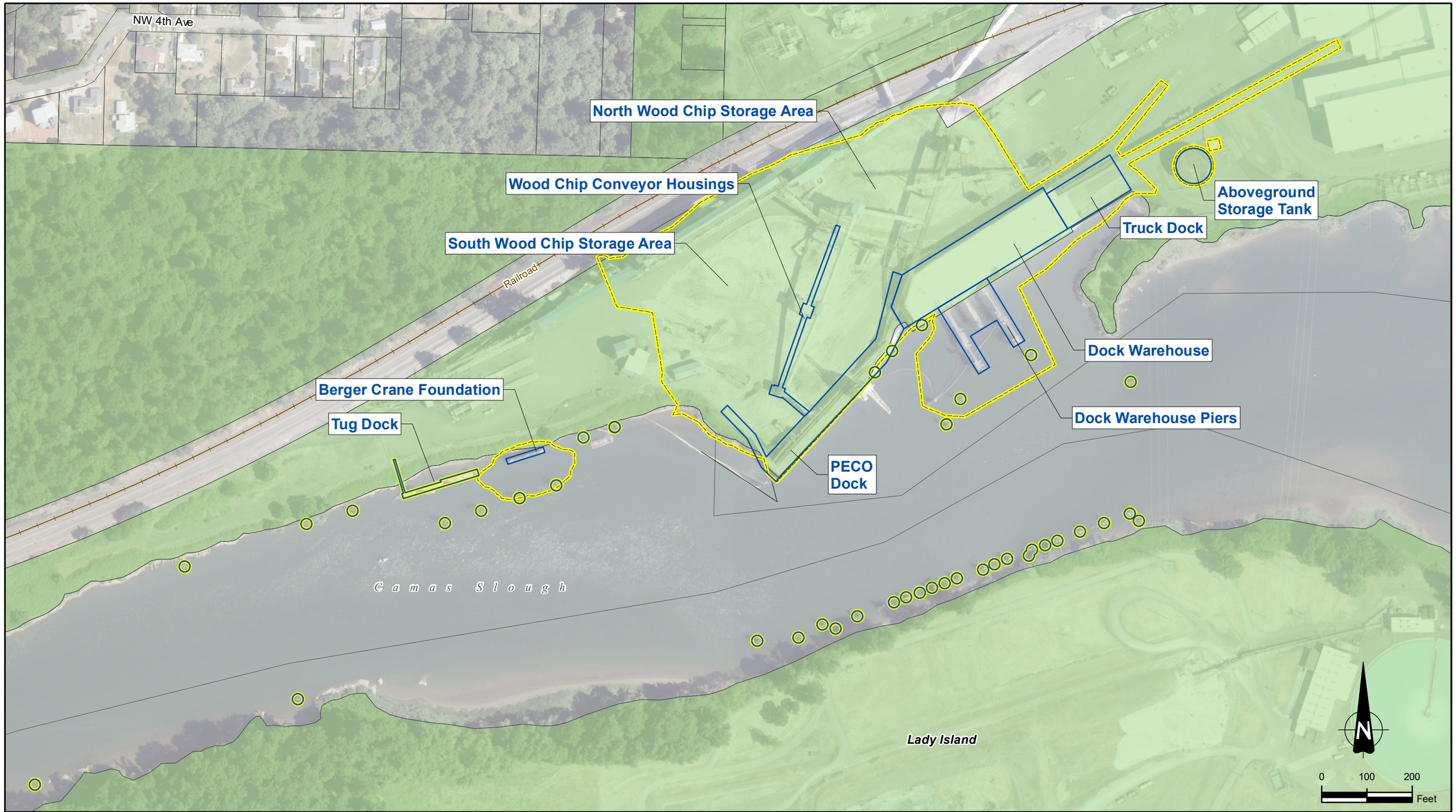

- Project Limits
- Structure To Be Removed
- Dolphin To Be Removed
- Tax Lot
- Tax Lot Owned by Georgia-Pacific

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED AND STUDY AREA MAP

DATE: OCTOBER 2022

SCALE: 1 " = 200 '

PROJECT NO.

FIGURE: 986

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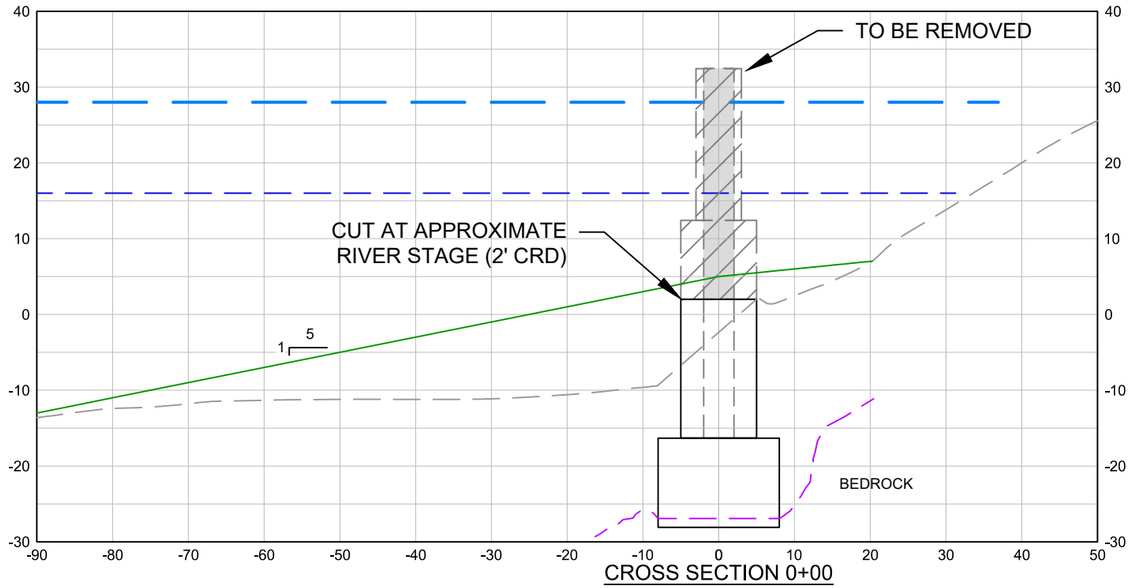
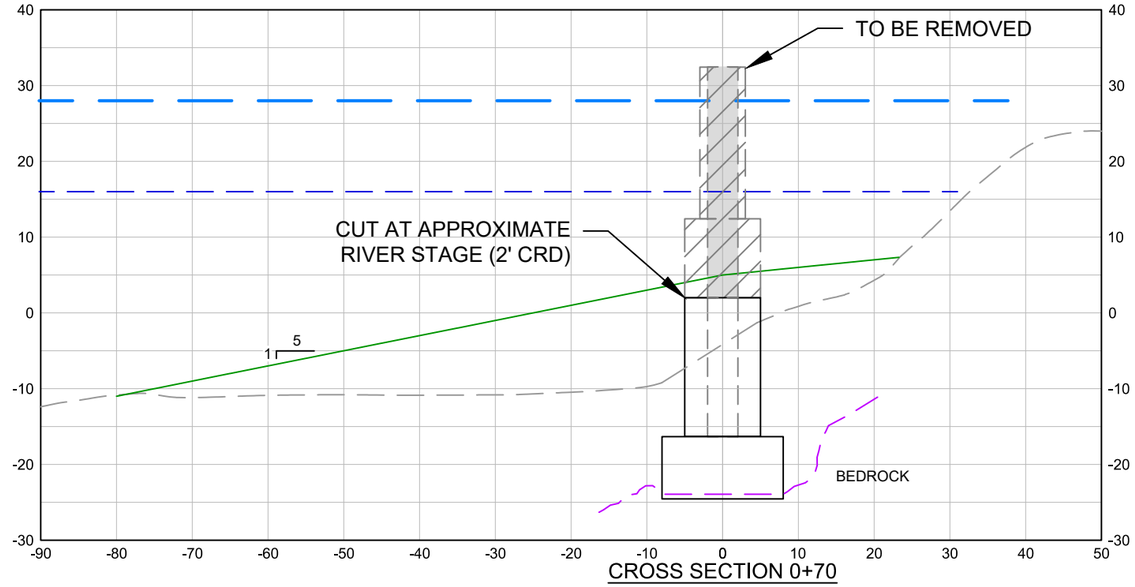


CROSS SECTION 0+00



CROSS SECTION 0+70

Depth Thickness Table in Ft		
MIN	MAX	Color
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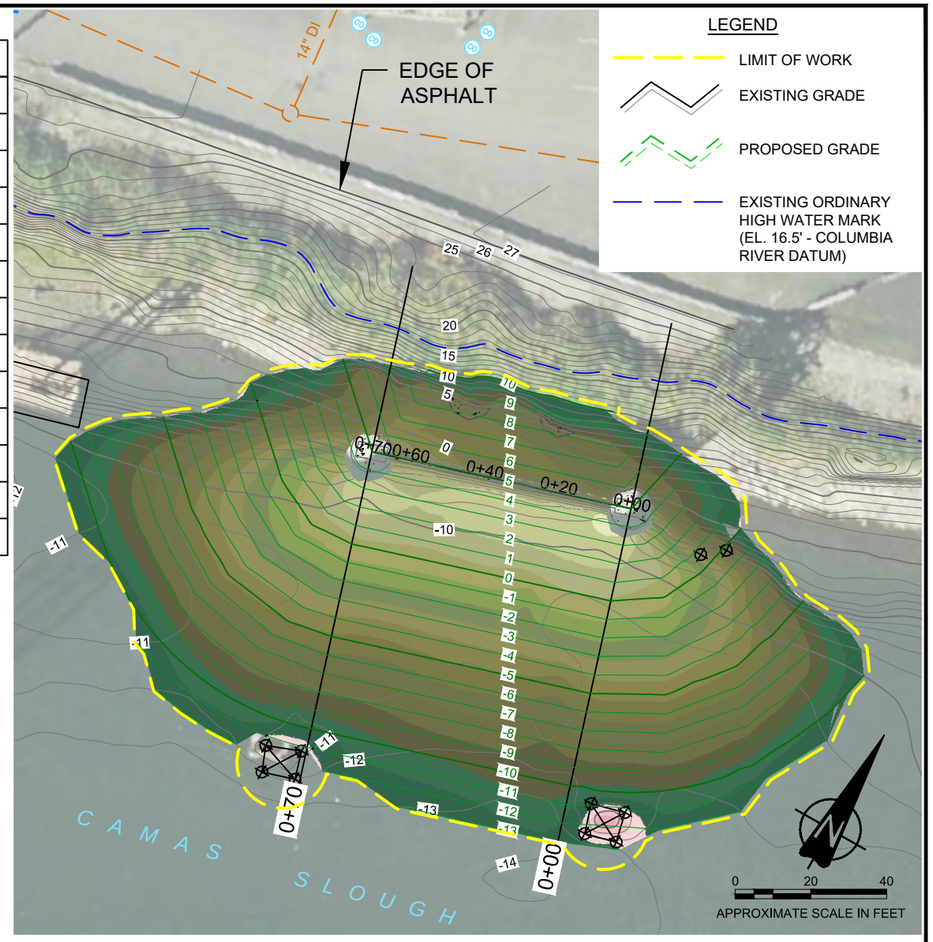
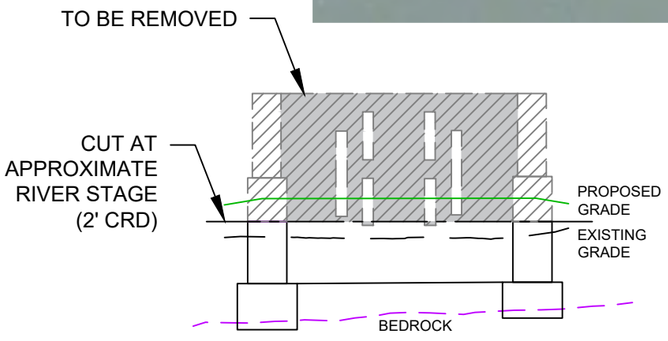
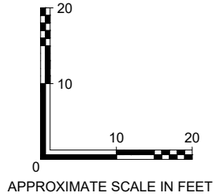
+1	+2	
+2	+3	
+3	+4	
+4	+5	
+5	+6	
+6	+7	
+7	+8	
+8	+9	
+9	+10	
+10	+11	
+11	+12	

3,500 c□ FILL





BERGER CRANE FOUNDATION PHOTO

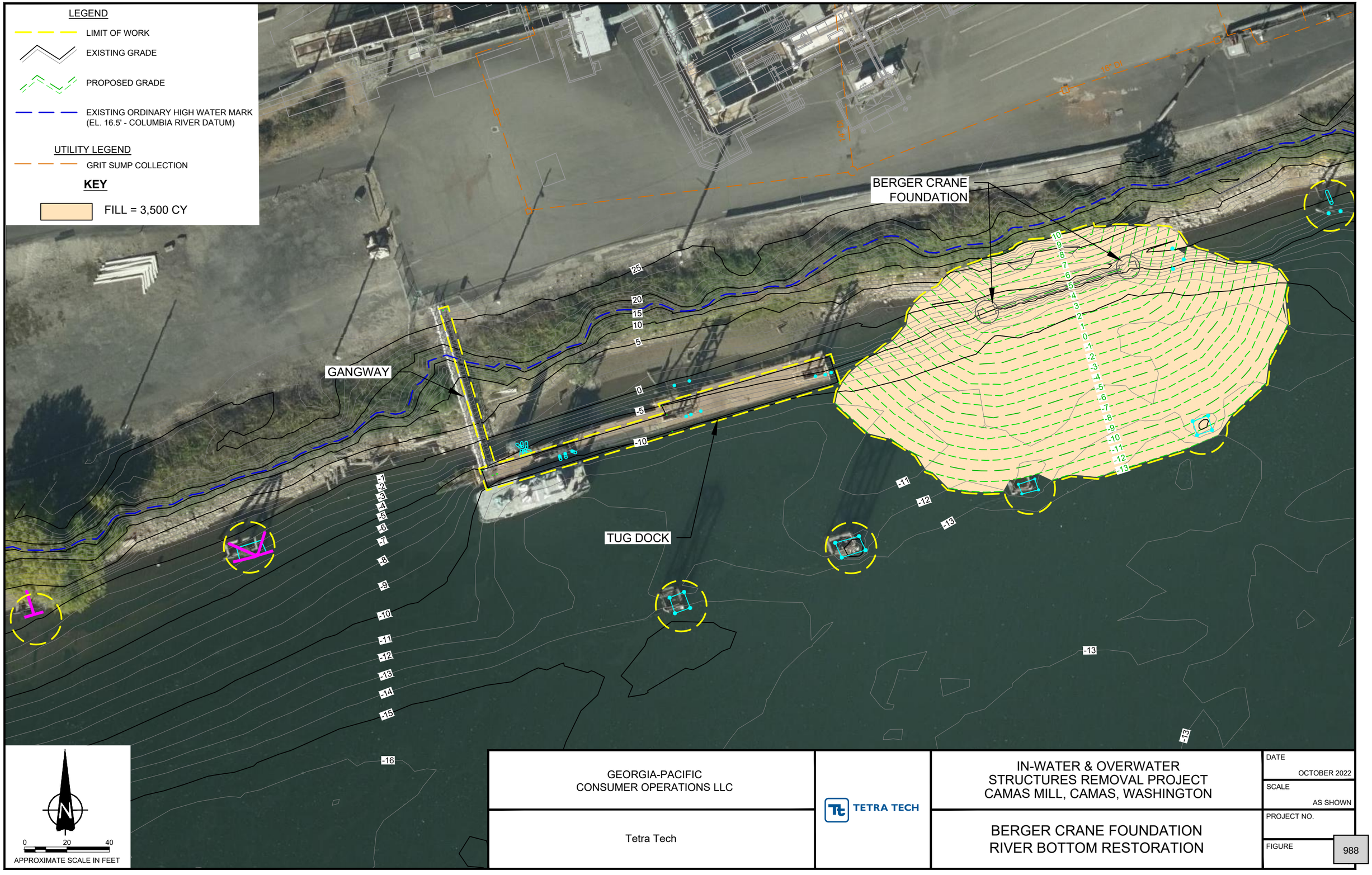


APPROXIMATE SCALE IN FEET

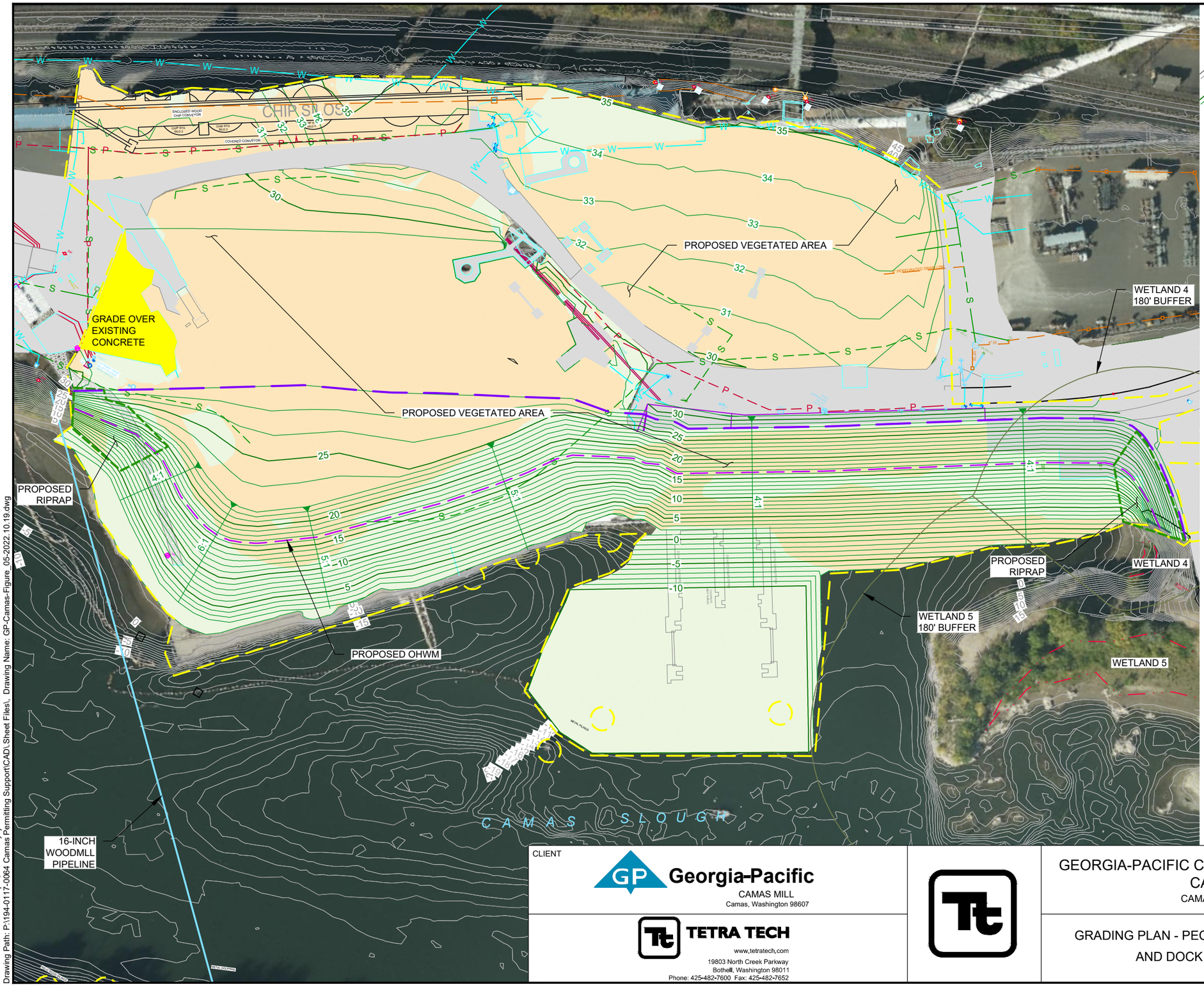
CROSS SECTION LEGEND

- ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING GRADE
- PROPOSED FINAL GRADE

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE: OCTOBER 2022
			SCALE: AS SHOWN
Tetra Tech		GRADING PLAN BERGER CRANE FOUNDATION	PROJECT NO.
			FIGURE: 987



GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE: OCTOBER 2022 SCALE: AS SHOWN PROJECT NO.
Tetra Tech		BERGER CRANE FOUNDATION RIVER BOTTOM RESTORATION	FIGURE: 988



LEGEND

- LIMIT OF WORK
- EXISTING GRADE CONTOURS (SITEWIDE LAND SURVEYING 7/07/20)
- PROPOSED FINAL GRADE CONTOURS
- PROPOSED ORDINARY HIGH WATER MARK (OHWM) (EL. 16.5' - COLUMBIA RIVER DATUM)
- PROPOSED 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING WETLAND

UTILITY LEGEND

- FIRE MAIN
- W — WATER
- S — PROCESS SEWER
- GRIT SUMP COLLECTION
- OL — OVERHEAD POWER LINE
- P — UNDERGROUND POWER LINE
- NATURAL GAS

EARTHWORK QUANTITIES

NORTH WOOD CHIP AREA:
130,730 SF (3.00 ACRE)
CUT = 5,678 CY
FILL = 32,943 CY

SOUTH WOOD CHIP AREA, PECO DOCK, WAREHOUSE, AND PIERS:
340,088 SF (7.81 ACRE)
CUT = 32,676 CY
FILL = 20,788 CY

DRAFT

0 50 100
APPROXIMATE SCALE IN FEET

CLIENT
Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

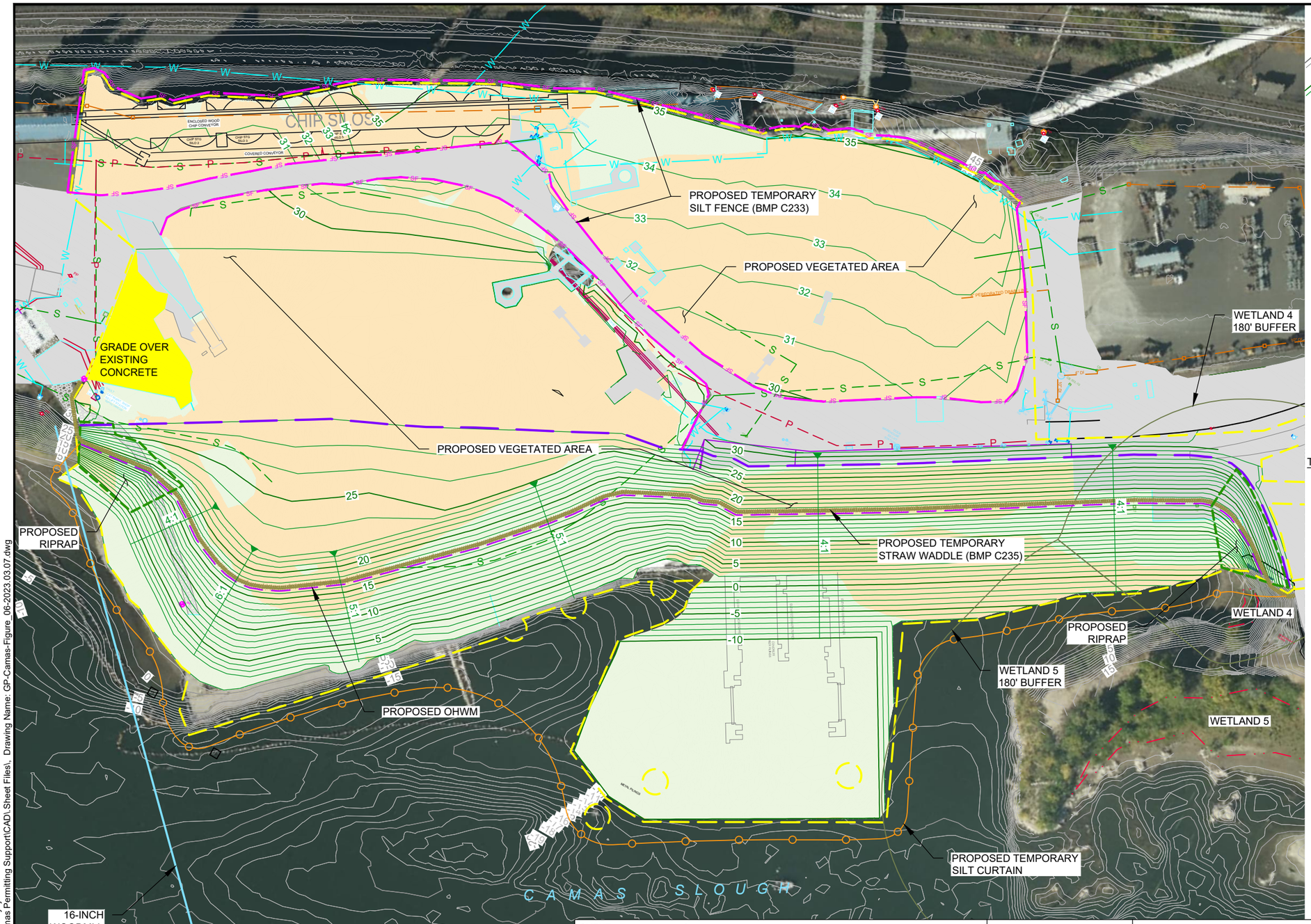
TETRA TECH
www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

GRADING PLAN - PECO DOCK, DOCK WAREHOUSE, AND DOCK WAREHOUSE PIERS

DATE 10/19/22
SCALE AS SHOWN
PROJECT No. 194-0117
FIGURE 989

Plot Date: 10/19/22 - 5:03pm, Plotted by: joel.cameron
Drawing Path: P:\194-0117-0064 Camas Permitting Support\CAD\ Sheet Files\, Drawing Name: GP-Camas-Figure_05-2022.10.19.dwg



LEGEND

- LIMIT OF WORK
- EXISTING GRADE CONTOURS (SITEWIDE LAND SURVEYING 7/07/20)
- PROPOSED FINAL GRADE CONTOURS
- PROPOSED ORDINARY HIGH WATER MARK (OHWM) (EL. 16.5' - COLUMBIA RIVER DATUM)
- PROPOSED 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING WETLAND
- SF — TEMPORARY SILT FENCE (BMP C233)
- TEMPORARY SILT CURTAINS
- TEMPORARY STRAW WADDLES (BMP C235)

UTILITY LEGEND

- FIRE MAIN
- W — WATER
- S — PROCESS SEWER
- GRIT SUMP COLLECTION
- OL — OVERHEAD POWER LINE
- P — UNDERGROUND POWER LINE
- NATURAL GAS

TESC NOTES:

1. INSTALL ALL TEMPORARY BMPS SHOWN PRIOR TO GROUND DISTURBANCE. SEE THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) NARRATIVE IN THE STORMWATER MANAGEMENT PLAN (SMP) FOR ADDITIONAL BMPS NOT SHOWN ON PLAN.
2. ESTABLISH A TEMPORARY CONSTRUCTION ENTRANCE PER ECOLOGY DETAIL BMP C105 WITH LOCATION BASED ON PROPOSED CONSTRUCTION METHODS.
3. INSTALL TEMPORARY SILT CURTAINS AROUND ALL IN-WATER WORK BELOW THE OHWM. IN-WATER WORK AREAS TO INSTALL TEMPORARY SILT CURTAIN INCLUDE THE TUG DOCK, BERGER CRANE FOUNDATION, PECO DOCK, DOCK WAREHOUSE PIERS AND ALL PIERS TO BE REMOVED.
4. THE SWPPP NARRATIVE IN THE SMP SHALL BE FOLLOWED AS PART OF THE TESC PLAN, AND COPIES OF BOTH THE TESC PLAN AND SMP SHALL BE KEPT ONSITE THROUGHOUT THE DURATION OF CONSTRUCTION.
5. ALL STORM DRAIN CATCH BASIN INLETS ADJACENT TO THE WORK AREAS SHALL HAVE INLET PROTECTION FILTERS INSTALLED PER ECOLOGY DETAIL BMP C220.
6. ALL UPLAND DISTURBED AREAS SHALL BE RESTORED PER ECOLOGY DETAIL BMP T5.13 (MIN 8 INCHES TOPSOIL, ETC), AND SHALL BE SEEDED WITH AN APPROVED SEED MIX.
7. EXISTING ACCESS ROADS SHALL NOT BE DISTURBED AS PART OF THIS PROJECT.
8. REMOVE ALL TEMPORARY BMPS UPON COMPLETION OF CONSTRUCTION AND STABILIZATION OF DISTURBED AREAS.

DRAFT

0 50 100
APPROXIMATE SCALE IN FEET

Plot Date: 03/07/23 - 5:10pm, Plotted by: joel.cameron
Drawing Path: P:\194-0117-0064 Camas Permitting Support\CAD\Sheet Files\, Drawing Name: GP-Camas-Figure_06-2023.03.07.dwg

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CAMAS MILL
CAMAS, WASHINGTON

TEMPORARY EROSION & SEDIMENT CONTROL PLAN (TESC)

DATE 03/07/23
SCALE AS SHOWN
PROJECT No. 194-0117
FIGURE 990

Appendix B: BMP Details

BMP C102: Buffer Zones

Purpose

Creation of an undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and stormwater runoff velocities.

Conditions of Use

Buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Contractors can use vegetative buffer zone BMPs to protect natural swales and they can incorporate them into the natural landscaping of an area.

Do not use critical-areas buffer zones as sediment treatment areas. These areas shall remain completely undisturbed. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

The types of buffer zones can change the level of protection required as shown below:

Designated Critical Area Buffers - buffers that protect Critical Areas, as defined by the Washington State Growth Management Act, and are established and managed by the local permitting authority. These should not be disturbed and must protected with sediment control BMPs to prevent impacts. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

Vegetative Buffer Zones - areas that may be identified in undisturbed vegetation areas or managed vegetation areas that are outside any Designated Critical Area Buffer. They may be utilized to provide an additional sediment control area and/or reduce runoff velocities. If being used for preservation of natural vegetation, they should be arranged in clumps or strips. They can be used to protect natural swales and incorporated into the natural landscaping area.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. Steel construction fencing is the most effective method to protect sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage by

burying and smothering vegetation.

- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

Maintenance Standards

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately. Remove all materials located in the buffer area that may impede the ability of the vegetation to act as a filter.

BMP C103: High-Visibility Fence

Purpose

High-visibility fencing is intended to:

- Restrict clearing to approved limits.
- Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed.
- Limit construction traffic to designated construction entrances, exits, or internal roads.
- Protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits plastic, fabric, or metal fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

Design and Installation Specifications

High-visibility plastic fence shall be composed of a high-density polyethylene material and shall be at least four feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every six inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high-visibility orange. The fence tensile strength shall be 360 lbs/ft using the ASTM D4595 testing method.

If appropriate install fabric silt fence in accordance with BMP C233: Silt Fence to act as high-visibility fence. Silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.

Metal fences shall be designed and installed according to the manufacturer's specifications.

Metal fences shall be at least 3 feet high and must be highly visible.

Fences shall not be wired or stapled to trees.

Maintenance Standards

If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C105: Stabilized Construction Access

Purpose

Stabilized construction accesses are established to reduce the amount of sediment transported onto paved roads outside the project site by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for project sites.

Conditions of Use

Construction accesses shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.

For residential subdivision construction sites, provide a stabilized construction access for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size and configuration.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized accesses not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation Specifications

See Figure II-3.1: Stabilized Construction Access for details. Note: the 100' minimum length of the access shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').

Construct stabilized construction accesses with a 12-inch thick pad of 4-inch to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction access stabilization because these products raise pH levels in stormwater and concrete discharge to waters of the State is prohibited.

A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the standards listed in Table II-3.2: Stabilized Construction Access Geotextile Standards.

Table II-3.2: Stabilized Construction Access Geotextile Standards

Geotextile Property	Required Value
Grab Tensile Strength (ASTM D4751)	200 psi min.

Table II-3.2: Stabilized Construction Access Geotextile Standards (continued)

Geotextile Property	Required Value
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	20-45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will be paved; this can be used as a stabilized access. Also consider the installation of excess concrete as a stabilized access. During large concrete pours, excess concrete is often available for this purpose.
- Fencing (see BMP C103: High-Visibility Fence) shall be installed as necessary to restrict traffic to the construction access.
- Whenever possible, the access shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction accesses should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction access must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.

Alternative Material Specification

WSDOT has raised safety concerns about the Quarry Spall rock specified above. WSDOT observes that the 4-inch to 8-inch rock sizes can become trapped between Dually truck tires, and then released off-site at highway speeds. WSDOT has chosen to use a modified specification for the rock while continuously verifying that the Stabilized Construction Access remains effective. To remain effective, the BMP must prevent sediment from migrating off site. To date, there has been no performance testing to verify operation of this new specification. Jurisdictions may use the alternative specification, but must perform increased off-site inspection if they use, or allow others to use, it.

Stabilized Construction Accesses may use material that meets the requirements of WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* Section 9-03.9(1) (WSDOT, 2016) for ballast except for the following special requirements.

The grading and quality requirements are listed in Table II-3.3: Stabilized Construction Access Alternative Material Requirements.

Table II-3.3: Stabilized Construction Access Alternative Material Requirements

Sieve Size	Percent Passing
2½"	99-100

Table II-3.3: Stabilized Construction Access Alternative Material Requirements (continued)

Sieve Size	Percent Passing
2″	65-100
¾″	40-80
No. 4	5 max.
No. 100	0-2
% Fracture	75 min.

- All percentages are by weight.
- The sand equivalent value and dust ratio requirements do not apply.
- The fracture requirement shall be at least one fractured face and will apply the combined aggregate retained on the No. 4 sieve in accordance with FOP for AASHTO T 335.

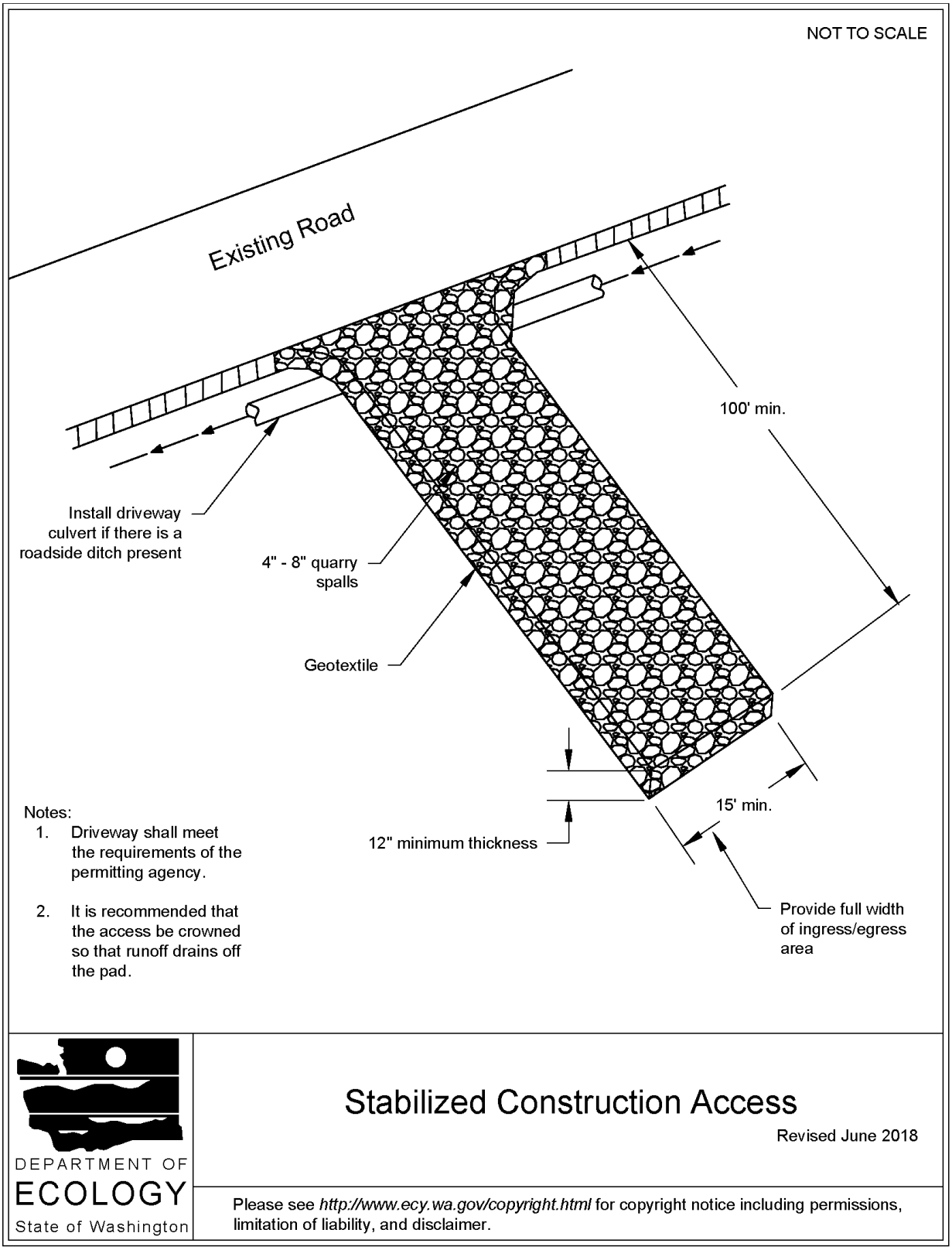
Maintenance Standards

Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- If the access is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions of the access, or the installation of BMP C106: Wheel Wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when high efficiency sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the wash water shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high efficiency sweeper. Do not use a non-high efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction access(es), BMP C103: High-Visibility Fence shall be installed to control traffic.

- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

Figure II-3.1: Stabilized Construction Access



Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C106: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by washing dirt from the wheels of motor vehicles prior to the motor vehicles leaving the construction site.

Conditions of Use

- Use a wheel wash when BMP C105: Stabilized Construction Access is not preventing sediment from being tracked off site.
- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.
- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.
- Wheel wash wastewater is not stormwater. It is commonly called process water, and must be discharged to a separate on-site treatment system that prevents discharge to waters of the State, or to the sanitary sewer with local sewer district approval.
- Wheel washes may use closed-loop recirculation systems to conserve water use.
- Wheel wash wastewater shall not include wastewater from concrete washout areas.
- When practical, the wheel wash should be placed in sequence with BMP C105: Stabilized Construction Access. Locate the wheel wash such that vehicles exiting the wheel wash will enter directly onto BMP C105: Stabilized Construction Access. In order to achieve this, BMP C105: Stabilized Construction Access may need to be extended beyond the standard installation to meet the exit of the wheel wash.

Design and Installation Specifications

Suggested details are shown in Figure II-3.2: Wheel Wash. The Local Permitting Authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.

Use a low clearance truck to test the wheel wash before paving. Either a belly dump or lowboy will work well to test clearance.

Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.

Midpoint spray nozzles are only needed in extremely muddy conditions.

Wheel wash systems should be designed with a small grade change, 6- to 12-inches for a 10-foot-wide pond, to allow sediment to flow to the low side of pond to help prevent re-suspension of sediment. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow for easy cleaning and refilling. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel wash water at a rate of 0.25 - 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the wash water.

Maintenance Standards

The wheel wash should start out each day with fresh water.

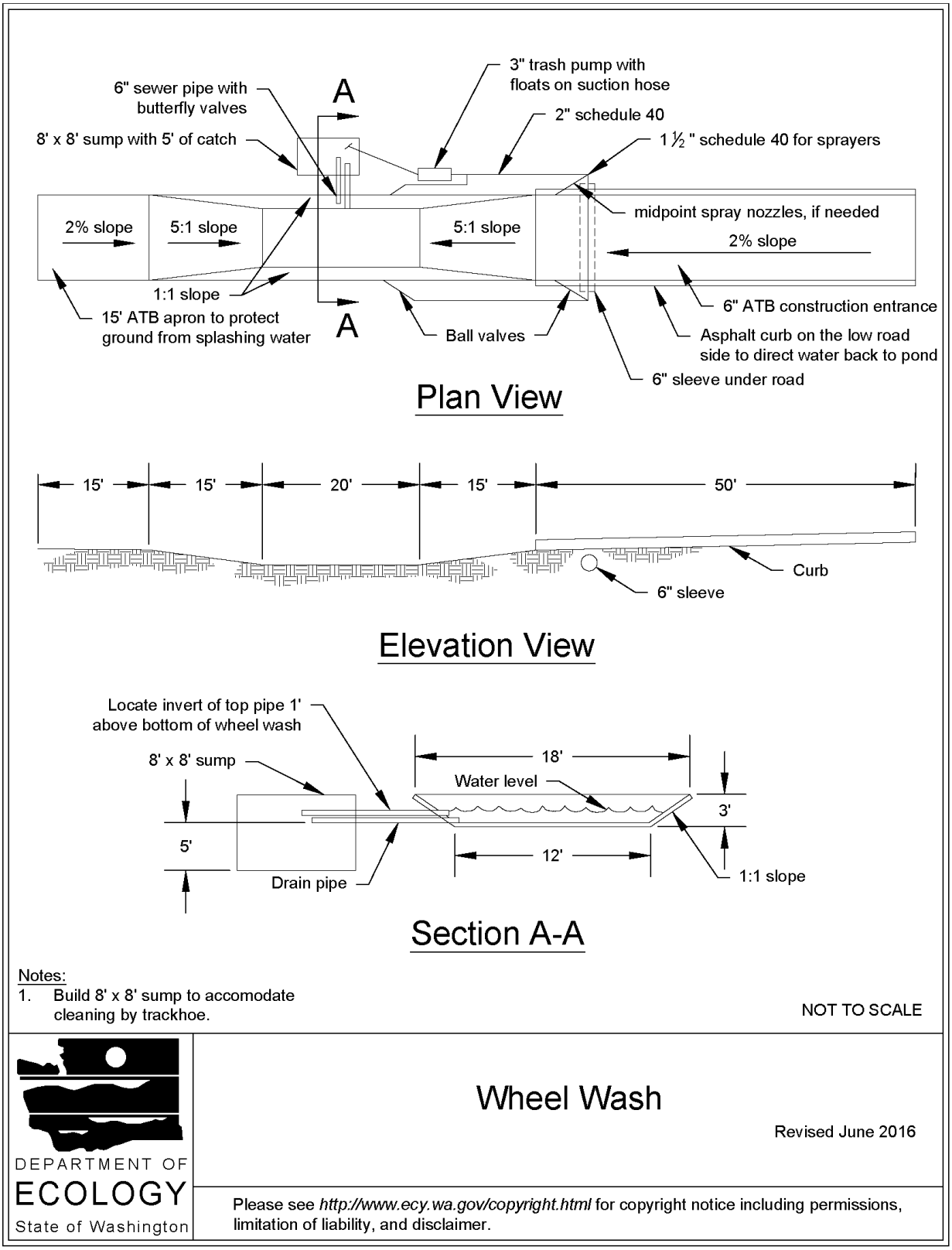
The wheel wash water should be changed a minimum of once per day. On large earthwork jobs where more than 10-20 trucks per hour are expected, the wheel wash water will need to be changed more often.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

Figure II-3.2: Wheel Wash



Notes:

1. Build 8' x 8' sump to accomodate cleaning by trackhoe.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Wheel Wash

Revised June 2016

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BMP C107: Construction Road / Parking Area Stabilization

Purpose

Stabilizing roads, parking areas, and other on-site vehicle transportation routes immediately after grading reduces erosion caused by construction traffic or stormwater runoff.

Conditions of Use

Roads and parking areas shall be stabilized wherever they are constructed, whether permanent or temporary, for use by construction traffic.

BMP C103: High-Visibility Fence shall be installed, if necessary, to limit the access of vehicles to only those roads and parking areas that are stabilized.

Design and Installation Specifications

- On areas that will receive asphalt as part of the project, install the first lift as soon as possible.
- A 6-inch depth of 2- to 4-inch crushed rock, gravel base, or crushed surfacing base course shall be applied immediately after grading or utility installation. A 4-inch course of asphalt treated base (ATB) may also be used, or the road/parking area may be paved. It may also be possible to use cement or calcium chloride for soil stabilization. If cement or cement kiln dust is used for roadbase stabilization, pH monitoring and BMP C252: Treating and Disposing of High pH Water is necessary to evaluate and minimize the effects on stormwater. If the area will not be used for permanent roads, parking areas, or structures, a 6-inch depth of hog fuel may also be used, but this is likely to require more maintenance. Whenever possible, construction roads and parking areas shall be placed on a firm, compacted subgrade.
- Temporary road gradients shall not exceed 15 percent. Roadways shall be carefully graded to drain. Drainage ditches shall be provided on each side of the roadway in the case of a crowned section, or on one side in the case of a super-elevated section. Drainage ditches shall be directed to a sediment control BMP.
- Rather than relying on ditches, it may also be possible to grade the road so that runoff sheetflows into a heavily vegetated area with a well-developed topsoil. Landscaped areas are not adequate. If this area has at least 50 feet of vegetation that water can flow through, then it is generally preferable to use the vegetation to treat runoff, rather than a sediment pond or trap. The 50 feet shall not include wetlands or their buffers. If runoff is allowed to sheetflow through adjacent vegetated areas, it is vital to design the roadways and parking areas so that no concentrated runoff is created.
- Storm drain inlets shall be protected to prevent sediment-laden water entering the drainage system (see BMP C220: Inlet Protection).

Maintenance Standards

Inspect stabilized areas regularly, especially after large storm events.

Crushed rock, gravel base, etc., shall be added as required to maintain a stable driving surface and to stabilize any areas that have eroded.

Following construction, these areas shall be restored to pre-construction condition or better to prevent future erosion.

Perform street cleaning at the end of each day or more often if necessary.

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days.

The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1.

Between July 1 and August 30 seeding requires irrigation until 75 percent grass cover is established.

Between October 1 and March 30 seeding requires a cover of mulch or an erosion control blanket until 75 percent grass cover is established.

Review all disturbed areas in late August to early September and complete all seeding by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.

Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching for specifications.

Seed and mulch all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions, or geotextiles) which will prevent erosion. See BMP T5.13: Post-Construction Soil Quality and Depth.

Design and Installation Specifications

General

- Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix. For vegetated channels that will have high flows, install erosion control blankets over the top of hydroseed. Before allowing water to flow in vegetated channels, establish 75 percent vegetation cover. If vegetated channels cannot be established by seed

before water flow; install sod in the channel bottom — over top of hydromulch and erosion control blankets.

- Confirm the installation of all required surface water control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. See BMP C121: Mulching for specifications.
- Areas that will have seeding only and not landscaping may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed soil surface before application. See BMP T5.13: Post-Construction Soil Quality and Depth.
- When installing seed via hydroseeding operations, only about 1/3 of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.
- Enhance vegetation establishment by dividing the hydromulch operation into two phases:
    - Phase 1- Install all seed and fertilizer with 25-30 percent mulch and tackifier onto soil in the first lift.
    - Phase 2- Install the rest of the mulch and tackifier over the first lift.

  Or, enhance vegetation by:
    - Installing the mulch, seed, fertilizer, and tackifier in one lift.
    - Spread or blow straw over the top of the hydromulch at a rate of 800-1000 pounds per acre.
    - Hold straw in place with a standard tackifier.

  Both of these approaches will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:
    - Irrigation.
    - Reapplication of mulch.
    - Repair of failed slope surfaces.

  This technique works with standard hydromulch (1,500 pounds per acre minimum) and Bonded Fiber Matrix/ Mechanically Bonded Fiber Matrix (BFM/MBFMs) (3,000 pounds per acre minimum).
- Seed may be installed by hand if:
    - Temporary and covered by straw, mulch, or topsoil.
    - Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- The seed mixes listed in Table II-3.4: Temporary and Permanent Seed Mixes include

recommended mixes for both temporary and permanent seeding.

- Apply these mixes, with the exception of the wet area seed mix, at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used. Apply the wet area seed mix at a rate of 60 pounds per acre.
- Consult the local suppliers or the local conservation district for their recommendations. The appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the local authority may be used, depending on the soil type and hydrology of the area.

Table II-3.4: Temporary and Permanent Seed Mixes

Common Name	Latin Name	% Weight	% Purity	% Germination
Temporary Erosion Control Seed Mix A standard mix for areas requiring a temporary vegetative cover.				
Chewings or annual blue grass	*Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye	*Lolium perenne*	50	98	90
Redtop or colonial bentgrass	*Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover	*Trifolium repens*	5	98	90
Landscaping Seed Mix A recommended mix for landscaping seed.				
Perennial rye blend	*Lolium perenne*	70	98	90
Chewings and red fescue blend	*Festuca rubra var. commutata* or *Festuca rubra*	30	98	90
Low-Growing Turf Seed Mix A turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.				
Dwarf tall fescue (several varieties)	*Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay)	*Lolium perenne var. barclay*	30	98	90
Red fescue	*Festuca rubra*	20	98	90
Colonial bentgrass	*Agrostis tenuis*	5	98	90
Bioswale Seed Mix A seed mix for bioswales and other intermittently wet areas.				
Tall or meadow fes-	*Festuca arundin-*	75-80	98	90

Table II-3.4: Temporary and Permanent Seed Mixes (continued)

Common Name	Latin Name	% Weight	% Purity	% Germination
cue	*acea* or *Festuca elatior*			
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	92	85
Redtop bentgrass	*Agrostis alba* or *Agrostis gigantea*	5-10	90	80
Wet Area Seed Mix A low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.				
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	98	85
Meadow foxtail	*Alepocurus pratensis*	10-15	90	80
Alsike clover	*Trifolium hybridum*	1-6	98	90
Redtop bentgrass	*Agrostis alba*	1-6	92	85
Meadow Seed Mix A recommended meadow seed mix for infrequently maintained areas or non-maintained areas where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. Consider the appropriateness of clover, a fairly invasive species, in the mix. Amending the soil can reduce the need for clover.				
Redtop or Oregon bentgrass	*Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue	*Festuca rubra*	70	98	90
White dutch clover	*Trifolium repens*	10	98	90

Roughening and Rototilling

- The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Backblading or smoothing of slopes greater than 4H:1V is not allowed if they are to be seeded.
- Restoration-based landscape practices require deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical, initially rip the subgrade to improve long-term permeability, infiltration, and water inflow qualities. At a minimum,

permanent areas shall use soil amendments to achieve organic matter and permeability performance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches complete the rototilling process in multiple lifts, or prepare the engineered soil system per specifications and place to achieve the specified depth.

Fertilizers

- Conducting soil tests to determine the exact type and quantity of fertilizer is recommended. This will prevent the over-application of fertilizer.
- Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form.
- In general, use 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer at a rate of 90 pounds per acre. Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow-release coating.
- There are numerous products available that take the place of chemical fertilizers. These include several with seaweed extracts that are beneficial to soil microbes and organisms. If 100 percent cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.

Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix

- On steep slopes use Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products. Apply BFM/MBFM products at a minimum rate of 3,000 pounds per acre with approximately 10 percent tackifier. Achieve a minimum of 95 percent soil coverage during application. Numerous products are available commercially. Most products require 24-36 hours to cure before rainfall and cannot be installed on wet or saturated soils. Generally, products come in 40-50 pound bags and include all necessary ingredients except for seed and fertilizer.
- Install products per manufacturer's instructions.
- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include:
    - BFM and MBFMs do not require surface preparation.
    - Helicopters can assist in installing BFM and MBFMs in remote areas.
    - On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
    - Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.

Maintenance Standards

Reseed any seeded areas that fail to establish at least 75 percent cover (100 percent cover for areas that receive sheet or concentrated flows). If reseeding is ineffective, use an alternate method such as sodding, mulching, nets, or blankets.

- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. Reseed and protect by mulch any eroded area.
- Supply seeded areas with adequate moisture, but do not water to the extent that it causes run-off.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C121: Mulching

Purpose

Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There are a variety of mulches that can be used. This section discusses only the most common types of mulch.

Conditions of Use

As a temporary cover measure, mulch should be used:

- For less than 30 days on disturbed areas that require cover.
- At all times for seeded areas, especially during the wet season and during the hot summer months.
- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.

Mulch may be applied at any time of the year and must be refreshed periodically.

For seeded areas, mulch may be made up of 100 percent:

- cottonseed meal;
- fibers made of wood, recycled cellulose, hemp, or kenaf;

- compost;
- or blends of these.

Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers.

Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at time of application.

Recycled cellulose may contain polychlorinated biphenyl (PCBs). Ecology recommends that products should be evaluated for PCBs prior to use.

Refer to BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection for conditions of use. PAM shall not be directly applied to water or allowed to enter a water body.

Any mulch or tackifier product used shall be installed per the manufacturer's instructions.

Design and Installation Specifications

For mulch materials, application rates, and specifications, see Table II-3.6: Mulch Standards and Guidelines. Consult with the local supplier or the local conservation district for their recommendations. Increase the application rate until the ground is 95% covered (i.e. not visible under the mulch layer). Note: Thickness may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Where the option of "Compost" is selected, it should be a coarse compost that meets the size gradations listed in Table II-3.5: Size Gradations of Compost as Mulch Material when tested in accordance with Test Method 02.02-B found in *Test Methods for the Examination of Composting and Compost* (Thompson, 2001).

Table II-3.5: Size Gradations of Compost as Mulch Material

Sieve Size	Percent Passing
3"	100%
1"	90% - 100%
3/4"	70% - 100%
1/4"	40% - 100%

Mulch used within the ordinary high-water mark of surface waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult the Hydraulic Permit Authority (HPA) for mulch mixes if applicable.

Maintenance Standards

The thickness of the mulch cover must be maintained.

Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

Table II-3.6: Mulch Standards and Guidelines

Mulch Material	Guideline	Description
Straw	**Quality Standards**	Air-dried; free from undesirable seed and coarse material.
	Application Rates	2"-3" thick; 5 bales per 1,000 sf or 2-3 tons per acre
	Remarks	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	**Quality Standards**	No growth inhibiting factors.
	Application Rates	Approx. 35-45 lbs per 1,000 sf or 1,500 - 2,000 lbs per acre
	Remarks	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about 3/4 - 1 inch clog hydromulch equipment. Fibers should be kept to less than 3/4 inch.
Compost	**Quality Standards**	No visible water or dust during handling. Must be produced per WAC 173-350, Solid Waste Handling Standards, but may have up to 35% biosolids.
	Application Rates	2" thick min.; approx. 100 tons per acre (approx. 750 lbs per cubic yard)
	Remarks	More effective control can be obtained by increasing thickness to 3". Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for BMP C125: Topsoiling / Composting or BMP T5.13: Post-Construction Soil Quality and Depth. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use near wetlands or near phosphorous impaired water bodies.
Chipped Site Vegetation	**Quality Standards**	Gradations from fines to 6 inches in length for texture, variation, and interlocking properties. Include a mix of various sizes so that the average size is between 2- and 4- inches.
	Application Rates	2" thick min.;

Table II-3.6: Mulch Standards and Guidelines (continued)

Mulch Material	Guideline	Description
	Remarks	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approx. 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If permanent seeding or planting is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment. Note: thick application of this material over existing grass, herbaceous species, and some groundcovers could smother and kill vegetation.
Wood-Based Mulch	**Quality Standards**	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.
	Application Rates	2" thick min.; approx. 100 tons per acre (approx. 750 lbs. per cubic yard)
	Remarks	This material is often called "wood straw" or "hog fuel". The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).
Wood Strand Mulch	**Quality Standards**	A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.
	Application Rates	2" thick min.
	Remarks	Cost-effective protection when applied with adequate thickness. A minimum of 95-percent of the wood strand shall have lengths between 2 and 10-inches, with a width and thickness between 1/16 and 1/2-inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. [Specification 9-14.4(4) from the *Standard Specifications for Road, Bridge, and Municipal Construction* (WSDOT, 2016)

BMP C122: Nets and Blankets

Purpose

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage ways during high flows.

Nets (commonly called matting) are strands of material woven into an open, but high-tensile strength net (for example, coconut fiber matting). Blankets are strands of material that are not tightly woven, but instead form a layer of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets, but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

Conditions of Use

Erosion control netting and blankets shall be made of natural plant fibers unaltered by synthetic materials.

Erosion control nets and blankets should be used:

- To aid permanent vegetated stabilization of slopes 2H:1V or greater and with more than 10 feet of vertical relief.
- For drainage ditches and swales (highly recommended). The application of appropriate netting or blanket to drainage ditches and swales can protect bare soil from channelized runoff while vegetation is established. Nets and blankets also can capture a great deal of sediment due to their open, porous structure. Nets and blankets can be used to permanently stabilize channels and may provide a cost-effective, environmentally preferable alternative to riprap.

Disadvantages of nets and blankets include:

- Surface preparation is required.
- On slopes steeper than 2.5H:1V, net and blanket installers may need to be roped and harnessed for safety.
- They cost at least $4,000-6,000 per acre installed.

Advantages of nets and blankets include:

- Installation without mobilizing special equipment.
- Installation by anyone with minimal training
- Installation in stages or phases as the project progresses.
- Installers can hand place seed and fertilizer as they progress down the slope.
- Installation in any weather.
- There are numerous types of nets and blankets that can be designed with various parameters in mind. Those parameters include: fiber blend, mesh strength, longevity, biodegradability, cost, and availability.

An alternative to nets and blankets in some limited conditions is BMP C202: Riprap Channel Lining. Ensure that BMP C202: Riprap Channel Lining is appropriate before using it as a substitute for nets and blankets.

Design and Installation Specifications

- See Figure II-3.3: Channel Installation (Clackamas County et al., 2008) and Figure II-3.4: Slope Installation for typical orientation and installation of nets and blankets used in channels and as slope protection. Note: these are typical only; all nets and blankets must be installed per manufacturer's installation instructions.
- Installation is critical to the effectiveness of these products. If good ground contact is not achieved, runoff can concentrate under the product, resulting in significant erosion.
- Installation of nets and blankets on slopes:
    1. Complete final grade and track walk up and down the slope.
    2. Install hydromulch with seed and fertilizer.
    3. Dig a small trench, approximately 12 inches wide by 6 inches deep along the top of the slope.
    4. Install the leading edge of the net/blanket into the small trench and staple approximately every 18 inches. NOTE: Staples are metal, "U"-shaped, and a minimum of 6 inches long. Longer staples are used in sandy soils. Biodegradable stakes are also available.
    5. Roll the net/blanket slowly down the slope as the installer walks backward. NOTE: The net/blanket rests against the installer's legs. Staples are installed as the net/blanket is unrolled. It is critical that the proper staple pattern is used for the net/blanket being installed. The net/blanket is not to be allowed to roll down the slope on its own as this stretches the net/blanket, making it impossible to maintain soil contact. In addition, no one is allowed to walk on the net/blanket after it is in place.
    6. If the net/blanket is not long enough to cover the entire slope length, the trailing edge of the upper net/blanket should overlap the leading edge of the lower net/blanket and be stapled. On steeper slopes, this overlap should be installed in a small trench, stapled, and covered with soil.
- With the variety of products available, it is impossible to cover all the details of appropriate use and installation. Therefore, it is critical that the designer consult the manufacturer's information and that a site visit takes place in order to ensure that the product specified is appropriate. Information is also available in WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* Division 8-01 and Division 9-14 (WSDOT, 2016).
- Use jute matting in conjunction with mulch (BMP C121: Mulching). Excelsior, woven straw blankets and coir (coconut fiber) blankets may be installed without mulch. There are many other types of erosion control nets and blankets on the market that may be appropriate in certain circumstances.
- In general, most nets (e.g., jute matting) require mulch in order to prevent erosion because they have a fairly open structure. Blankets typically do not require mulch because they usually provide complete protection of the surface.
- Extremely steep, unstable, wet, or rocky slopes are often appropriate candidates for use of synthetic blankets, as are riverbanks, beaches and other high-energy environments. If

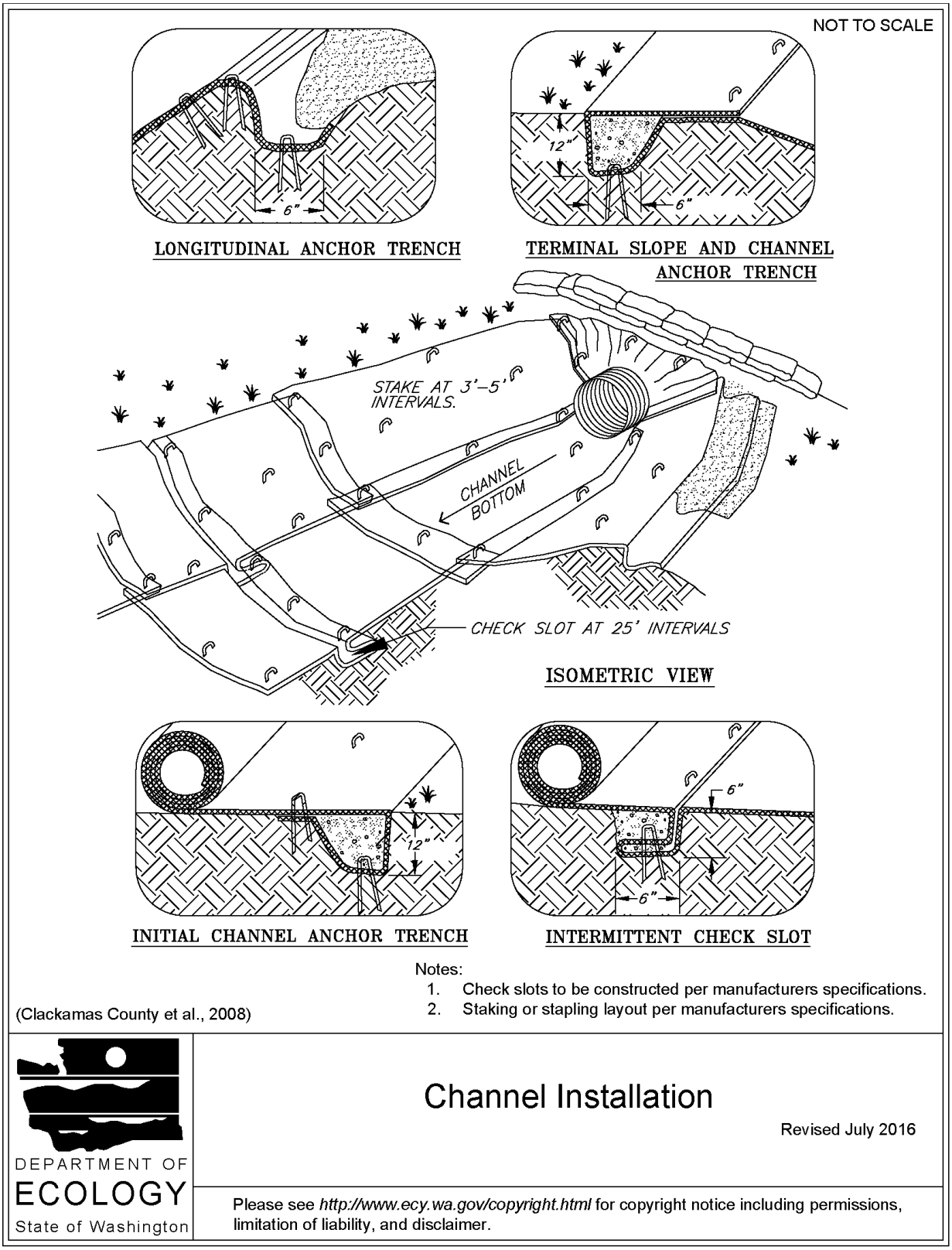
synthetic blankets are used, the soil should be hydromulched first.

- 100-percent biodegradable blankets are available for use in sensitive areas. These organic blankets are usually held together with a paper or fiber mesh and stitching which may last up to a year.
- Most netting used with blankets is photodegradable, meaning it breaks down under sunlight (not UV stabilized). However, this process can take months or years even under bright sun. Once vegetation is established, sunlight does not reach the mesh. It is not uncommon to find non-degraded netting still in place several years after installation. This can be a problem if maintenance requires the use of mowers or ditch cleaning equipment. In addition, birds and small animals can become trapped in the netting.

Maintenance Standards

- Maintain good contact with the ground. Erosion must not occur beneath the net or blanket.
- Repair and staple any areas of the net or blanket that are damaged or not in close contact with the ground.
- Fix and protect eroded areas if erosion occurs due to poorly controlled drainage.

Figure II-3.3: Channel Installation



Notes:
1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.

(Clackamas County et al., 2008)

DEPARTMENT OF ECOLOGY
State of Washington

Channel Installation

Revised July 2016

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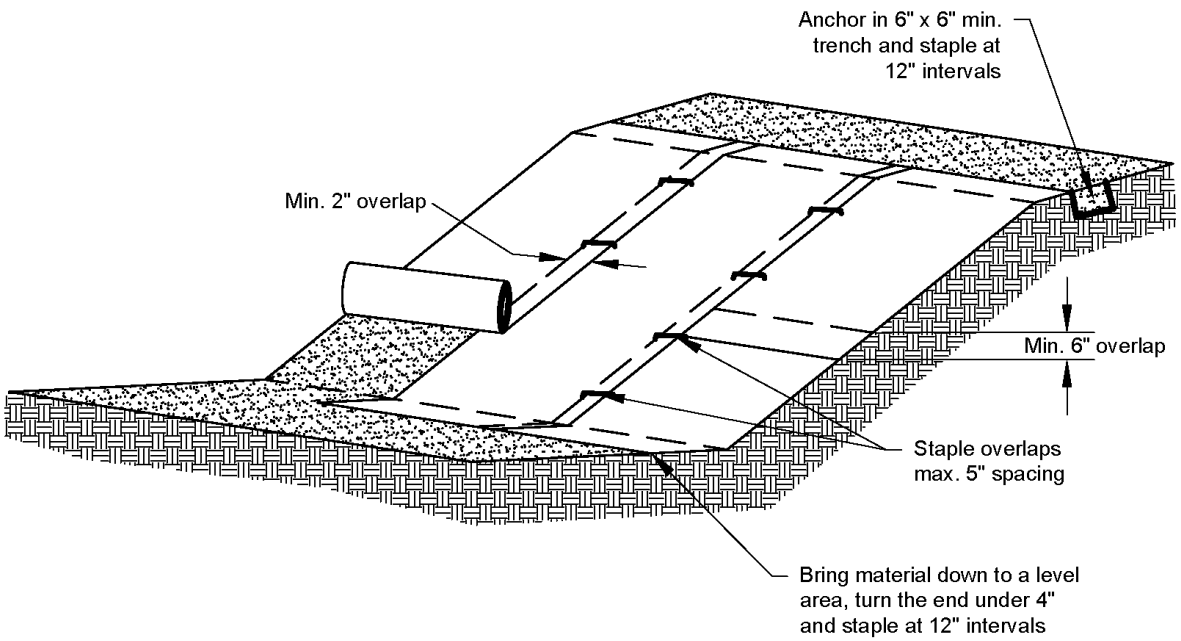
Figure II-3.4: Slope Installation



Notes:

1. Slope surface shall be smooth before placement for proper soil contact.
2. Stapling pattern as per manufacturer's recommendations.
3. Do not stretch blankets/mattings tight - allow the rolls to mold to any irregularities.
4. For slopes less than 3H:1V, rolls may be placed in horizontal strips.
5. If there is a berm at the top of the slope, anchor upslope of the berm.
6. Lime, fertilize, and seed before installation. Planting of shrubs, trees, etc. should occur after installation.

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DEPARTMENT OF ECOLOGY
State of Washington

Slope Installation

Revised June 2016

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BMP C123: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. However, the relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for applications greater than six months.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- Although the plastic material is inexpensive to purchase, the cost of installation, maintenance, removal, and disposal add to the total costs of this BMP.
- Whenever plastic is used to protect slopes, install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to convey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
    - Temporary ditch liner.
    - Pond liner in temporary sediment pond.
    - Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored.
    - Emergency slope protection during heavy rains.
    - Temporary drainpipe (“elephant trunk”) used to direct water.

Design and Installation Specifications

- Plastic slope cover must be installed as follows:
    1. Run plastic up and down the slope, not across the slope.
    2. Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet.

3. Provide a minimum of 8-inch overlap at the seams.
4. On long or wide slopes, or slopes subject to wind, tape all seams.
5. Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
6. Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil, which causes extreme erosion.
8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.

- Plastic sheeting shall have a minimum thickness of 0.06 millimeters.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C124: Sodding

Purpose

The purpose of sodding is to establish turf for immediate erosion protection and to stabilize drainage paths where concentrated overland flow will occur.

Conditions of Use

Sodding may be used in the following areas:

- Disturbed areas that require short-term or long-term cover.
- Disturbed areas that require immediate vegetative cover.
- All waterways that require vegetative lining. Waterways may also be seeded rather than sodded, and protected with a net or blanket.

Design and Installation Specifications

Sod shall be free of weeds, of uniform thickness (approximately 1-inch thick), and shall have a dense root mat for mechanical strength.

The following steps are recommended for sod installation:

1. Shape and smooth the surface to final grade in accordance with the approved grading plan. Consider any areas (such as swales) that need to be overexcavated below design elevation to allow room for placing soil amendment and sod.
2. Amend 4 inches (minimum) of compost into the top 8 inches of the soil if the organic content of the soil is less than ten percent or the permeability is less than 0.6 inches per hour. See https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Organic-materials/Managing-organics-compost for further information.
3. Fertilize according to the sod supplier's recommendations.
4. Work lime and fertilizer 1 to 2 inches into the soil, and smooth the surface.
5. Lay strips of sod beginning at the lowest area to be sodded and perpendicular to the direction of water flow. Wedge strips securely into place. Square the ends of each strip to provide for a close, tight fit. Stagger joints at least 12 inches. Staple on slopes steeper than 3H:1V. Staple the upstream edge of each sod strip.
6. Roll the sodded area and irrigate.
7. When sodding is carried out in alternating strips or other patterns, seed the areas between the sod immediately after sodding.

Maintenance Standards

If the grass is unhealthy, the cause shall be determined and appropriate action taken to reestablish a healthy groundcover. If it is impossible to establish a healthy groundcover due to frequent saturation, instability, or some other cause, the sod shall be removed, the area seeded with an appropriate mix, and protected with a net or blanket.

BMP C125: Topsoiling / Composting

Purpose

Topsoiling and composting provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling and composting are an integral component of providing permanent cover in those areas where there is an unsuitable soil surface for plant growth. Use this BMP in conjunction with other BMPs such as BMP C120: Temporary and Permanent Seeding, BMP C121: Mulching, or BMP C124: Sodding. Implementation of this BMP may meet the post-construction requirements of BMP T5.13: Post-Construction Soil Quality and Depth.

Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer and pesticides needed to support installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches including organic debris.

Conditions of Use

- Permanent landscaped areas shall contain healthy topsoil that reduces the need for fertilizers, improves overall topsoil quality, provides for better vegetative health and vitality, improves hydrologic characteristics, and reduces the need for irrigation.
- Leave native soils and the duff layer undisturbed to the maximum extent practicable. Stripping of existing, properly functioning soil system and vegetation for the purpose of topsoiling during construction is not acceptable. Preserve existing soil systems in undisturbed and uncompacted conditions if functioning properly.
- Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.
- Restore, to the maximum extent practical, native soils disturbed during clearing and grading to a condition equal to or better than the original site condition's moisture-holding capacity. Use on-site native topsoil, incorporate amendments into on-site soil, or import blended topsoil to meet this requirement.
- Topsoiling is a required procedure when establishing vegetation on shallow soils, and soils of critically low pH (high acid) levels.
- Beware of where the topsoil comes from, and what vegetation was on site before disturbance. Invasive plant seeds may be included and could cause problems for establishing native plants, landscaped areas, or grasses.
- Topsoil from the site will contain mycorrhizal bacteria that are necessary for healthy root growth and nutrient transfer. These native mycorrhiza are acclimated to the site and will provide optimum conditions for establishing grasses. Use commercially available mycorrhiza products when using off-site topsoil.

Design and Installation Specifications

Meet the following requirements for disturbed areas that will be developed as lawn or landscaped areas at the completed project site:

- Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium. Topsoil shall have:
    - A minimum depth of 8-inches. Scarify subsoils below the topsoil layer at least 4-inches with some incorporation of the upper material to avoid stratified layers, where feasible. Ripping or re-structuring the subgrade may also provide additional benefits regarding the overall infiltration and interflow dynamics of the soil system.
    - A minimum organic content of 10% dry weight in planting beds, and 5% organic matter content in turf areas. Incorporate organic amendments to a minimum 8-inch depth except where tree roots or other natural features limit the depth of incorporation.
    - A pH between 6.0 and 8.0 or matching the pH of the undisturbed soil.
    - If blended topsoil is imported, then fines should be limited to 25 percent passing through a 200 sieve.
- Mulch planting beds with 2 inches of organic material
- Accomplish the required organic content, depth, and pH by returning native topsoil to the site, importing topsoil of sufficient organic content, and/or incorporating organic amendments. When using the option of incorporating amendments to meet the organic content requirement, use compost that meets the compost specification for Bioretention (See BMP T7.30: Bioretention), with the exception that the compost may have up to 35% biosolids or manure.
- Sections 3 through 7 of *Building Soil: Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington* (Stenn et al., 2016), provides useful guidance for implementing whichever option is chosen. It includes guidance for pre-approved default strategies and guidance for custom strategies. Check with your local jurisdiction concerning its acceptance of this guidance.
- The final composition and construction of the soil system will result in a natural selection or favoring of certain plant species over time. For example, incorporation of topsoil may favor grasses, while layering with mildly acidic, high-carbon amendments may favor more woody vegetation.
- Allow sufficient time in scheduling for topsoil spreading prior to seeding, sodding, or planting.
- Take care when applying top soil to subsoils with contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil layers and causes the topsoil to slough. If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method to promote bonding is to actually work the topsoil into the layer below for a depth of at least 6 inches.
- Field exploration of the site shall be made to determine if there is surface soil of sufficient quantity and quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam,

silt loam, sandy clay loam, and clay loam). Avoid areas of natural ground water recharge.

- Stripping shall be confined to the immediate construction area. A 4-inch to 6-inch stripping depth is common, but depth may vary depending on the particular soil. All surface runoff control structures shall be in place prior to stripping.
- Do not place topsoil while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding.
- In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas. Reapply stockpiled topsoil to other portions of the site where feasible.
- Locate the topsoil stockpile so that it meets specifications and does not interfere with work on the site. It may be possible to locate more than one pile in proximity to areas where topsoil will be used.
- Stockpiling of topsoil shall occur in the following manner:
    - Side slopes of the stockpile shall not exceed 2H:1V.
    - Between October 1 and April 30:
        - An interceptor dike with gravel outlet and silt fence shall surround all topsoil.
        - Within 2 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
    - Between May 1 and September 30:
        - An interceptor dike with gravel outlet and silt fence shall surround all topsoil if the stockpile will remain in place for a longer period of time than active construction grading.
        - Within 7 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
- When native topsoil is to be stockpiled and reused the following should apply to ensure that the mycorrhizal bacterial, earthworms, and other beneficial organisms will not be destroyed:
    - Re-install topsoil within 4 to 6 weeks.
    - Do not allow the saturation of topsoil with water.
    - Do not use plastic covering.

Maintenance Standards

- Inspect stockpiles regularly, especially after large storm events. Stabilize any areas that have eroded.
- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.

- Plant and mulch soil after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

BMP C130: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Use this BMP in conjunction with other BMPs such as BMP C120: Temporary and Permanent Seeding, BMP C121: Mulching, or BMP C124: Sodding.

Conditions for Use

- All slopes steeper than 3H:1V and greater than 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.

- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

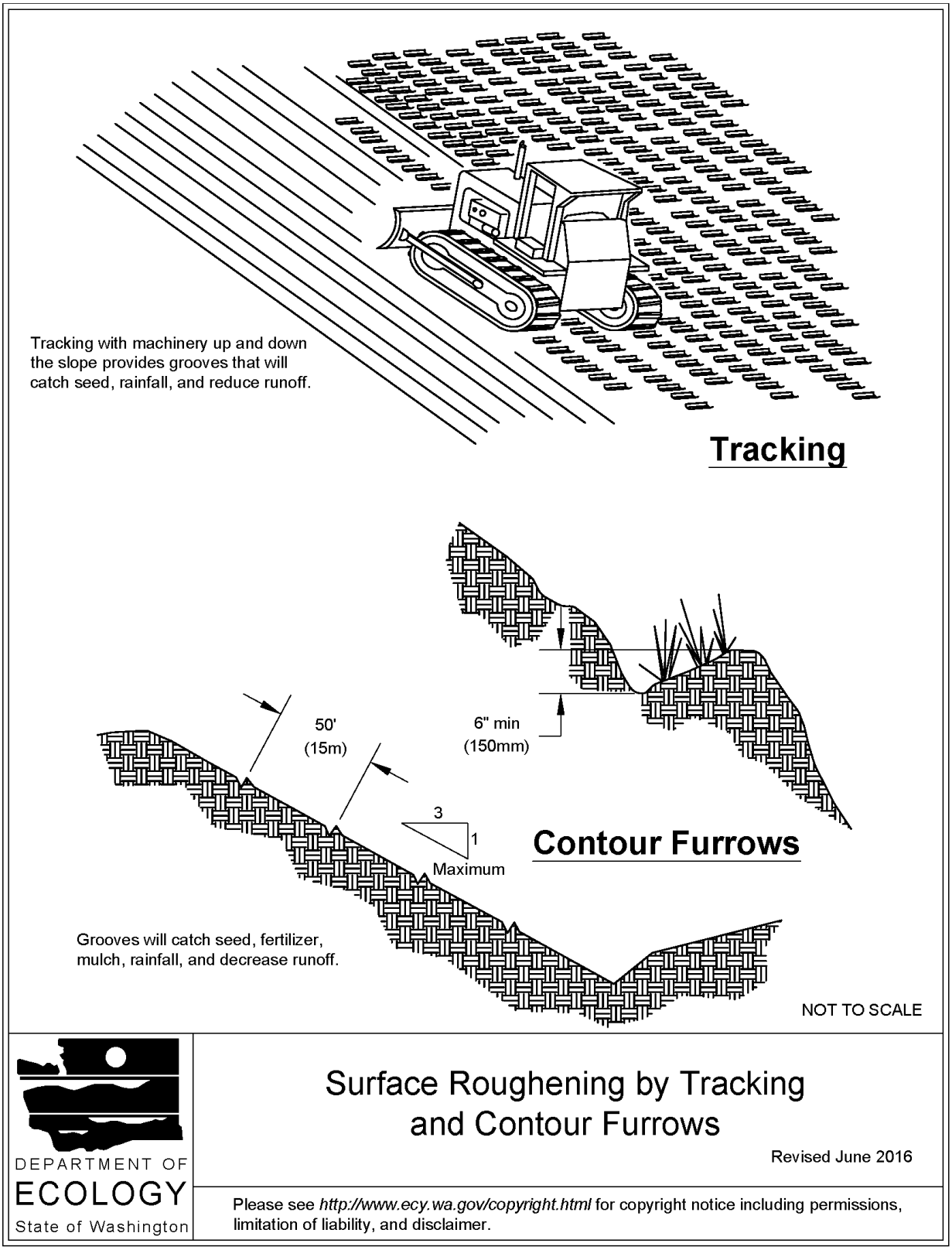
There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure II-3.5: Surface Roughening by Tracking and Contour Furrows. Factors to be considered in choosing a roughening method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3H:1V) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes steeper than 3H:1V but less than 2H:1V should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are surface roughened should be seeded as quickly as possible.
- Regular inspections should be made of the area. If rills appear, they should be re-roughened and re-seeded immediately.

Figure II-3.5: Surface Roughening by Tracking and Contour Furrows



BMP C140: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Conditions of Use

Use dust control in areas (including roadways) subject to surface and air movement of dust where on-site or off-site impacts to roadways, drainage ways, or surface waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until the surface is wet. Repeat as needed. To prevent carryout of mud onto the street, refer to BMP C105: Stabilized Construction Access and BMP C106: Wheel Wash.
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Used oil is prohibited from use as a dust suppressant. Local governments may approve other dust palliatives such as calcium chloride or PAM.
- PAM (BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection) added to water at a rate of 0.5 pounds per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may reduce the quantity of water needed for dust control. Note that the application rate specified here applies to this BMP, and is not the same application rate that is specified in BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection, but the downstream protections still apply.

  Refer to BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection for conditions of use. PAM shall not be directly applied to water or allowed to enter a water body.
- Contact your local Air Pollution Control Authority for guidance and training on other dust control measures. Compliance with the local Air Pollution Control Authority constitutes

compliance with this BMP.

- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Techniques that can be used for unpaved roads and lots include:
    - Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
    - Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
    - Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than .075 mm) to 10 to 20 percent.
    - Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
    - Encourage the use of alternate, paved routes, if available.
    - Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
    - Limit dust-causing work on windy days.
    - Pave unpaved permanent roads and other trafficked areas.

Maintenance Standards

Respray area as necessary to keep dust to a minimum.

BMP C150: Materials on Hand

Purpose

Keep quantities of erosion prevention and sediment control materials on the project site at all times to be used for regular maintenance and emergency situations such as unexpected heavy rains. Having these materials on-site reduces the time needed to replace existing or implement new BMPs when inspections indicate that existing BMPs are not meeting the Construction SWPPP requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

Conditions of Use

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible

pipe, sandbags, geotextile fabric and steel “T” posts.

- Materials should be stockpiled and readily available before any site clearing, grubbing, or earthwork begins. A large contractor or project proponent could keep a stockpile of materials that are available for use on several projects.
- If storage space at the project site is at a premium, the contractor could maintain the materials at their office or yard. The office or yard must be less than an hour from the project site.

Design and Installation Specifications

Depending on project type, size, complexity, and length, materials and quantities will vary. A good minimum list of items that will cover numerous situations includes:

- Clear Plastic, 6 mil
- Drainpipe, 6 or 8 inch diameter
- Sandbags, filled
- Straw Bales for mulching
- Quarry Spalls
- Washed Gravel
- Geotextile Fabric
- Catch Basin Inserts
- Steel "T" Posts
- Silt fence material
- Straw Wattles

Maintenance Standards

- All materials with the exception of the quarry spalls, steel “T” posts, and gravel should be kept covered and out of both sun and rain.
- Re-stock materials as needed.

BMP C151: Concrete Handling

Purpose

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the State.

Conditions of Use

Any time concrete is used, utilize these management practices. Concrete construction project components include, but are not limited to:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Disposal options for concrete, in order of preference are:

1. Off-site disposal
2. Concrete wash-out areas (see BMP C154: Concrete Washout Area)
3. De minimus washout to formed areas awaiting concrete

Design and Installation Specifications

- Wash concrete truck drums at an approved off-site location or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground (including formed areas awaiting concrete), or into storm drains, open ditches, streets, or streams. Refer to BMP C154: Concrete Washout Area for information on concrete washout areas.
    - Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas as allowed in BMP C154: Concrete Washout Area.
- Wash small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheelbarrows) into designated concrete washout areas or into formed areas awaiting concrete pour.
- At no time shall concrete be washed off into the footprint of an area where an infiltration feature will be installed.
- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow washwater from areas, such as concrete aggregate driveways, to drain directly (without detention or treatment) to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no designated concrete washout areas (or formed areas, allowed as described above) are available. Dispose of contained concrete and concrete washwater (process water) properly.

- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMP C252: Treating and Disposing of High pH Water for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit (CSWGP) for pH monitoring requirements if the project involves one of the following activities:
    - Significant concrete work (as defined in the CSWGP).
    - The use of soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
    - Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

Maintenance Standards

Check containers for holes in the liner daily during concrete pours and repair the same day.

BMP C152: Sawcutting and Surfacing Pollution Prevention

Purpose

Sawcutting and surfacing operations generate slurry and process water that contains fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to waters of the State is prohibited. Use this BMP to minimize and eliminate process water and slurry created through sawcutting or surfacing from entering waters of the State.

Conditions of Use

Utilize these management practices anytime sawcutting or surfacing operations take place. Sawcutting and surfacing operations include, but are not limited to:

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate ground water or surface water quality standards.
- Do not allow process water generated during hydro-demolition, surface roughening or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Dispose of process water in a manner that does not violate ground water or surface water quality standards.
- Handle and dispose of cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

Maintenance Standards

Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and/or vacuum trucks.

BMP C153: Material Delivery, Storage, and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage. Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.

Conditions of Use

Use at construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g., Polyacrylamide)
- Fertilizers, pesticides and herbicides
- Detergents
- Asphalt and concrete compounds

- Hazardous chemicals such as acids, lime, adhesives, paints, solvents, and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

- The temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (Oct 1 – April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as an earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.
- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.
- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.
- Keep material storage areas clean, organized and equipped with an ample supply of appropriate spill clean-up material (spill kit).
- The spill kit should include, at a minimum:

- 1-Water Resistant Nylon Bag
- 3-Oil Absorbent Socks 3”x 4’
- 2-Oil Absorbent Socks 3”x 10’
- 12-Oil Absorbent Pads 17”x19”
- 1-Pair Splash Resistant Goggles
- 3-Pair Nitrile Gloves
- 10-Disposable Bags with Ties
- Instructions

Maintenance Standards

- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.
- Re-stock spill kit materials as needed.

II-3.3 Construction Runoff BMPs

BMP C200: Interceptor Dike and Swale

Purpose

Provide a dike of compacted soil or a swale at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Use the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Conditions of Use

Use an interceptor dike or swale where runoff from an exposed site or disturbed slope must be conveyed to an erosion control BMP which can safely convey the stormwater.

- Locate upslope of a construction site to prevent runoff from entering the disturbed area.
- When placed horizontally across a disturbed slope, it reduces the amount and velocity of runoff flowing down the slope.
- Locate downslope to collect runoff from a disturbed area and direct it to a sediment BMP (e.g. BMP C240: Sediment Trap or BMP C241: Sediment Pond (Temporary)).

Design and Installation Specifications

- Dike and/or swale and channel must be stabilized with temporary or permanent vegetation or other channel protection during construction.
- Steep grades require channel protection and check dams.
- Review construction for areas where overtopping may occur.
- Can be used at the top of new fill before vegetation is established.
- May be used as a permanent diversion channel to carry the runoff.
- Contributing area for an individual dike or swale should be one acre or less.
- Design the dike and/or swale to contain flows calculated by one of the following methods:
    - Single Event Hydrograph Method: The peak volumetric flow rate calculated using a 10-minute time step from a Type 1A, 10-year, 24-hour frequency storm for the worst-case land cover condition.

      OR
    - Continuous Simulation Method: The 10-year peak flow rate, as determined by an approved continuous runoff model with a 15-minute time step for the worst-case land cover condition.

  Worst-case land cover conditions (i.e., producing the most runoff) should be used for analysis (in most cases, this would be the land cover conditions just prior to final landscaping).

Interceptor Dikes

Interceptor dikes shall meet the following criteria:

- Top Width: 2 feet minimum.
- Height: 1.5 feet minimum on berm.
- Side Slope: 2H:1V or flatter.
- Grade: Depends on topography, however, dike system minimum is 0.5%, and maximum is 1%.
- Compaction: Minimum of 90 percent ASTM D698 standard proctor.
- Stabilization: Depends on velocity and reach. Inspect regularly to ensure stability.
- Ground Slopes <5%: Seed and mulch applied within 5 days of dike construction (see BMP C121: Mulching).
- Ground Slopes 5 - 40%: Dependent on runoff velocities and dike materials. Stabilization should be done immediately using either sod or riprap, or other measures to avoid erosion.
- The upslope side of the dike shall provide positive drainage to the dike outlet. No erosion shall

occur at the outlet. Provide energy dissipation measures as necessary. Sediment-laden runoff must be released through a sediment trapping facility.

- Minimize construction traffic over temporary dikes. Use temporary cross culverts for channel crossing.
- See Table II-3.8: Horizontal Spacing of Interceptor Dikes Along Ground Slope for recommended horizontal spacing between dikes.

Table II-3.8: Horizontal Spacing of Interceptor Dikes Along Ground Slope

Average Slope	Slope Percent	Flowpath Length
20H:1V or less	3-5%	300 feet
(10 to 20)H:1V	5-10%	200 feet
(4 to 10)H:1V	10-25%	100 feet
(2 to 4)H:1V	25-50%	50 feet

Interceptor Swales

Interceptor swales shall meet the following criteria:

- Bottom Width: 2 feet minimum; the cross-section bottom shall be level.
- Depth: 1-foot minimum.
- Side Slope: 2H:1V or flatter.
- Grade: Maximum 5 percent, with positive drainage to a suitable outlet (such as BMP C241: Sediment Pond (Temporary)).
- Stabilization: Seed as per BMP C120: Temporary and Permanent Seeding, or BMP C202: Riprap Channel Lining, 12 inches thick riprap pressed into the bank and extending at least 8 inches vertical from the bottom.

Maintenance Standards

- Inspect diversion dikes and interceptor swales once a week and after every rainfall. Immediately remove sediment from the flow area.
- Damage caused by construction traffic or other activity must be repaired before the end of each working day.
- Check outlets and make timely repairs as needed to avoid gully formation. When the area below the temporary diversion dike is permanently stabilized, remove the dike and fill and stabilize the channel to blend with the natural surface.

BMP C202: Riprap Channel Lining

Purpose

To protect channels by providing a channel liner using riprap.

Conditions of Use

Use this BMP when natural soils or vegetated stabilized soils in a channel are not adequate to prevent channel erosion.

Use this BMP when a permanent ditch or pipe system is to be installed and a temporary measure is needed.

An alternative to riprap channel lining is BMP C122: Nets and Blankets.

The Federal Highway Administration recommends not using geotextile liners whenever the slope exceeds 10 percent or the shear stress exceeds 8 lbs/ft^2.

Design and Installation Specifications

- Since riprap is typically used where erosion potential is high, construction must be sequenced so that the riprap is put in place with the minimum possible delay.
- Disturb areas awaiting riprap only when final preparation and placement of the riprap can follow immediately behind the initial disturbance. Where riprap is used for outlet protection, the riprap should be placed before or in conjunction with the construction of the pipe or channel so that it is in place when the pipe or channel begins to operate.
- The designer, after determining the riprap size that will be stable under the flow conditions, shall consider that size to be a minimum size and then, based on riprap gradations actually available in the area, select the size or sizes that equal or exceed the minimum size. The possibility of drainage structure damage by others shall be considered in selecting a riprap size, especially if there is nearby water or a gully in which to toss the stones.
- Stone for riprap shall consist of field stone or quarry stone of approximately rectangular shape. The stone shall be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering and it shall be suitable in all respects for the purpose intended. See Section 9-13 of WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* (WSDOT, 2016).
- A lining of engineering filter fabric (geotextile) shall be placed between the riprap and the underlying soil surface to prevent soil movement into or through the riprap. The geotextile should be keyed in at the top of the bank.
- Filter fabric shall not be used on slopes greater than 1.5H:1V as slippage may occur. It should be used in conjunction with a layer of coarse aggregate (granular filter blanket) when the riprap to be placed is 12 inches and larger.

Maintenance Standards

Replace riprap as needed.

BMP C203: Water Bars

Purpose

A water bar is a small ditch or ridge of material that is constructed diagonally across a road or right-of-way to divert stormwater runoff from the road surface, wheel tracks, or a shallow road ditch. See Figure II-3.12: Water Bar.

Conditions of Use

Clearing right-of-way and construction of access for power lines, pipelines, and other similar installations often require long narrow right-of-ways over sloping terrain. Disturbance and compaction promotes gully formation in these cleared strips by increasing the volume and velocity of runoff. Gully formation may be especially severe in tire tracks and ruts. To prevent gullying, runoff can often be diverted across the width of the right-of-way to undisturbed areas by using small predesigned diversions.

Give special consideration to each individual outlet area, as well as to the cumulative effect of added diversions. Use gravel to stabilize the diversion where significant vehicular traffic is anticipated.

Design and Installation Specifications

- Height: 8-inch minimum, measured from the channel bottom to the ridge top.
- Side slope of channel: 2H:1V maximum; 3H:1V or flatter when vehicles will cross.
- Top width of ridge: 6-inch minimum.
- Locate water bars to use natural drainage systems and to discharge into well vegetated stable areas.
- See Table II-3.9: Water Bar Spacing Guidelines:

Table II-3.9: Water Bar Spacing Guidelines

Slope Along Road (%)	Spacing (ft)
< 5	125
5 - 10	100
10 - 20	75
20 - 35	50
> 35	Use rock lined ditch

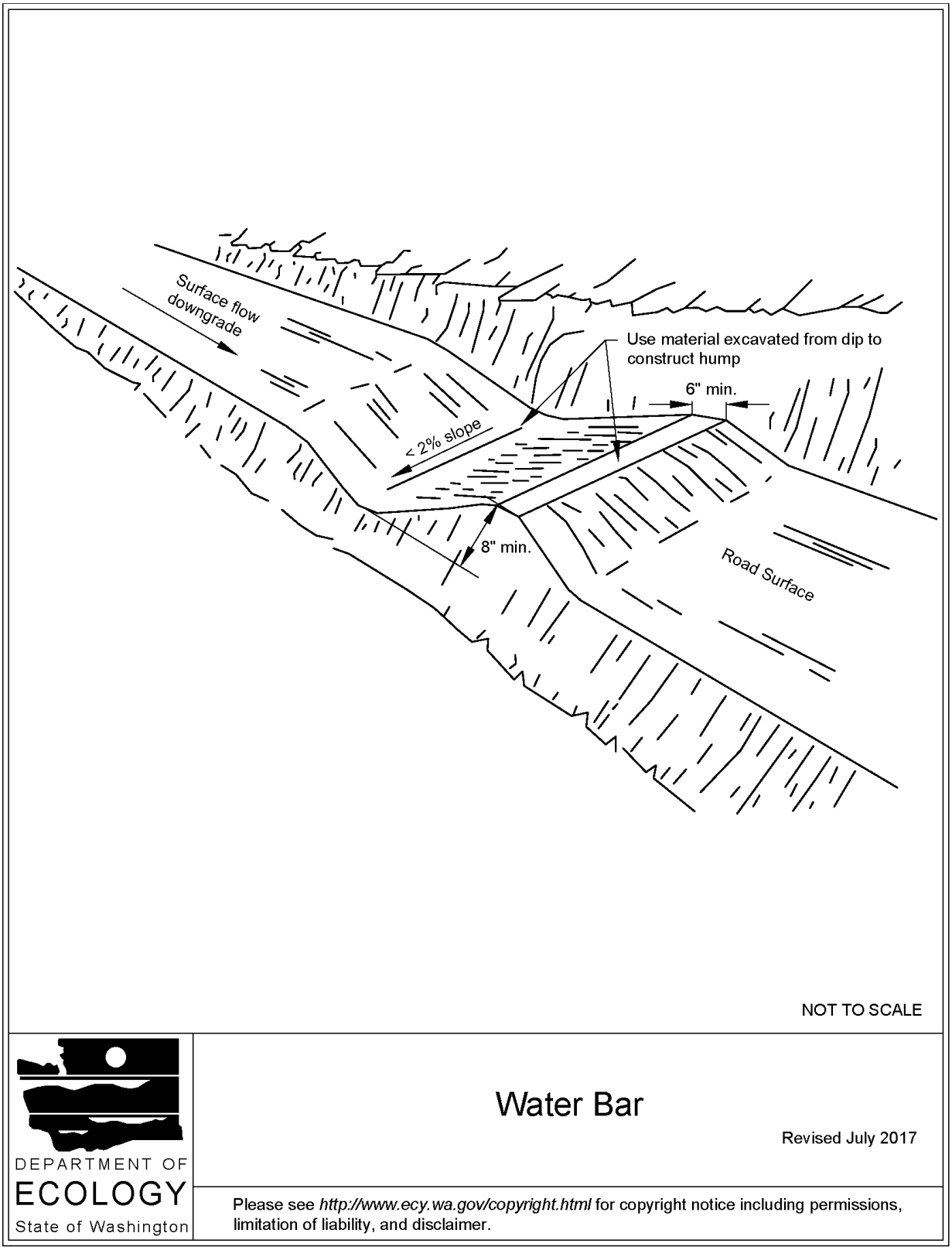
- Grade of water bar and angle: Select an angle that results in a ditch slope less than 2 percent.
- Install the water bar as soon as the clearing and grading is complete. When utilities are being installed, reconstruct the water bar as construction is complete in each section.
- Compact the water bar ridge.
- Stabilize, seed, and mulch the portions that are not subject to traffic. Gravel the areas crossed by vehicles.
- Note that BMP C208: Triangular Silt Dike (TSD) can be used to create the ridge for the water bar.

Maintenance Standards

Periodically inspect water bars after every heavy rainfall for wear and erosion damage.

- Immediately remove sediment from the flow area and repair the dike.
- Check outlet areas and make timely repairs as needed.
- When permanent road drainage is established and the area above the temporary water bar is permanently stabilized, remove the dikes and fill the channel to blend with the natural ground, and appropriately stabilize the disturbed area.

Figure II-3.12: Water Bar



BMP C207: Check Dams

Purpose

Construction of check dams across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam.

Conditions of Use

Use check dams where temporary or permanent channels are not yet vegetated, channel lining is infeasible, and/or velocity checks are required.

- Check dams may not be placed in streams unless approved by the State Department of Fish and Wildlife.
- Check dams may not be placed in wetlands without approval from a permitting agency.
- Do not place check dams below the expected backwater from any salmonid bearing water between October 1 and May 31 to ensure that there is no loss of high flow refuge habitat for overwintering juvenile salmonids and emergent salmonid fry.

Design and Installation Specifications

- Construct rock check dams from appropriately sized rock. The rock used must be large enough to stay in place given the expected design flow through the channel. The rock must be placed by hand or by mechanical means (do not dump the rock to form the dam) to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges.
- Check dams may also be constructed of either rock or pea-gravel filled bags. Numerous new products are also available for this purpose. They tend to be re-usable, quick and easy to install, effective, and cost efficient.
- Place check dams perpendicular to the flow of water.
- The check dam should form a triangle when viewed from the side. This prevents undercutting as water flows over the face of the check dam rather than falling directly onto the ditch bottom.
- Before installing check dams, impound and bypass upstream water flow away from the work area. Options for bypassing include pumps, siphons, or temporary channels.
- Check dams combined with sumps work more effectively at slowing flow and retaining sediment than a check dam alone. A deep sump should be provided immediately upstream of the check dam.
- In some cases, if carefully located and designed, check dams can remain as permanent installations with very minor regrading. They may be left as either spillways, in which case accumulated sediment would be graded and seeded, or as check dams to prevent further sediment from leaving the site.
- The maximum spacing between check dams shall be such that the downstream toe of the

upstream dam is at the same elevation as the top of the downstream dam.

- Keep the maximum height at 2 feet at the center of the check dam.
- Keep the center of the check dam at least 12 inches lower than the outer edges at natural ground elevation.
- Keep the side slopes of the check dam at 2H:1V or flatter.
- Key the stone into the ditch banks and extend it beyond the abutments a minimum of 18 inches to avoid washouts from overflow around the dam.
- Use filter fabric foundation under a rock or sand bag check dam. If a blanket ditch liner is used, filter fabric is not necessary. A piece of organic or synthetic blanket cut to fit will also work for this purpose.
- In the case of grass-lined ditches and swales, all check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale - unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- Ensure that channel appurtenances, such as culvert entrances below check dams, are not subject to damage or blockage from displaced stones.
- See Figure II-3.16: Rock Check Dam.

Maintenance Standards

Check dams shall be monitored for performance and sediment accumulation during and after each rainfall that produces runoff. Sediment shall be removed when it reaches one half the sump depth.

- Anticipate submergence and deposition above the check dam and erosion from high flows around the edges of the dam.
- If significant erosion occurs between dams, install a protective riprap liner in that portion of the channel. See BMP C202: Riprap Channel Lining.

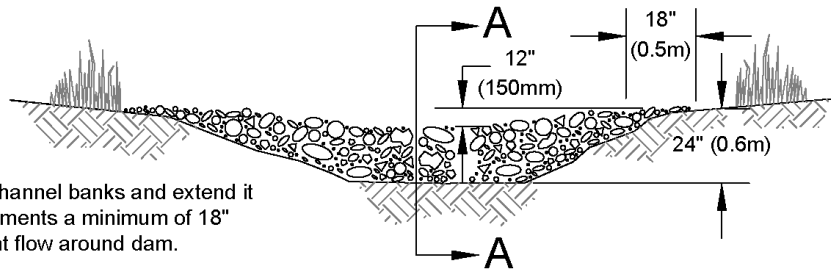
Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

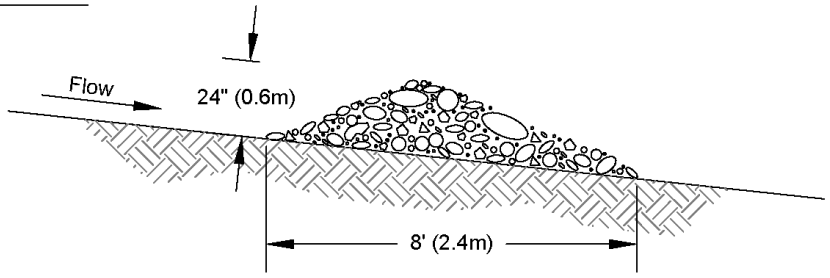
Figure II-3.16: Rock Check Dam

View Looking Upstream

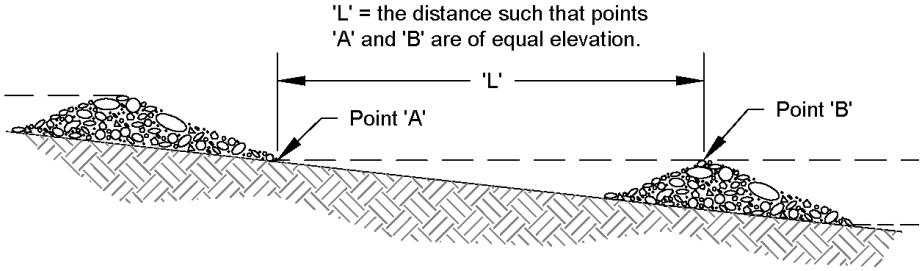


Note:
Key stone into channel banks and extend it beyond the abutments a minimum of 18" (0.5m) to prevent flow around dam.

Section A-A



Spacing Between Check Dams



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DEPARTMENT OF ECOLOGY
State of Washington

Rock Check Dam

Revised June 2016

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BMP C208: Triangular Silt Dike (TSD)

Purpose

Triangular silt dikes (TSDs) may be used as check dams, for perimeter protection, for temporary soil stockpile protection, for drop inlet protection, or as a temporary interceptor dike.

Conditions of Use

- TSDs may be used on soil or pavement with adhesive or staples.
- TSDs have been used to build temporary:
  - BMP C241: Sediment Pond (Temporary);
  - BMP C200: Interceptor Dike and Swale;
  - BMP C154: Concrete Washout Area;
  - BMP C203: Water Bars;
  - BMP C206: Level Spreader;
  - BMP C220: Inlet Protection;
  - BMP C207: Check Dams
  - curbing; and
  - berms.

Design and Installation Specifications

- TSDs are made of urethane foam sewn into a woven geosynthetic fabric.
- TSDs are triangular, 10 inches to 14 inches high in the center, with a 20-inch to 28-inch base. A 2 foot apron extends beyond both sides of the triangle along its standard section of 7 feet. A sleeve at one end allows attachment of additional sections as needed.
- Install with ends curved up to prevent water from flowing around the ends.
- The fabric flaps and check dam units are attached to the ground with wire staples. Wire staples should be No. 11 gauge wire and should be 200 mm to 300 mm in length.
- When multiple units are installed, the sleeve of fabric at the end of the unit shall overlap the abutting unit and be stapled.
- When used as check dams:
  - TSDs should be located and installed as soon as construction will allow.
  - TSDs should be placed perpendicular to the flow of water.
  - The leading edge of the TSD must be secured with rocks, sandbags, or a small key slot

and staples.

- In the case of grass-lined ditches and swales, check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.

Maintenance Standards

- Inspect TSDs for performance and sediment accumulation during and after each rainfall that produces runoff. Remove sediment when it reaches one half the height of the TSD.
- Anticipate submergence and deposition above the TSD and erosion from high flows around the edges of the TSD. Immediately repair any damage or any undercutting of the TSD.

BMP C220: Inlet Protection

Purpose

Inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use inlet protection at inlets that are operational before permanent stabilization of the disturbed areas that contribute runoff to the inlet. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless those inlets are preceded by a sediment trapping BMP.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters can add significant amounts of sediment into the roof drain system. If possible, delay installing lawn and yard drains until just before landscaping, or cap these drains to prevent sediment from entering the system until completion of landscaping. Provide 18-inches of sod around each finished lawn and yard drain.

Table II-3.10: Storm Drain Inlet Protection lists several options for inlet protection. All of the methods for inlet protection tend to plug and require a high frequency of maintenance. Limit contributing drainage areas for an individual inlet to one acre or less. If possible, provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table II-3.10: Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/ Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding may occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area requirement: 30'x30'/acre
Block and gravel drop inlet protection	Yes	Paved or Earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No	Paved or Earthen	Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap	N/A	N/A	18 month expected life.

Design and Installation Specifications

Excavated Drop Inlet Protection

Excavated drop inlet protection consists of an excavated impoundment around the storm drain inlet. Sediment settles out of the stormwater prior to entering the storm drain. Design and installation specifications for excavated drop inlet protection include:

- Provide a depth of 1-2 ft as measured from the crest of the inlet structure.
- Slope sides of excavation should be no steeper than 2H:1V.
- Minimum volume of excavation is 35 cubic yards.
- Shape the excavation to fit the site, with the longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water.
- Clear the area of all debris.

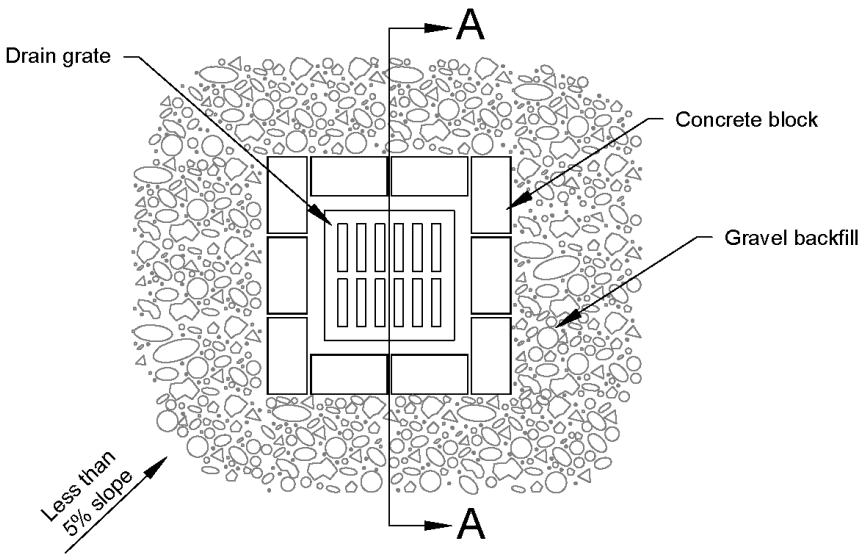
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.

Block and Gravel Filter

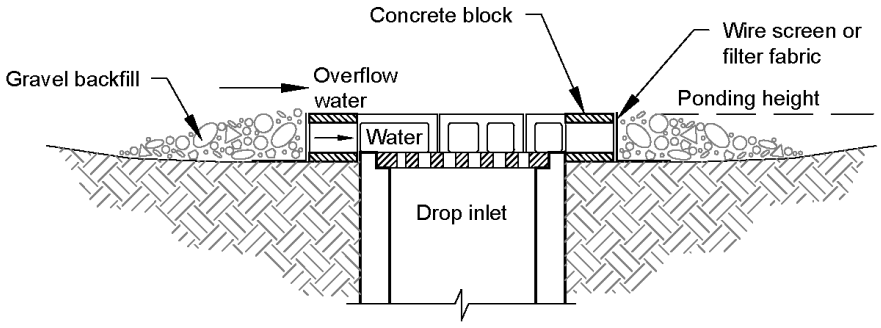
A block and gravel filter is a barrier formed around the inlet with standard concrete blocks and gravel. See Figure II-3.17: Block and Gravel Filter. Design and installation specifications for block gravel filters include:

- Provide a height of 1 to 2 feet above the inlet.
- Recess the first row of blocks 2-inches into the ground for stability.
- Support subsequent courses by placing a pressure treated wood 2x4 through the block opening.
- Do not use mortar.
- Lay some blocks in the bottom row on their side to allow for dewatering the pool.
- Place hardware cloth or comparable wire mesh with ½-inch openings over all block openings.
- Place gravel to just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel berm surrounding the inlet, as follows:
    - Provide a slope of 3H:1V on the upstream side of the berm.
    - Provide a slope of 2H:1V on the downstream side of the berm.
    - Provide a 1-foot wide level stone area between the gravel berm and the inlet.
    - Use stones 3 inches in diameter or larger on the upstream slope of the berm.
    - Use gravel ½- to ¾-inch at a minimum thickness of 1-foot on the downstream slope of the berm.

Figure II-3.17: Block and Gravel Filter



Plan View



Section A-A

Notes:

1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

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State of Washington

Block and Gravel Filter

Revised June 2016

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Gravel and Wire Mesh Filter

Gravel and wire mesh filters are gravel barriers placed over the top of the inlet. This method does not provide an overflow. Design and installation specifications for gravel and wire mesh filters include:

- Use a hardware cloth or comparable wire mesh with ½-inch openings.
    - Place wire mesh over the drop inlet so that the wire extends a minimum of 1-foot beyond each side of the inlet structure.
    - Overlap the strips if more than one strip of mesh is necessary.
- Place coarse aggregate over the wire mesh.
    - Provide at least a 12-inch depth of aggregate over the entire inlet opening and extend at least 18-inches on all sides.

Catch Basin Filters

Catch basin filters are designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements, combine a catch basin filter with another type of inlet protection. This type of inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way. Design and installation specifications for catch basin filters include:

- Provides 5 cubic feet of storage.
- Requires dewatering provisions.
- Provides a high-flow bypass that will not clog under normal use at a construction site.
- Insert the catch basin filter in the catch basin just below the grating.

Curb Inlet Protection with Wooden Weir

Curb inlet protection with wooden weir is an option that consists of a barrier formed around a curb inlet with a wooden frame and gravel. Design and installation specifications for curb inlet protection with wooden weirs include:

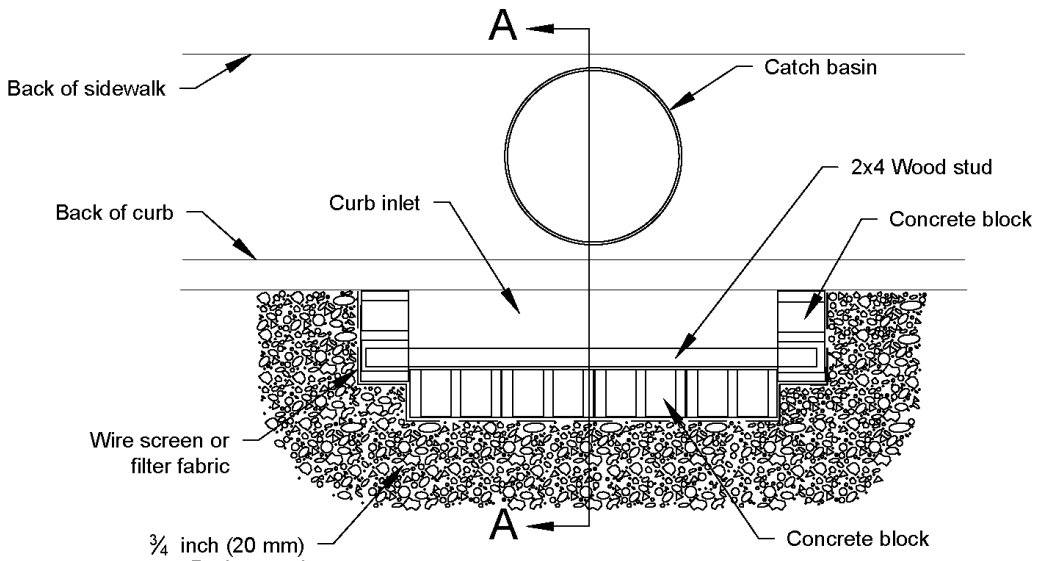
- Use wire mesh with ½-inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against the wire and fabric.
- Place weight on the frame anchors.

Block and Gravel Curb Inlet Protection

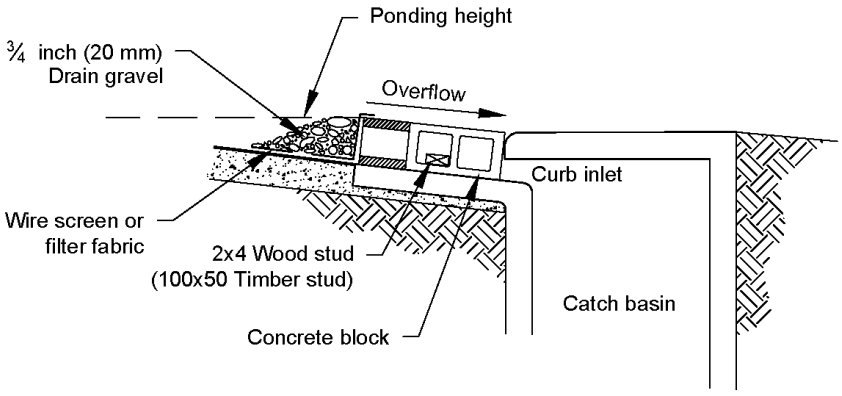
Block and gravel curb inlet protection is a barrier formed around a curb inlet with concrete blocks and gravel. See Figure II-3.18: Block and Gravel Curb Inlet Protection. Design and installation specifications for block and gravel curb inlet protection include:

- Use wire mesh with ½-inch openings.
- Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
- Place a 2x4 stud through the outer holes of each spacer block to align the front blocks.
- Place blocks on their sides across the front of the inlet and abutting the spacer blocks.
- Place wire mesh over the outside vertical face.
- Pile coarse aggregate against the wire to the top of the barrier.

Figure II-3.18: Block and Gravel Curb Inlet Protection



Plan View



Section A-A

Notes:

1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

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State of Washington

Block and Gravel Curb Inlet Protection

Revised June 2016

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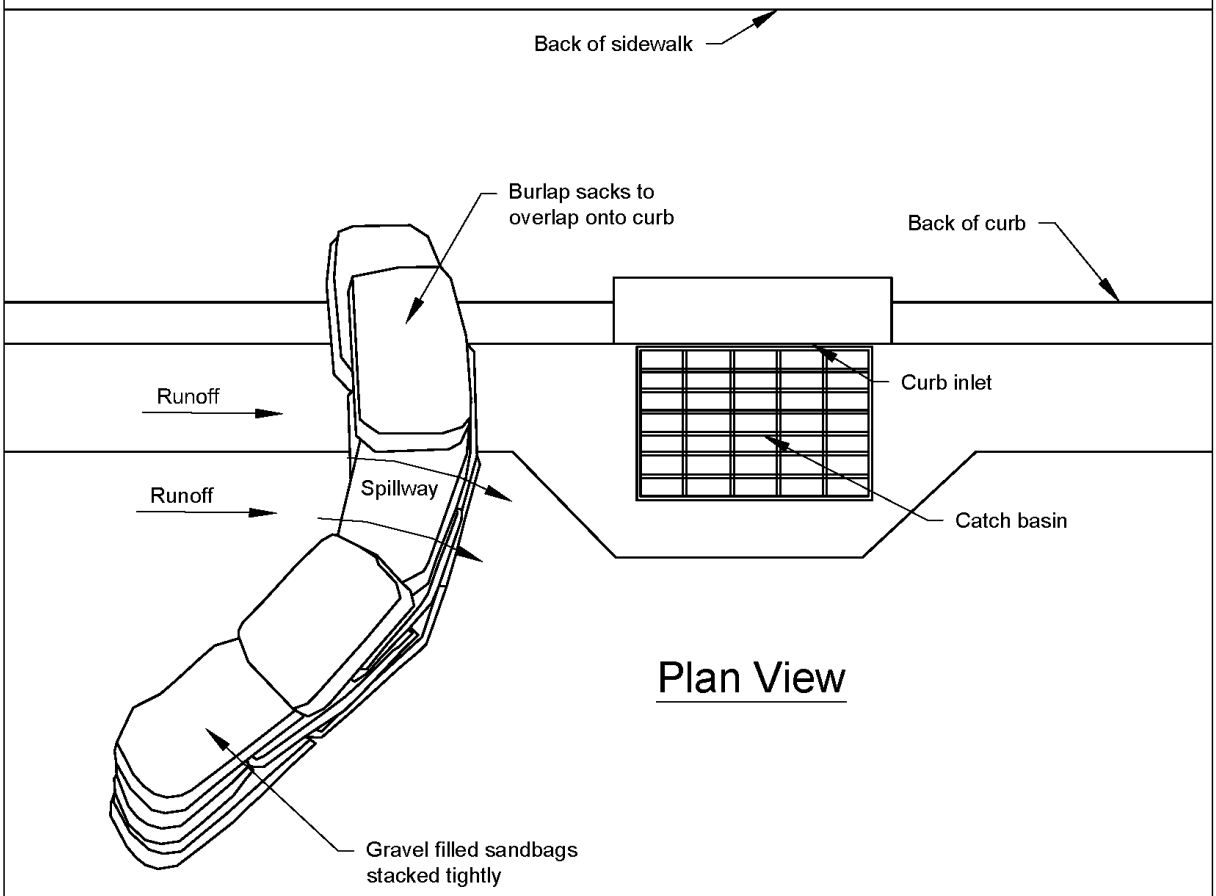
Curb and Gutter Sediment Barrier

Curb and gutter sediment barrier is a sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure II-3.19: Curb and Gutter Barrier. Design and installation specifications for curb and gutter sediment barrier include:

- Construct a horseshoe shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, at least 2 feet from the inlet.
- Construct a horseshoe shaped sedimentation trap on the upstream side of the berm. Size the trap to sediment trap standards for protecting a culvert inlet.

Figure II-3.19: Curb and Gutter Barrier



Notes:

1. Place curb type sediment barriers on gently sloping street segments, where water can pond and allow sediment to separate from runoff.
2. Sandbags of either burlap or woven 'geotextile' fabric, are filled with gravel, layered and packed tightly.
3. Leave a one sandbag gap in the top row to provide a spillway for overflow.
4. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

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State of Washington

Curb and Gutter Barrier

Revised June 2016

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Maintenance Standards

- Inspect all forms of inlet protection frequently, especially after storm events. Clean and replace clogged catch basin filters. For rock and gravel filters, pull away the rocks from the inlet and clean or replace. An alternative approach would be to use the clogged rock as fill and put fresh rock around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

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BMP C232: Gravel Filter Berm

Purpose

A gravel filter berm retains sediment by filtering runoff through a berm of gravel or crushed rock.

Conditions of Use

Use a gravel filter berm where a temporary measure is needed to retain sediment from construction sites.

Do not place gravel filter berms in traffic areas; gravel filter berms are not intended to be driven over.

Place gravel filter berms perpendicular to the flow of runoff, such that the runoff will filter through the berm prior to leaving the site.

Design and Installation Specifications

- Berm material shall be ¾ to 3 inches in size, washed well-grade gravel or crushed rock with less than 5 percent fines. Do not use crushed concrete.
- Spacing of berms:
    - Every 300 feet on slopes less than 5 percent
    - Every 200 feet on slopes between 5 percent and 10 percent
    - Every 100 feet on slopes greater than 10 percent
- Berm dimensions:
    - 1 foot high with 3H:1V side slopes
    - 8 linear feet per 1 cfs runoff based on the 10-year, 24-hour design storm
- See Figure II-3.21: Gravel Filter Berm for a photo of a gravel filter berm application.

Maintenance Standards

Regular inspection is required. Sediment shall be removed and filter material replaced as needed.

Figure II-3.21: Gravel Filter Berm

DEPARTMENT OF ECOLOGY
State of Washington

Gravel Filter Berm

Revised July 2017

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BMP C233: Silt Fence

Purpose

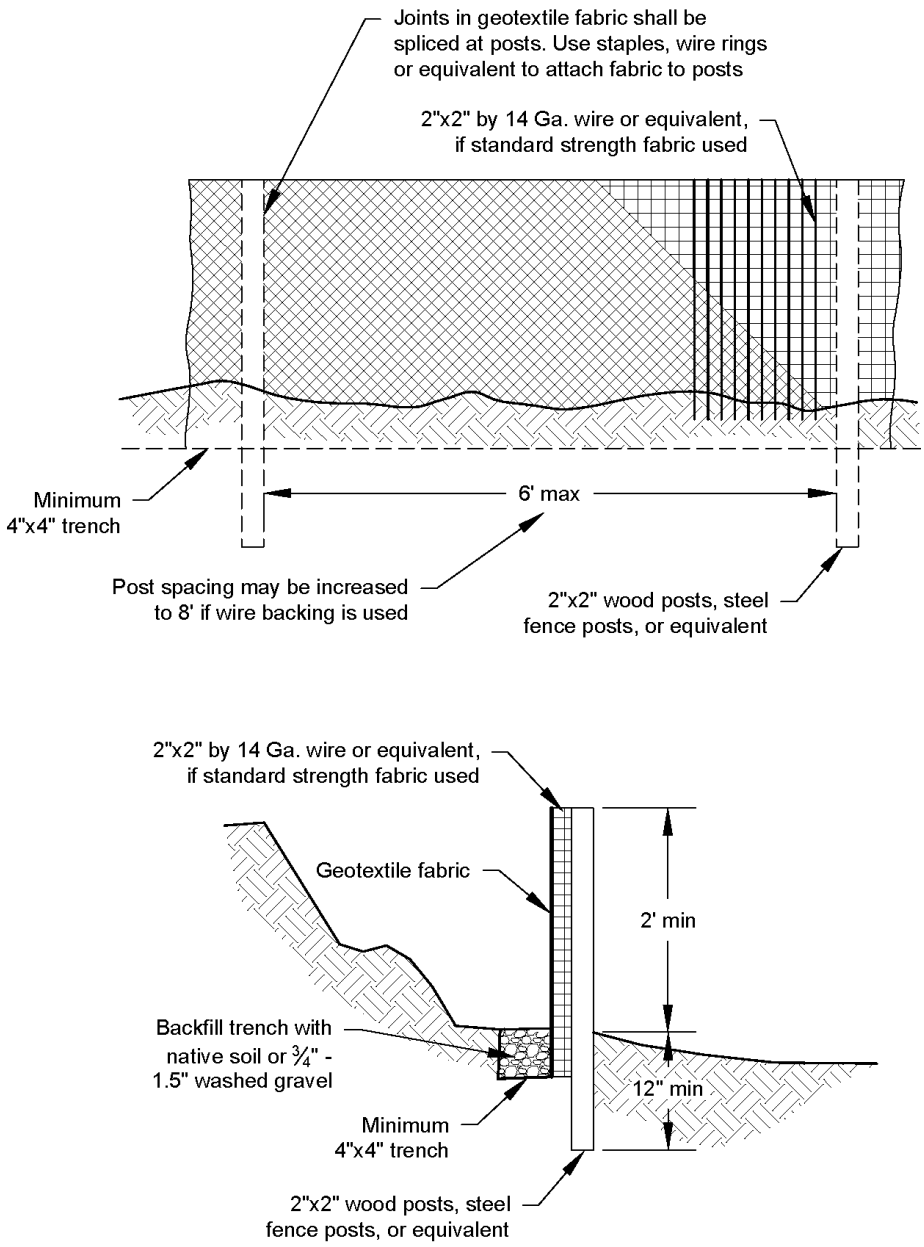
Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

Silt fence may be used downslope of all disturbed areas.

- Silt fence shall prevent sediment carried by runoff from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment trapping BMP.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

Figure II-3.22: Silt Fence



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Silt Fence

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Design and Installation Specifications

- Use in combination with other construction stormwater BMPs.
- Maximum slope steepness (perpendicular to the silt fence line) 1H:1V.
- Maximum sheet or overland flow path length to the silt fence of 100 feet.
- Do not allow flows greater than 0.5 cfs.
- Use geotextile fabric that meets the following standards. All geotextile properties listed below are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table II-3.11: Geotextile Fabric Standards for Silt Fence):

Table II-3.11: Geotextile Fabric Standards for Silt Fence

Geotextile Property	Minimum Average Roll Value
Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for slit film woven (#30 sieve). 0.30 mm maximum for all other geotextile types (#50 sieve). 0.15 mm minimum for all fabric types (#100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs. Minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength geotextiles with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the geotextile. Silt fence materials are available that have synthetic mesh backing attached.
- Silt fence material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0°F to 120°F.
- One-hundred percent biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by the local jurisdiction.
- Refer to Figure II-3.22: Silt Fence for standard silt fence details. Include the following Standard Notes for silt fence on construction plans and specifications:

    1. The Contractor shall install and maintain temporary silt fences at the locations shown in the Plans.
    2. Construct silt fences in areas of clearing, grading, or drainage prior to starting those activities.

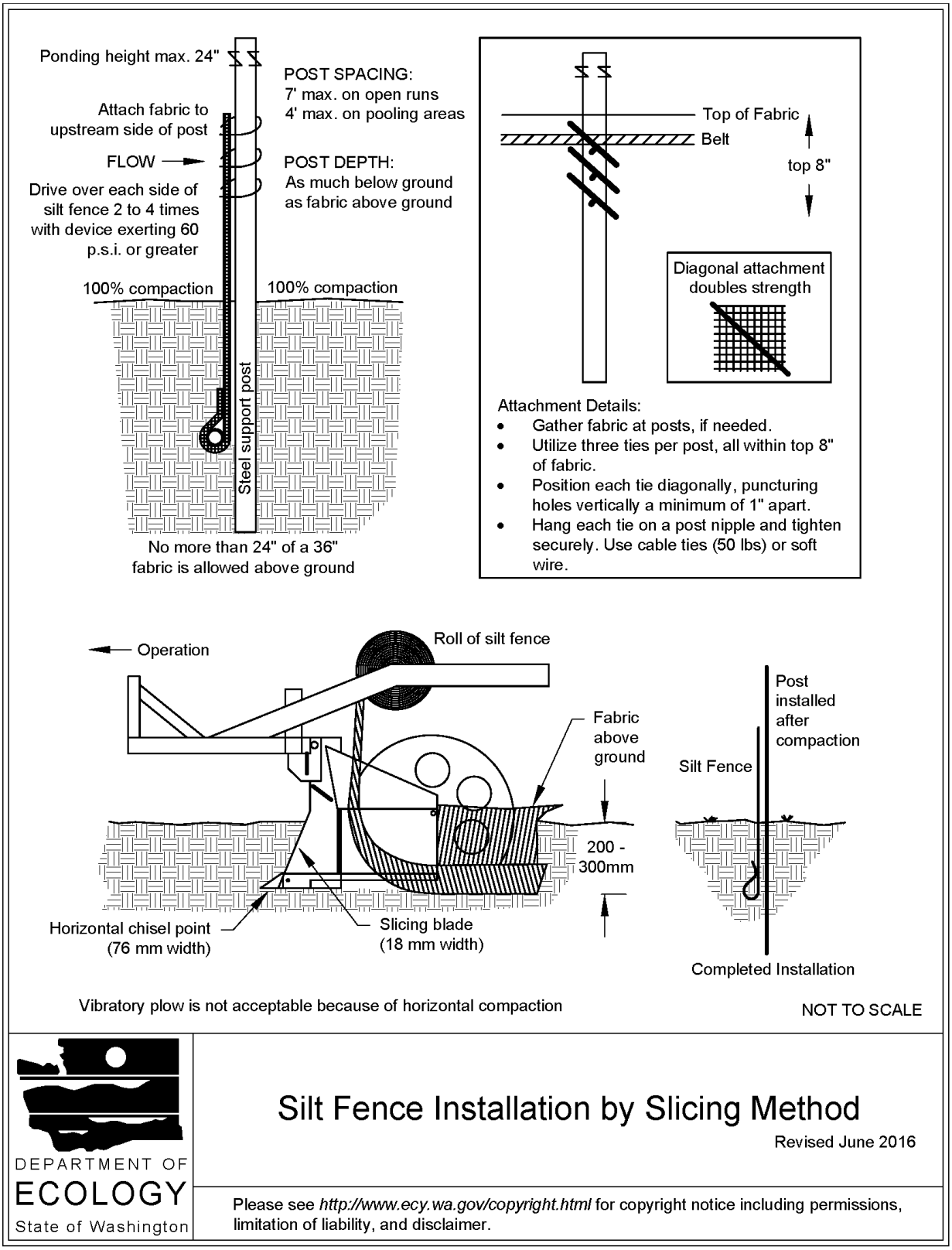
3. The silt fence shall have a 2-feet min. and a 2½-feet max. height above the original ground surface.
4. The geotextile fabric shall be sewn together at the point of manufacture to form fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided that the overlap is long enough and that the adjacent silt fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.
5. Attach the geotextile fabric on the up-slope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the geotextile fabric to the posts in a manner that reduces the potential for tearing.
6. Support the geotextile fabric with wire or plastic mesh, dependent on the properties of the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the up-slope side of the posts with the geotextile fabric up-slope of the mesh.
7. Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2-inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 lbs. grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the geotextile fabric it supports.
8. Bury the bottom of the geotextile fabric 4-inches min. below the ground surface. Backfill and tamp soil in place over the buried portion of the geotextile fabric, so that no flow can pass beneath the silt fence and scouring cannot occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the ground 3-inches min.
9. Drive or place the silt fence posts into the ground 18-inches min. A 12–inch min. depth is allowed if topsoil or other soft subgrade soil is not present and 18-inches cannot be reached. Increase fence post min. depths by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.
10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6-feet. Posts shall consist of either:
    - Wood with minimum dimensions of 2 inches by 2 inches by 3 feet. Wood shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
    - U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft.
    - Other steel posts having equivalent strength and bending resistance to the post sizes listed above.
11. Locate silt fences on contour as much as possible, except at the ends of the fence,

where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.

12. If the fence must cross contours, with the exception of the ends of the fence, place check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.
    - Check dams shall be approximately 1-foot deep at the back of the fence. Check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
    - Check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Refer to Figure II-3.23: Silt Fence Installation by Slicing Method for slicing method details. The following are specifications for silt fence installation using the slicing method:
    1. The base of both end posts must be at least 2- to 4-inches above the top of the geo-textile fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
    2. Install posts 3- to 4-feet apart in critical retention areas and 6- to 7-feet apart in standard applications.
    3. Install posts 24-inches deep on the downstream side of the silt fence, and as close as possible to the geotextile fabric, enabling posts to support the geotextile fabric from upstream water pressure.
    4. Install posts with the nipples facing away from the geotextile fabric.
    5. Attach the geotextile fabric to each post with three ties, all spaced within the top 8-inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1-inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.
    6. Wrap approximately 6-inches of the geotextile fabric around the end posts and secure with 3 ties.
    7. No more than 24-inches of a 36-inch geotextile fabric is allowed above ground level.
    8. Compact the soil immediately next to the geotextile fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the silt fence installation for any deviation before compaction. Use a flat-bladed shovel to tuck the fabric deeper into the ground if necessary.

Figure II-3.23: Silt Fence Installation by Slicing Method



Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the silt fence to a sediment trapping BMP.
- Check the uphill side of the silt fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence and remove the trapped sediment.
- Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace geotextile fabric that has deteriorated due to ultraviolet breakdown.

BMP C235: Wattles

Purpose

Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in netting made of natural plant fiber or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment.

Conditions of Use

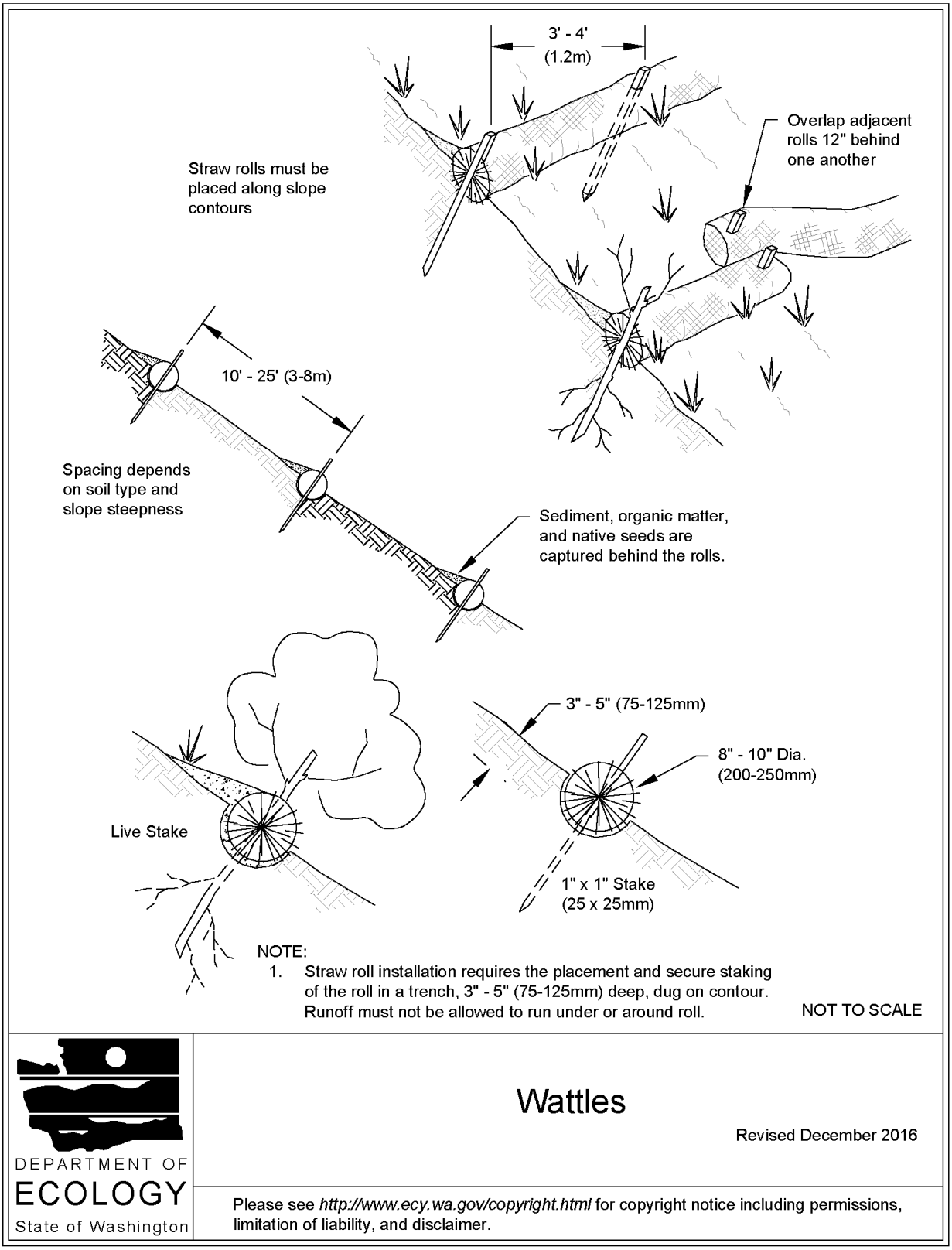
- Wattles shall consist of cylinders of plant material such as weed-free straw, coir, wood chips, excelsior, or wood fiber or shavings encased within netting made of natural plant fibers unaltered by synthetic materials.
- Use wattles:
    - In disturbed areas that require immediate erosion protection.
    - On exposed soils during the period of short construction delays, or over winter months.
    - On slopes requiring stabilization until permanent vegetation can be established.
- The material used dictates the effectiveness period of the wattle. Generally, wattles are effective for one to two seasons.

- Prevent rilling beneath wattles by entrenching and overlapping wattles to prevent water from passing between them.

Design Criteria

- See Figure II-3.24: Wattles for typical construction details.
- Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length.
- Install wattles perpendicular to the flow direction and parallel to the slope contour.
- Place wattles in shallow trenches, staked along the contour of disturbed or newly constructed slopes. Dig narrow trenches across the slope (on contour) to a depth of 3- to 5-inches on clay soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches should be dug to a depth of 5- to 7- inches, or 1/2 to 2/3 of the thickness of the wattle.
- Start building trenches and installing wattles from the base of the slope and work up. Spread excavated material evenly along the uphill slope and compact it using hand tamping or other methods.
- Construct trenches at intervals of 10- to 25-feet depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.
- Install the wattles snugly into the trenches and overlap the ends of adjacent wattles 12 inches behind one another.
- Install stakes at each end of the wattle, and at 4-foot centers along entire length of wattle.
- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.
- Wooden stakes should be approximately 0.75 x 0.75 x 24 inches min. Willow cuttings or 3/8-inch rebar can also be used for stakes.
- Stakes should be driven through the middle of the wattle, leaving 2 to 3 inches of the stake protruding above the wattle.

Figure II-3.24: Wattles



Maintenance Standards

- Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils.
- Inspect the slope after significant storms and repair any areas where wattles are not tightly abutted or water has scoured beneath the wattles.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C240: Sediment Trap

Purpose

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites during construction. Sediment traps, along with other perimeter controls, shall be installed before any land disturbance takes place in the drainage area.

Conditions of Use

- Sediment traps are intended for use on sites where the tributary drainage area is less than 3 acres, with no unusual drainage features, and a projected build-out time of six months or less. The sediment trap is a temporary measure (with a design life of approximately 6 months) and shall be maintained until the tributary area is permanently protected against erosion by vegetation and/or structures.
- Sediment traps are only effective in removing sediment down to about the medium silt size fraction. Runoff with sediment of finer grades (fine silt and clay) will pass through untreated, emphasizing the need to control erosion to the maximum extent first.
- Projects that are constructing permanent Flow Control BMPs, or Runoff Treatment BMPs that use ponding for treatment, may use the rough-graded or final-graded permanent BMP footprint for the temporary sediment trap. When permanent BMP footprints are used as temporary sediment traps, the surface area requirement of the sediment trap must be met. If the surface area requirement of the sediment trap is larger than the surface area of the permanent BMP, then the sediment trap shall be enlarged beyond the permanent BMP footprint to comply with the surface area requirement.

- A floating pond skimmer may be used for the sediment trap outlet if approved by the Local Permitting Authority.
- Sediment traps may not be feasible on utility projects due to the limited work space or the short-term nature of the work. Portable tanks may be used in place of sediment traps for utility projects.

Design and Installation Specifications

- See Figure II-3.26: Cross Section of Sediment Trap and Figure II-3.27: Sediment Trap Outlet for details.
- To determine the sediment trap geometry, first calculate the design surface area (SA) of the trap, measured at the invert of the weir. Use the following equation:

$$SA = FS(Q_2/V_s)$$

where

Q_2 =

  - Option 1 - Single Event Hydrograph Method:

    Q_2 = Peak volumetric flow rate calculated using a 10-minute time step from a Type 1A, 2-year, 24-hour frequency storm for the developed condition. The 10-year peak volumetric flow rate shall be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection.

  - Option 2 - For construction sites that are less than 1 acre, the Rational Method may be used to determine Q_2.

V_s = The settling velocity of the soil particle of interest. The 0.02 mm (medium silt) particle with an assumed density of 2.65 g/cm3 has been selected as the particle of interest and has a settling velocity (Vs) of 0.00096 ft/sec.

FS = A safety factor of 2 to account for non-ideal settling.

Therefore, the equation for computing sediment trap surface area becomes:

$$SA = 2 \times Q_2/0.00096$$

or

2080 square feet per cfs of inflow

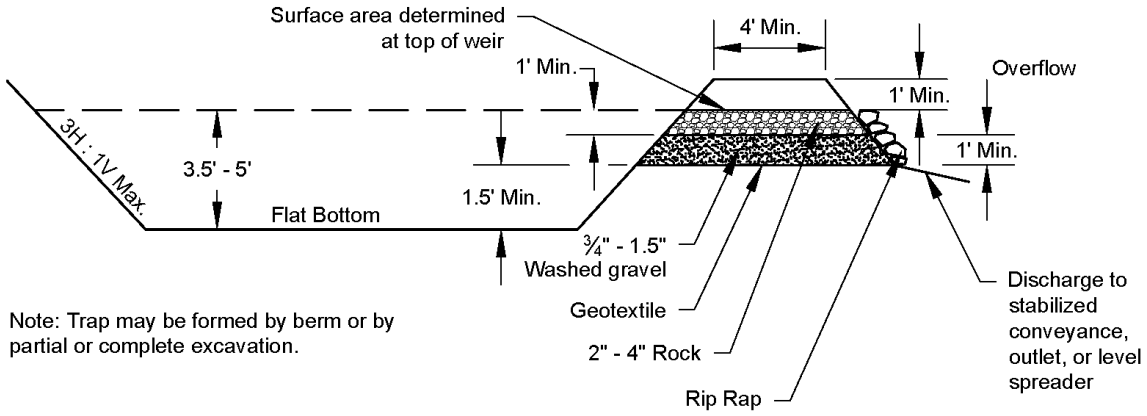
- Sediment trap depth shall be 3.5 feet minimum from the bottom of the trap to the top of the overflow weir.
- To aid in determining sediment depth, all sediment traps shall have a staff gauge with a prominent mark 1-foot above the bottom of the trap.

- Design the discharge from the sediment trap by using the guidance for discharge from temporary sediment ponds in BMP C241: Sediment Pond (Temporary).

Maintenance Standards

- Sediment shall be removed from the trap when it reaches 1-foot in depth.
- Any damage to the trap embankments or slopes shall be repaired.

Figure II-3.26: Cross Section of Sediment Trap



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Cross Section of Sediment Trap

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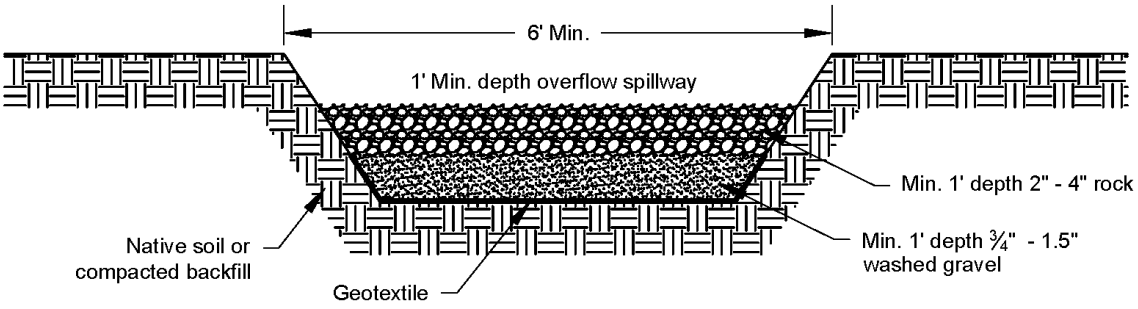
Figure II-3.27: Sediment Trap Outlet



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Sediment Trap Outlet

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BMP C241: Sediment Pond (Temporary)

Purpose

Sediment ponds are temporary ponds used during construction to remove sediment from runoff originating from disturbed areas of the project site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Consequently, they usually reduce turbidity only slightly.

Conditions of Use

- Use a sediment pond where the contributing drainage area to the pond is 3 acres or more. Ponds must be used in conjunction with other Construction Stormwater BMPs to reduce the amount of sediment flowing into the pond.
- Do not install sediment ponds on sites where failure of the BMP would result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. Also, sediment ponds are attractive to children and can be dangerous. Compliance with local ordinances regarding health and safety must be addressed. If fencing of the pond is required, show the type of fence and its location on the drawings in the Construction SWPPP.
- Sediment ponds that can impound 10 acre-ft (435,600 cu-ft, or 3.26 million gallons) or more, or have an embankment of more than 6 feet, are subject to the Washington Dam Safety Regulations (Chapter 173-175 WAC). See BMP D.1: Detention Ponds for more information regarding dam safety considerations for detention ponds.
- Projects that are constructing permanent Flow Control BMPs or Runoff Treatment BMPs that use ponding for treatment may use the rough-graded or final-graded permanent BMP footprint for the temporary sediment pond. When permanent BMP footprints are used as temporary sediment ponds, the surface area requirement of the temporary sediment pond must be met. If the surface area requirement of the sediment pond is larger than the surface area of the permanent BMP, then the sediment pond shall be enlarged beyond the permanent BMP footprint to comply with the surface area requirement.

  The permanent control structure must be temporarily replaced with a control structure that only allows water to leave the temporary sediment pond from the surface or by pumping. Alternatively, the permanent control structure may used if it is temporarily modified by plugging any outlet holes below the riser. The permanent control structure must be installed as part of the permanent BMP after the site is fully stabilized.

Design and Installation Specifications

General

- See Figure II-3.28: Sediment Pond Plan View, Figure II-3.29: Sediment Pond Cross Section, and Figure II-3.30: Sediment Pond Riser Detail for details.
- Use of permanent infiltration BMP footprints for temporary sediment ponds during

construction tends to clog the soils and reduce their capacity to infiltrate. If permanent infiltration BMP footprints are used, the sides and bottom of the temporary sediment pond must only be rough excavated to a minimum of 2 feet above final grade of the permanent infiltration BMP. Final grading of the permanent infiltration BMP shall occur only when all contributing drainage areas are fully stabilized. Any proposed permanent pretreatment BMP prior to the infiltration BMP should be fully constructed and used with the temporary sediment pond to help prevent clogging of the soils. See Element 13: Protect Low Impact Development BMPs for more information about protecting permanent infiltration BMPs.

- The pond shall be divided into two roughly equal volume cells by a permeable divider that will reduce turbulence while allowing movement of water between the cells. The divider shall be at least one-half the height of the riser, and at least one foot below the top of the riser. Wire-backed, 2- to 3-foot high, high strength geotextile fabric supported by treated 4"x4"s can be used as a divider. Alternatively, staked straw bales wrapped with geotextile fabric may be used. If the pond is more than 6 feet deep, a different divider design must be proposed. A riprap embankment is one acceptable method of separation for deeper ponds. Other designs that satisfy the intent of this provision are allowed as long as the divider is permeable, structurally sound, and designed to prevent erosion under and around the divider.
- The most common structural failure of sediment ponds is caused by piping. Piping refers to two phenomena: (1) water seeping through fine-grained soil, eroding the soil grain by grain and forming pipes or tunnels; and, (2) water under pressure flowing upward through a granular soil with a head of sufficient magnitude to cause soil grains to lose contact and capability for support.

  The most critical construction practices to prevent piping are:

  - Tight connections between the riser and outlet pipe, and other pipe connections.
  - Adequate anchoring of the riser.
  - Proper soil compaction of the embankment and riser footing.
  - Proper construction of anti-seep devices.

Sediment Pond Geometry

To determine the sediment pond geometry, first calculate the design surface area (SA) of the pond, measured at the top of the riser pipe. Use the following equation:

$$SA = 2 \times Q_2/0.00096$$

or

2080 square feet per cfs of inflow

See BMP C240: Sediment Trap for more information on the above equation.

The basic geometry of the pond can now be determined using the following design criteria:

- Required surface area SA (from the equation above) at the top of the riser.
- Minimum 3.5-foot depth from the top of the riser to the bottom of the pond.

- Maximum 3H:1V interior side slopes and maximum 2H:1V exterior slopes. The interior slopes can be increased to a maximum of 2H:1V if fencing is provided at or above the maximum water surface.
- One foot of freeboard between the top of the riser and the crest of the emergency spillway.
- Flat bottom.
- Minimum 1-foot deep spillway.
- Length-to-width ratio between 3:1 and 6:1.

Sediment Pond Discharge

The outlet for the pond consists of a combination of principal and emergency spillways. These outlets must pass the peak runoff expected from the contributing drainage area for a 100-year storm. If, due to site conditions and basin geometry, a separate emergency spillway is not feasible, the principal spillway must pass the entire peak runoff expected from the 100-year storm. However, an attempt to provide a separate emergency spillway should always be made. Base the runoff calculations on the site conditions during construction. The flow through the dewatering orifice cannot be utilized when calculating the 100-year storm elevation because of its potential to become clogged; therefore, available spillway storage must begin at the principal spillway riser crest.

The principal spillway designed by the procedures described below will result in some reduction in the peak rate of runoff. However, the design will not control the discharge flow rates to the extent required to comply with I-3.4.7 MR7: Flow Control. The size of the contributing basin, the expected life of the construction project, the anticipated downstream effects, and the anticipated weather conditions during construction should be considered to determine the need for additional discharge control.

Principal Spillway: Determine the required diameter for the principal spillway (riser pipe). The diameter shall be the minimum necessary to pass the peak volumetric flow rate using a 15-minute time step from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Use Figure II-3.31: Riser Inflow Curves to determine the riser diameter.

To aid in determining sediment depth, one-foot intervals shall be prominently marked on the riser.

Emergency Overflow Spillway: Size the emergency overflow spillway for the peak volumetric flow rate using a 10-minute time step from a Type 1A, 100-year, 24-hour frequency storm for the developed condition. See BMP D.1: Detention Ponds for additional guidance for Emergency Overflow Spillway design

Dewatering Orifice: Size of the dewatering orifice(s) (minimum 1-inch diameter) using a modified version of the discharge equation for a vertical orifice and a basic equation for the area of a circular orifice. Determine the required area of the orifice with the following equation:

$$A_o = \frac{A_S(2h)^{0.5}}{0.6 \times 3600 T g^{0.5}}$$

where

A_o = orifice area (square feet)

A_S = pond surface area (square feet)

h = head of water above orifice (height of riser in feet)

T = dewatering time (24 hours)

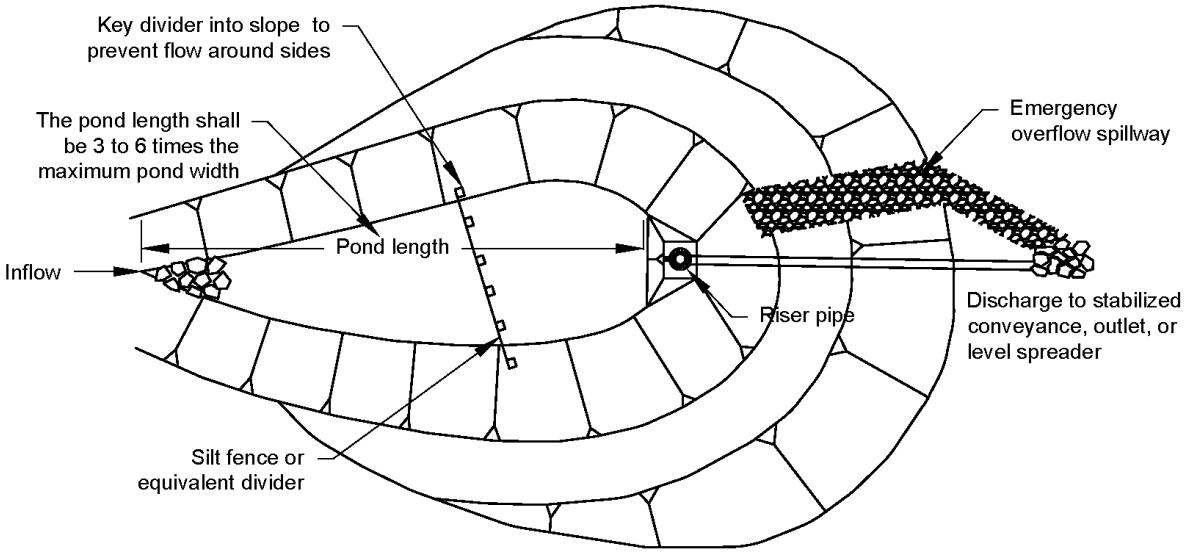
g = acceleration of gravity (32.2 feet/second^2)

Convert the orifice area (in square feet) to the orifice diameter D (in inches):

$$D = 24 \times \sqrt{\frac{A_o}{\pi}} = 13.54 \times \sqrt{A_o}$$

The vertical, perforated tubing connected to the dewatering orifice must be at least 2 inches larger in diameter than the orifice to improve flow characteristics. The size and number of perforations in the tubing should be large enough so that the tubing does not restrict flow. The orifice should control the flow rate.

Figure II-3.28: Sediment Pond Plan View



Note: Pond may be formed by berm or by partial or complete excavation

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Sediment Pond Plan View

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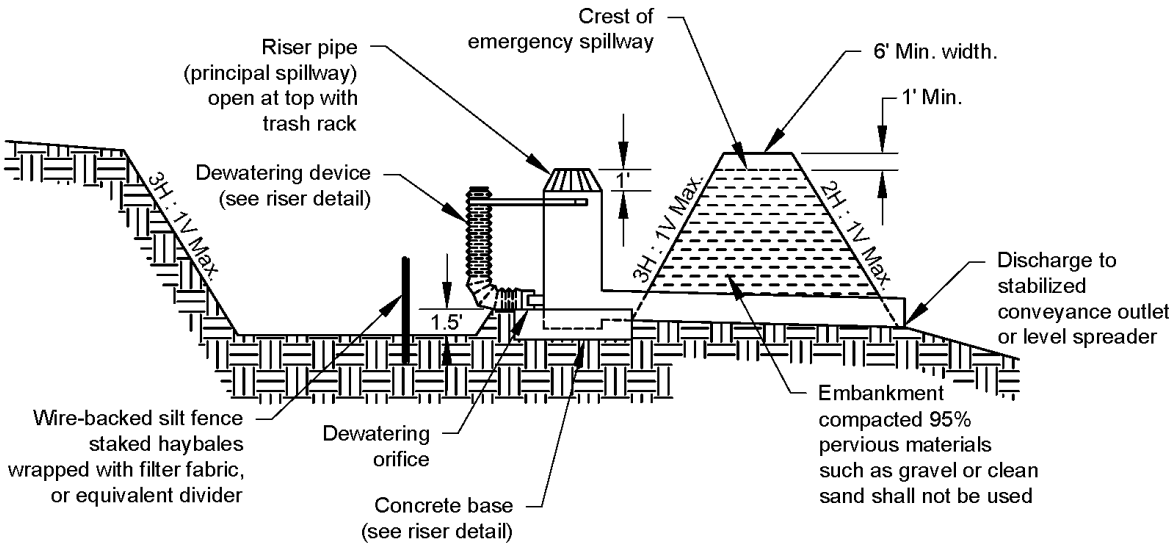
Figure II-3.29: Sediment Pond Cross Section



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Sediment Pond Cross Section

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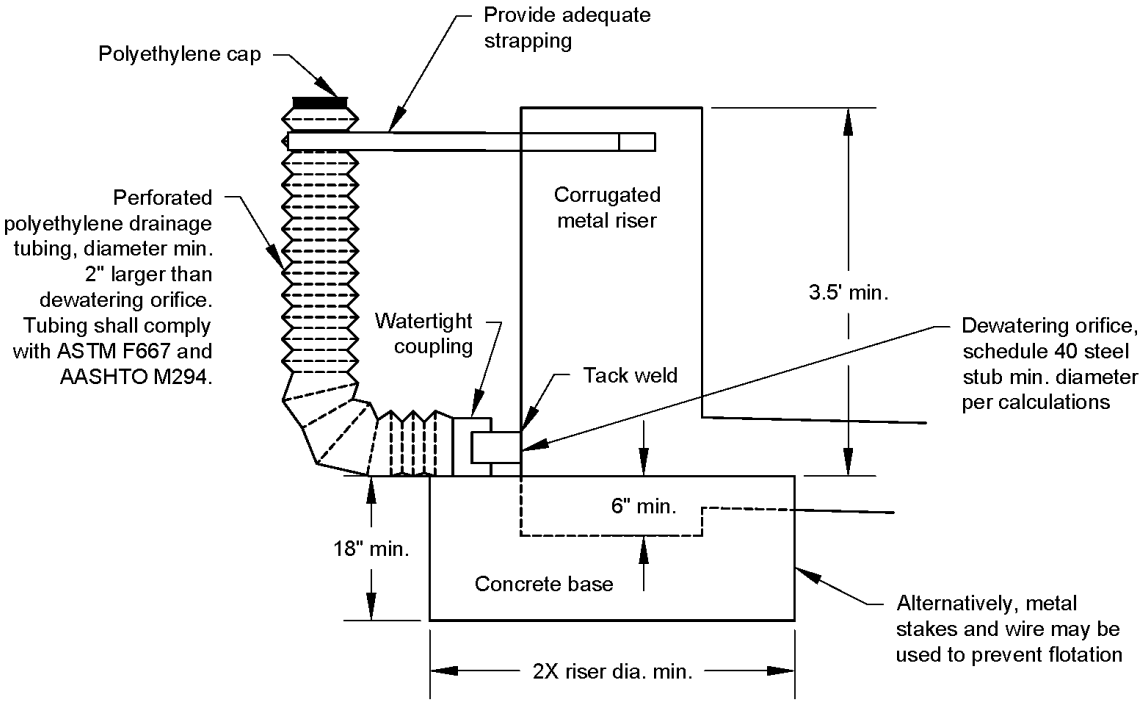
Figure II-3.30: Sediment Pond Riser Detail



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Sediment Pond Riser Detail

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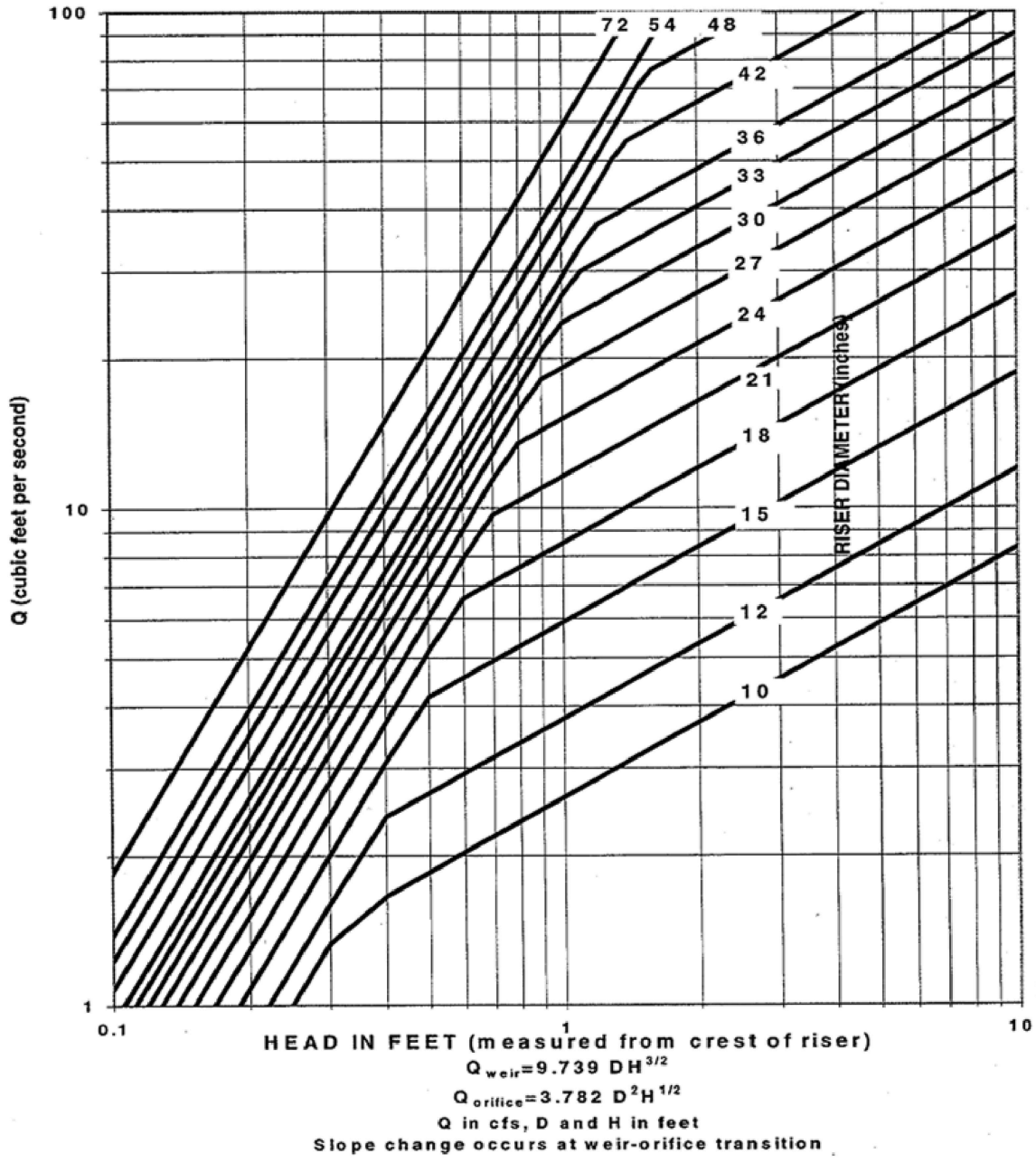
Figure II-3.31: Riser Inflow Curves



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Riser Inflow Curves

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Maintenance Standards

- Remove sediment from the pond when it reaches 1 foot in depth.
- Repair any damage to the pond embankments or slopes.

BMP C251: Construction Stormwater Filtration

Purpose

Filtration removes sediment from runoff originating from disturbed areas of the site.

Conditions of Use

Traditional Construction Stormwater BMPs used to control soil erosion and sediment loss from construction sites may not be adequate to ensure compliance with the water quality standard for turbidity in the receiving water. Filtration may be used in conjunction with gravity settling to remove sediment as small as fine silt (0.5 µm). The reduction in turbidity will be dependent on the particle size distribution of the sediment in the stormwater. In some circumstances, sedimentation and filtration may achieve compliance with the water quality standard for turbidity.

The use of construction stormwater filtration does not require approval from Ecology as long as treatment chemicals are not used. Filtration in conjunction with BMP C250: Construction Stormwater Chemical Treatment requires testing under the Chemical Technology Assessment Protocol – Ecology (CTAPE) before it can be initiated. Approval from Ecology must be obtained at each site where chemical use is proposed prior to use. See https://-fortress.wa.gov/ecy/publications/SummaryPages/ecy070258.html for a copy of the Request for Chemical Treatment form.

Design and Installation Specifications

Two types of filtration systems may be applied to construction stormwater treatment: rapid and slow.

Rapid filtration systems are the typical system used for water and wastewater treatment. They can achieve relatively high hydraulic flow rates, on the order of 2 to 20 gpm/sf, because they have automatic backwash systems to remove accumulated solids.

Slow filtration systems have very low hydraulic rates, on the order of 0.02 gpm/sf, because they do not have backwash systems. Slow filtration systems have generally been used as post construction BMPs to treat stormwater (see V-6 Filtration BMPs). Slow filtration is mechanically simple in comparison to rapid filtration, but requires a much larger filter area.

Filter Types and Efficiencies

Sand media filters are available with automatic backwashing features that can filter to 50 µm particle size. Screen or bag filters can filter down to 5 µm. Fiber wound filters can remove particles down to 0.5 µm. Filters should be sequenced from the largest to the smallest pore opening. Sediment removal efficiency will be related to particle size distribution in the stormwater.

Treatment Process and Description

Stormwater is collected at interception point(s) on the site and diverted to an untreated stormwater sediment pond or tank for removal of large sediment, and storage of the stormwater before it is treated by the filtration system. In a rapid filtration system, the untreated stormwater is pumped from the pond or tank through the filtration media. Slow filtration systems are designed using gravity to convey water from the pond or tank to and through the filtration media.

Sizing

Filtration treatment systems must be designed to control the velocity and peak volumetric flow rate that is discharged from the system and consequently the project site. See Element 3: Control Flow Rates for further details on this requirement.

The untreated stormwater storage pond or tank should be sized to hold 1.5 times the volume of runoff generated from the site during the 10-year, 24-hour storm event, minus the filtration treatment system flowrate for an 8-hour period. For a chitosan-enhanced sand filtration system, the filtration treatment system flowrate should be sized using a hydraulic loading rate between 6-8 gpm/ft^2. Other hydraulic loading rates may be more appropriate for other systems. Bypass should be provided around the filtration treatment system to accommodate extreme storm events. Runoff volume shall be calculated using the methods presented in III-2.3 Single Event Hydrograph Method. Worst-case land cover conditions (i.e., producing the most runoff) should be used for analyses (in most cases, this would be the land cover conditions just prior to final landscaping).

If the filtration treatment system design does not allow you to discharge at the rates as required by Element 3: Control Flow Rates, and if the site has a permanent Flow Control BMP that will serve the planned development, the discharge from the filtration treatment system may be directed to the permanent Flow Control BMP to comply with Element 3: Control Flow Rates. In this case, all discharge (including water passing through the treatment system and stormwater bypassing the treatment

system) will be directed into the permanent Flow Control BMP. If site constraints make locating the untreated stormwater storage pond difficult, the permanent Flow Control BMP may be divided to serve as the untreated stormwater storage pond and the post-treatment temporary flow control pond. A berm or barrier must be used in this case so the untreated water does not mix with the treated water. Both untreated stormwater storage requirements, and adequate post-treatment flow control must be achieved. The designer must document in the Construction SWPPP how the permanent Flow Control BMP is able to attenuate the discharge from the site to meet the requirements of Element 3: Control Flow Rates. If the design of the permanent Flow Control BMP was modified for temporary construction flow control purposes, the construction of the permanent Flow Control BMP must be finalized, as designed for its permanent function, at project completion.

Maintenance Standards

- Rapid sand filters typically have automatic backwash systems that are triggered by a pre-set pressure drop across the filter. If the backwash water volume is not large or substantially more turbid than the untreated stormwater stored in the holding pond or tank, backwash return to the untreated stormwater pond or tank may be appropriate. However, other means of treatment and disposal may be necessary.
- Screen, bag, and fiber filters must be cleaned and/or replaced when they become clogged.
- Sediment shall be removed from the storage and/or treatment ponds as necessary. Typically, sediment removal is required once or twice during a wet season and at the decommissioning of the ponds.
- Disposal of filtration equipment must comply with applicable local, state, and federal regulations.

IV-1 Source Control BMPs Applicable to All Sites

S410 BMPs for Correcting Illicit Discharges to Storm Drains

Description of Pollutant Sources: Illicit discharges are unpermitted sanitary or process wastewater discharges to a storm sewer or to surface water, rather than to a sanitary sewer, industrial process wastewater, or other appropriate treatment. They can also include swimming pool water, filter backwash, cleaning solutions/washwaters, cooling water, etc. Experience has shown that illicit discharges are common, particularly in older buildings.

Pollutant Control Approach: Identify and eliminate unpermitted discharges or obtain an NPDES permit, where necessary, particularly at industrial and commercial facilities.

Applicable Operational BMPs:

- For all real properties, responsible parties must examine their plumbing systems to identify any potential illicit discharges. Review site plans, engineering drawings, or other sources of information for the plumbing systems on the property.
- If an illicit discharge is suspected, trace the source using an appropriate method such as visual reconnaissance, smoke test, flow test, dye test with a nontoxic dye, or closed circuit television (CCTV) inspection. These tests are to be performed by qualified personnel such as a plumbing contractor. Note: Contact Ecology prior to performing a dye test which may result in a discharge to a receiving water.
- If illicit connections are found, permanently plug or disconnect the connections.
- Eliminate prohibited discharges to storm sewer, ground water, or surface water.
- Convey unpermitted discharges to a sanitary sewer if allowed by the local sewer authority, or to other approved treatment.
- Obtain all necessary permits for altering or repairing side sewers and plumbing fixtures. Restrictions on certain types of discharges, particularly industrial process waters, may require pretreatment of discharges before they enter the sanitary sewer. It is the responsibility of the property owner or business operator to obtain the necessary permits and to replace the connection.
- Obtain appropriate state and local permits for these discharges.

Recommended Additional Operational BMPs:

At commercial and industrial facilities, conduct a survey of wastewater discharge connections to storm drains and to surface water as follows:

- Conduct a field survey of buildings, particularly older buildings, and other industrial areas to locate storm drains from buildings and paved surfaces. Note where these discharge.
- During non-stormwater conditions, inspect each storm drain for non-stormwater discharges. Record the locations of all non-stormwater discharges. Include all permitted discharges.
- If useful, prepare a map of each area. Show on the map the known location of storm sewers, sanitary sewers, and permitted and unpermitted discharges. Aerial photos may be useful. Check records such as piping schematics to identify known side sewer connections and show these on the map. Consider using smoke, dye, or chemical analysis tests to detect connections between two conveyance systems (e.g., process water and stormwater). If desirable, conduct TV inspections of the storm drains and record the footage on videotape.
- Compare the observed locations of connections with the information on the map and revise the map accordingly. Note suspect connections that are inconsistent with the field survey.
- Identify all connections to storm sewers or to surface water and take the actions specified above as applicable BMPs.

S453 BMPs for Formation of a Pollution Prevention Team

The pollution prevention team should be responsible for implementing and maintaining all BMPs and treatment for the site. This team should be able to address any corrective actions needed on site to mitigate potential stormwater contamination. The team members should:

- Consist of those people who are familiar with the facility and its operations.
- Possess the knowledge and skills to assess conditions and activities that could impact stormwater quality at your facility, and who can evaluate the effectiveness of control measures.
- Assign pollution prevention team staff to be on duty on a daily basis to cover applicable permittee facilities when those facilities are in operation.
- Have the primary responsibility for developing and overseeing facility activities necessary to comply with stormwater requirements.
- Have access to all applicable permit, monitoring, SWPPP, and other records.
- Be trained in the operation, maintenance and inspections of all BMPs and reporting procedures.
- Establish responsibilities for inspections, operation, maintenance, and emergencies.
- Regularly meet to review overall facility operations and BMP effectiveness.

S454 BMPs for Preventive Maintenance / Good Housekeeping

Preventative maintenance and good housekeeping practices reduce the potential for stormwater to come into contact with pollutants and can reduce maintenance intervals for the drainage system and sewer system.

Applicable BMPs:

- Prevent the discharge of unpermitted liquid or solid wastes, process wastewater, and sewage to ground or surface water, or to storm drains that discharge to surface water, or to the ground. Conduct all oily parts cleaning, steam cleaning, or pressure washing of equipment or containers inside a building, or on an impervious contained area, such as a concrete pad. Direct contaminated stormwater from such an area to a sanitary sewer where allowed by local sewer authority, or to other approved treatment.
- Promptly contain and clean up solid and liquid pollutant leaks and spills including oils, solvents, fuels, and dust from manufacturing operations on an exposed soil, vegetation, or paved area.
- If a contaminated surface must be pressure washed, collect the resulting washwater for proper disposal (usually involves plugging storm drains, or otherwise preventing discharge and pumping or vactoring up washwater, for discharge to sanitary sewer or for vactor truck transport to a waste water treatment plant for disposal).
- Do not hose down pollutants from any area to the ground, storm drains, conveyance ditches, or receiving water. Convey pollutants before discharge to a treatment system approved by the local jurisdiction.
- Sweep all appropriate surfaces with vacuum sweepers quarterly, or more frequently as needed, for the collection and disposal of dust and debris that could contaminate stormwater. Use mechanical sweepers, and manual sweeping as necessary to access areas that a vacuum sweeper can't reach to ensure that all surface contaminants are routinely removed.
- Do not pave over contaminated soil unless it has been determined that ground water has not been and will not be contaminated by the soil. Call Ecology for assistance.
- Construct impervious areas that are compatible with the materials handled. Portland cement concrete, asphalt, or equivalent material may be considered.
- Use drip pans to collect leaks and spills from industrial/commercial equipment such as cranes at ship/boat building and repair facilities, log stackers, industrial parts, trucks and other vehicles stored outside.
- At industrial and commercial facilities, drain oil and fuel filters before disposal. Discard empty oil and fuel filters, oily rags, and other oily solid waste into appropriately closed and properly labeled containers, and in compliance with the Uniform Fire Code or International Building Code.
- For the storage of liquids use containers, such as steel and plastic drums, that are rigid and

durable, corrosion resistant to the weather and fluid content, non-absorbent, water tight, rodent-proof, and equipped with a close fitting cover.

- For the temporary storage of solid wastes contaminated with liquids or other potential polluted materials use dumpsters, garbage cans, drums, and comparable containers, which are durable, corrosion resistant, non-absorbent, non-leaking, and equipped with either a solid cover or screen cover to prevent littering. If covered with a screen, the container must be stored under a roof or other form of adequate cover.
- Where exposed to stormwater, use containers, piping, tubing, pumps, fittings, and valves that are appropriate for their intended use and for the contained liquid.
- Clean oils, debris, sludge, etc. from all stormwater facilities regularly, including catch basins, settling/detention basins, oil/water separators, boomed areas, and conveyance systems to prevent the contamination of stormwater. Refer to Ecology Requirements for Generators of Dangerous Wastes in I-2.15 Other Requirements for references to assist in handling potentially dangerous waste.
- Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas, subjected to pollutant material leaks or spills. Promptly repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater.
- Do not connect floor drains in potential pollutant source areas to storm drains, surface water, or to the ground.

Recommended BMPs:

- Where feasible, store potential stormwater pollutant materials inside a building or under a cover and/or containment.
- Minimize use of toxic cleaning solvents, such as chlorinated solvents, and other toxic chemicals.
- Use environmentally safe raw materials, products, additives, etc. such as substitutes for zinc used in rubber production.
- Recycle waste materials such as solvents, coolants, oils, degreasers, and batteries to the maximum extent feasible. Contact Ecology's *Hazardous Waste & Toxics Reduction Program* at https://ecology.wa.gov/About-us/Get-to-know-us/Our-Programs/Hazardous-Waste-Toxics-Reduction for recommendations on recycling or disposal of vehicle waste liquids and other waste materials.
- Empty drip pans immediately after a spill or leak is collected in an uncovered area.
- Stencil warning signs at stormwater catch basins and drains, e.g., “Dump no waste – Drains to waterbody”.
- Use solid absorbents, e.g., clay and peat absorbents and rags for cleanup of liquid spills/leaks, where practicable.
- Promptly repair/replace/reseal damaged paved areas at industrial facilities.

- Recycle materials, such as oils, solvents, and wood waste, to the maximum extent practicable.

Note: Evidence of stormwater contamination by oils and grease can include the presence of visible sheen, color, or turbidity in the runoff, or present or historical operational problems at the facility. Operators can use simple pH tests, for example with litmus or pH paper. These tests can screen for high or low pH levels (anything outside a 6.5-8.5 range) due to contamination in stormwater.

S455 BMPs for Spill Prevention and Cleanup

Description of Pollutant Sources: Spills and leaks can damage public infrastructure, interfere with sewage treatment, and cause a threat to human health or the environment. Spills are often preventable if appropriate chemical and waste handling techniques are practiced effectively and the spill response plan is immediately implemented. Additional spill control requirements may be required based on the specific activity occurring on site.

Applicable BMPs:

Spill Prevention

- Clearly label or mark all containers that contain potential pollutants.
- Store and transport liquid materials in appropriate containers with tight-fitting lids.
- Place drip pans underneath all containers, fittings, valves, and where materials are likely to spill or leak.
- Use tarpaulins, ground cloths, or drip pans in areas where materials are mixed, carried, and applied to capture any spilled materials.
- Train employees on the safe techniques for handling materials used on the site and to check for leaks and spills.

Spill Plan

- Develop and implement a spill plan and update it annually or whenever there is a change in activities or staff responsible for spill cleanup. Post a written summary of the plan at areas with a high potential for spills, such as loading docks, product storage areas, waste storage areas, and near a phone. The spill plan may need to be posted at multiple locations. Describe the facility, including the owner's name, address, and telephone number; the nature of the facility activity; and the general types of chemicals used at the facility.
- Designate spill response employees to be on-site during business activities. Provide a current list of the names and telephone numbers (home and office) of designated spill response employees who are responsible for implementing the spill plan.
- Provide a site plan showing the locations of storage areas for chemicals, inlets/catch basins, spill kits and other relevant infrastructure or materials information.
- Describe the emergency cleanup and disposal procedures. Note the location of all spill kits in

the spill plan.

- List the names and telephone numbers of public agencies to contact in the event of a spill.

Spill Cleanup Kits

- Store all cleanup kits near areas with a high potential for spills so that they are easily accessible in the event of a spill. The contents of the spill kit must be appropriate to the types and quantities of materials stored or otherwise used at the facility, and refilled when the materials are used. Spill kits must be located within 25 feet of all fueling/fuel transfer areas, including on-board mobile fuel trucks.

  Note: Ecology recommends that the kit(s) include salvage drums or containers, such as high density polyethylene, polypropylene or polyethylene sheet-lined steel; polyethylene or equivalent disposal bags; an emergency response guidebook; safety gloves/clothes/equipment; shovels or other soil removal equipment; and oil containment booms and absorbent pads; all stored in an impervious container.

Spill Cleanup and Proper Disposal of Waste

- Stop, contain, and clean up all spills immediately upon discovery.
- Implement the spill plan immediately.
- Contact the designated spill response employees.
- Block off and seal nearby inlets/catch basins to prevent materials from entering the drainage system or combined sewer.
- Use the appropriate material to clean up the spill.
- Do not use emulsifiers or dispersants such as liquid detergents or degreasers unless disposed of proplerly. Emulsifiers and dispersants are not allowed to be used on surface water, or in a place where they may enter storm drains, surface waters, treatments systems, or sanitary sewers.
- Immediately notify Ecology and the local jurisdiction if a spill has reached or may reach a sanitary or storm sewer, ground water, or surface water. Notification must comply with state and federal spill reporting requirements.
- Do not wash absorbent material into interior floor drains or inlets/catch basins.
- Place used spill control materials in appropriate containers and dispose of according to regulations.

S456 BMPs for Employee Training

Train all employees that work in pollutant source areas about the following topics:

- Identifying Pollution Prevention Team Members.
- Identifying pollutant sources.

- Understanding pollutant control measures.
- Spill prevention and response.
- Emergency response procedures.
- Handling practices that are environmentally acceptable. Particularly those related to vehicle/equipment liquids such as fuels, and vehicle/equipment cleaning.

Additional specialized training may be needed for staff who will be responsible for handling hazardous materials.

S457 BMPS for Inspections

Qualified personnel shall conduct inspections monthly. Make and maintain a record of each inspection on-site. The following requirements apply to inspections:

- Be conducted by someone familiar with the facility's site, operations, and BMPs.
- Verify the accuracy of the pollutant source descriptions in the SWPPP.
- Assess all BMPs that have been implemented for effectiveness and needed maintenance and locate areas where additional BMPs are needed.
- Reflect current conditions on the site.
- Include written observations of the presence of floating materials, suspended solids, oil and grease, discoloration, turbidity and odor in the stormwater discharges; in outside vehicle maintenance/repair; and liquid handling, and storage areas. In areas where acid or alkaline materials are handled or stored use a simple litmus or pH paper to identify those types of stormwater contaminants where needed.
- Eliminate or obtain a permit for unpermitted non-stormwater discharges to storm drains or receiving waters, such as process wastewater and vehicle/equipment washwater.
- Identify actions to address inspection deficiencies.

S458 BMPs for Record Keeping

See the applicable permit for specific record-keeping requirements and retention schedules for the following reports. At a minimum, retain the following reports for five years:

- Inspection reports which should include:
    - Time and date of the inspection
    - Locations inspected
    - Statement on status of compliance with the permit
    - Summary report of any remediation activities required
    - Name, title, and signature of person conducting the inspection

- Reports on spills of oil or hazardous substances in greater than Reportable Quantities (Code of Federal Regulations Title 40 Parts 302.4 and 117). Report spills of the following: antifreeze, oil, gasoline, or diesel fuel, that cause:
    - A violation of the State of Washington's Water Quality Standards.
    - A film or sheen upon or discoloration of the waters of the State or adjoining shorelines.
    - A sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

  To report a spill or to determine if a spill is a substance of a Reportable Quantity, call the Ecology regional office and ask for an oil spill operations or a dangerous waste specialist:

    - Northwest Region (425)649-7000
    - Southwest Region (360)407-6300
    - Eastern Region (509)329-3400
    - Central Region (509) 575-2490

  In addition, call the Washington Emergency Management Division at 1-800-258-5990 or 1-800-OILS-911 AND the National Response Center at 1-800-424-8802.

  Also, refer to *Focus on Emergency Spill Response* (Ecology, 2009).

The following is additional recommended record keeping:

Maintain records of all related pollutant control and pollutant generating activities such as training, materials purchased, material use and disposal, maintenance performed, etc.

V-11 Miscellaneous LID BMPs

V-11.1 Introduction to Miscellaneous LID BMPs

BMPs in this chapter have been grouped because they have the following in common:

- They employ Low Impact Development (LID) Principles
- They cannot be used to meet I-3.4.6 MR6: Runoff Treatment
- They cannot, by themselves, be used to meet the Flow Control Performance Standard or the LID Performance Standard.
    - Some of the BMPs in this chapter do allow for some amount of Flow Control credit. See the guidance for each individual BMP for details.
- The design methods for each BMP in this chapter are unique. They do not have strong enough design similarities to other BMPs in this volume to place them in the other BMP categories identified in this volume.

BMP T5.13: Post-Construction Soil Quality and Depth

Purpose and Definition

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition. These functions are largely lost when development strips away native soil and vegetation and replaces it with minimal topsoil and sod. Not only are these important stormwater functions lost, but such landscapes themselves become pollution generating pervious surfaces due to increased use of pesticides, fertilizers and other landscaping and household/industrial chemicals, the concentration of pet wastes, and pollutants that accompany roadside litter.

Establishing soil quality and depth regains greater stormwater functions in the post development landscape, provides increased treatment of pollutants and sediments that result from development and habitation, and minimizes the need for some landscaping chemicals, thus reducing pollution through prevention.

Applications and Limitations

Establishing a minimum soil quality and depth is not the same as preservation of naturally occurring soil and vegetation. However, establishing a minimum soil quality and depth will provide improved on-site management of stormwater flow and water quality.

Soil organic matter can be attained through numerous materials such as compost, composted woody material, biosolids, and forest product residuals. It is important that the materials used to

meet this BMP be appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoils improve soil conditions and do not have an excessive percent of clay fines.

This BMP can be considered infeasible on till soil slopes greater than 33 percent.

Design Guidelines

Soil Retention

Retain, in an undisturbed state, the duff layer and native topsoil to the maximum extent practicable. In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.

Soil Quality

All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:

1. A topsoil layer with a minimum organic matter content of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.
2. Mulch planting beds with 2 inches of organic material.
3. Use compost and other materials that meet the following organic content requirements:
    a. The organic content for “pre-approved” amendment rates can be met only using compost meeting the compost specification for BMP T7.30: Bioretention, with the exception that the compost may have up to 35% biosolids or manure.

       The compost must also have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1.

       The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

    b. Calculated amendment rates may be met through use of composted material meeting (a.) above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and not exceeding the contaminant limits identified in Table 220-B, Testing Parameters, in WAC 173-350-220.

The resulting soil should be conducive to the type of vegetation to be established.

Implementation Options

The soil quality design guidelines listed above can be met by using one of the methods listed below:

1. Leave undisturbed native vegetation and soil, and protect from compaction during construction.
2. Amend existing site topsoil or subsoil either at default "pre-approved" rates, or at custom calculated rates based on tests of the soil and amendment.
3. Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default "pre-approved" rate or at a custom calculated rate.
4. Import topsoil mix of sufficient organic content and depth to meet the requirements.

More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Planning/Permitting/Inspection/Verification Guidelines & Procedures

Local governments are encouraged to adopt guidelines and procedures similar to those recommended in *Building Soil: Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington* (Stenn et al., 2016).

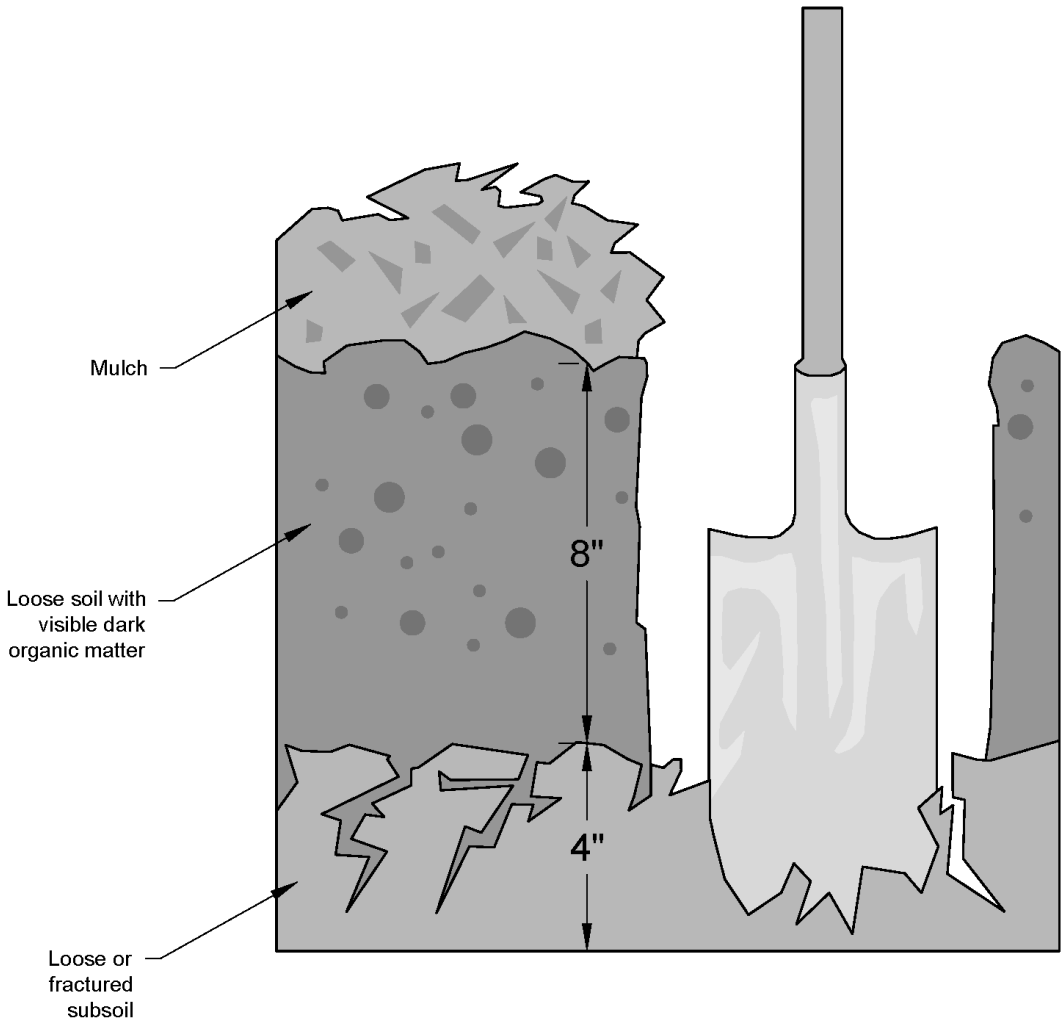
Maintenance

- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant vegetation and mulch the amended soil area after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

Runoff Model Representation

All areas meeting the soil quality and depth design criteria may be entered into approved runoff models as "Pasture" rather than "Lawn/Landscaping".

Figure V-11.1: Planting Bed Cross-Section



Reprinted from *Guidelines and Resources For Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington*, 2010, Washington Organic Recycling Council

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Planting Bed Cross-Section

Revised June 2016

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Appendix C: Site Inspection Form

Construction Stormwater Site Inspection Form

Project Name _____ Permit # _____ Inspection Date _____ Time _____

Name of Certified Erosion Sediment Control Lead (CESCL) or qualified inspector if *less than one acre*
Print Name: _____

Approximate rainfall amount since the last inspection (in inches): _____

Approximate rainfall amount in the last 24 hours (in inches): _____

Current Weather Clear ☐ Cloudy ☐ Mist ☐ Rain ☐ Wind ☐ Fog ☐

A. Type of inspection: Weekly ☐ Post Storm Event ☐ Other ☐

B. Phase of Active Construction (*check all that apply*):

Pre Construction/installation of erosion/sediment controls	☐	Clearing/Demo/Grading	☐	Infrastructure/storm/roads	☐
Concrete pours	☐	Vertical Construction/buildings	☐	Utilities	☐
Offsite improvements	☐	Site temporary stabilized	☐	Final stabilization	☐

C. Questions:

1. Were all areas of construction and discharge points inspected? Yes ___ No ___
2. Did you observe the presence of suspended sediment, turbidity, discoloration, or oil sheen Yes ___ No ___
3. Was a water quality sample taken during inspection? (*refer to permit conditions S4 & S5*) Yes ___ No ___
4. Was there a turbid discharge 250 NTU or greater, or Transparency 6 cm or less?* Yes ___ No ___
5. If yes to #4 was it reported to Ecology? Yes ___ No ___
6. Is pH sampling required? pH range required is 6.5 to 8.5. Yes ___ No ___

If answering yes to a discharge, describe the event. Include when, where, and why it happened; what action was taken, and when.

_____

_____

_____

_____

*If answering yes to # 4 record NTU/Transparency with continual sampling daily until turbidity is 25 NTU or less/ transparency is 33 cm or greater.

Sampling Results: Date: _____

Parameter	Method (circle one)	Result			Other/Note
		NTU	cm	pH	
Turbidity	tube, meter, laboratory				
pH	Paper, kit, meter				

Construction Stormwater Site Inspection Form

D. Check the observed status of all items. Provide "Action Required "details and dates.

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
1 Clearing Limits	Before beginning land disturbing activities are all clearing limits, natural resource areas (streams, wetlands, buffers, trees) protected with barriers or similar BMPs? (high visibility recommended)						
2 Construction Access	Construction access is stabilized with quarry spalls or equivalent BMP to prevent sediment from being tracked onto roads?						
	Sediment tracked onto the road way was cleaned thoroughly at the end of the day or more frequent as necessary.						
3 Control Flow Rates	Are flow control measures installed to control stormwater volumes and velocity during construction and do they protect downstream properties and waterways from erosion?						
	If permanent infiltration ponds are used for flow control during construction, are they protected from siltation?						
4 Sediment Controls	All perimeter sediment controls (e.g. silt fence, wattles, compost socks, berms, etc.) installed, and maintained in accordance with the Stormwater Pollution Prevention Plan (SWPPP).						
	Sediment control BMPs (sediment ponds, traps, filters etc.) have been constructed and functional as the first step of grading.						
	Stormwater runoff from disturbed areas is directed to sediment removal BMP.						
5 Stabilize Soils	Have exposed un-worked soils been stabilized with effective BMP to prevent erosion and sediment deposition?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
5 Stabilize Soils Cont.	Are stockpiles stabilized from erosion, protected with sediment trapping measures and located away from drain inlet, waterways, and drainage channels?						
	Have soils been stabilized at the end of the shift, before a holiday or weekend if needed based on the weather forecast?						
6 Protect Slopes	Has stormwater and ground water been diverted away from slopes and disturbed areas with interceptor dikes, pipes and or swales?						
	Is off-site storm water managed separately from stormwater generated on the site?						
	Is excavated material placed on uphill side of trenches consistent with safety and space considerations?						
	Have check dams been placed at regular intervals within constructed channels that are cut down a slope?						
7 Drain Inlets	Storm drain inlets made operable during construction are protected.						
	Are existing storm drains within the influence of the project protected?						
8 Stabilize Channel and Outlets	Have all on-site conveyance channels been designed, constructed and stabilized to prevent erosion from expected peak flows?						
	Is stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream conveyance systems?						
9 Control Pollutants	Are waste materials and demolition debris handled and disposed of to prevent contamination of stormwater?						
	Has cover been provided for all chemicals, liquid products, petroleum products, and other material?						
	Has secondary containment been provided capable of containing 110% of the volume?						
	Were contaminated surfaces cleaned immediately after a spill incident?						
	Were BMPs used to prevent contamination of stormwater by a pH modifying sources?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
9 Cont.	Wheel wash wastewater is handled and disposed of properly.						
10 Control Dewatering	Concrete washout in designated areas. No washout or excess concrete on the ground.						
	Dewatering has been done to an approved source and in compliance with the SWPPP.						
	Were there any clean non turbid dewatering discharges?						
11 Maintain BMP	Are all temporary and permanent erosion and sediment control BMPs maintained to perform as intended?						
12 Manage the Project	Has the project been phased to the maximum degree practicable?						
	Has regular inspection, monitoring and maintenance been performed as required by the permit?						
	Has the SWPPP been updated, implemented and records maintained?						
13 Protect LID	Is all Bioretention and Rain Garden Facilities protected from sedimentation with appropriate BMPs?						
	Is the Bioretention and Rain Garden protected against over compaction of construction equipment and foot traffic to retain its infiltration capabilities?						
	Permeable pavements are clean and free of sediment and sediment laden-water runoff. Muddy construction equipment has not been on the base material or pavement.						
	Have soiled permeable pavements been cleaned of sediments and pass infiltration test as required by stormwater manual methodology?						
	Heavy equipment has been kept off existing soils under LID facilities to retain infiltration rate.						

E. Check all areas that have been inspected. ✔

All in place BMPs ☐ All disturbed soils ☐ All concrete wash out area ☐ All material storage areas ☐
All discharge locations ☐ All equipment storage areas ☐ All construction entrances/exits ☐

Construction Stormwater Site Inspection Form

F. Elements checked "Action Required" (section D) describe corrective action to be taken. List the element number; be specific on location and work needed. Document, initial, and date when the corrective action has been completed and inspected.

Element #	Description and Location	Action Required	Completion Date	Initials

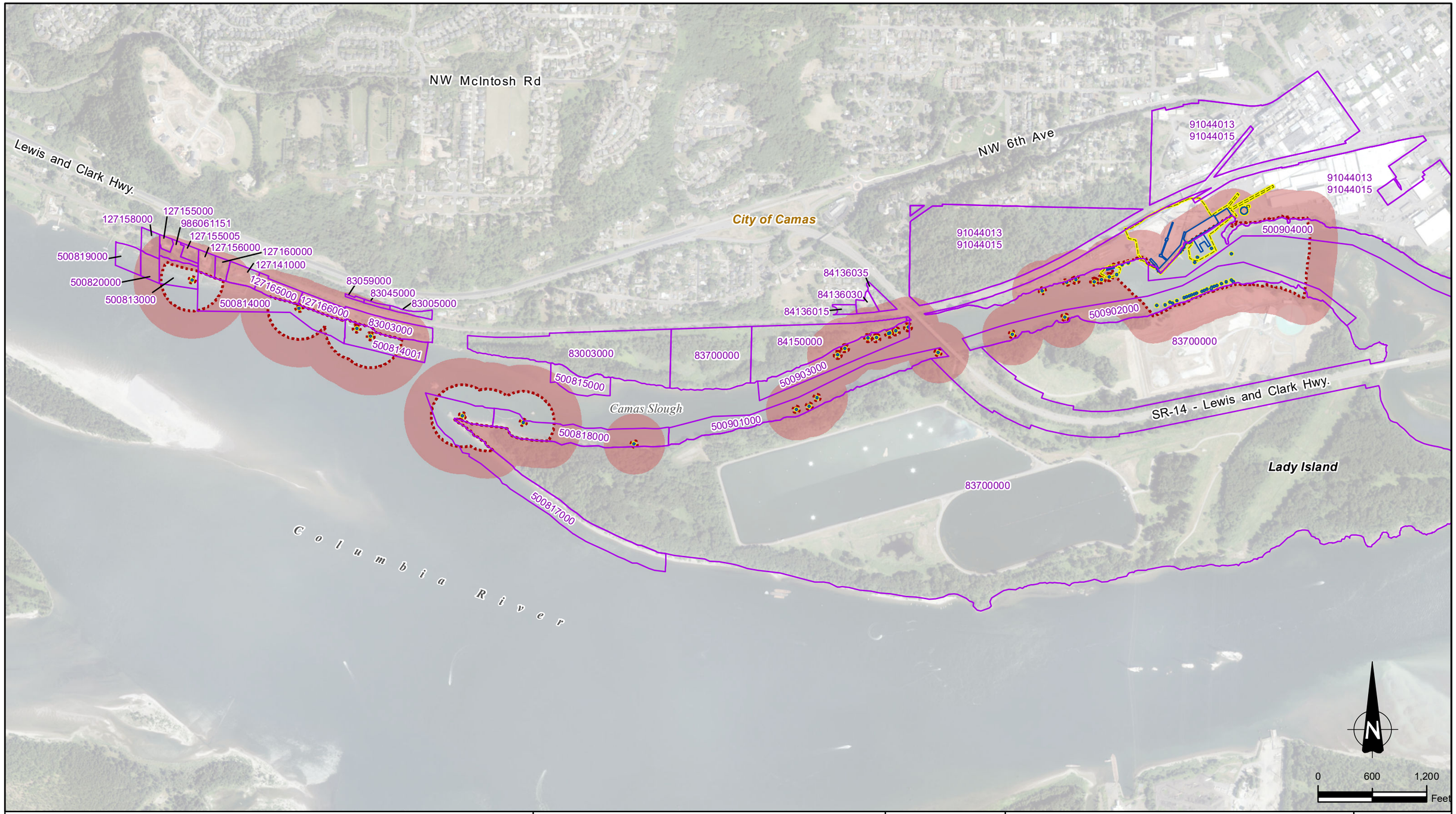
Attach additional page if needed

Sign the following certification:

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief"

Inspected by: (print) _____ (Signature) _____ Date: _____

Title/Qualification of Inspector: _____



Project Limits
Structure To Be Removed
Dolphin To Be Removed
Action Area
Action Area 300-foot Buffer
Parcels within Buffer Zone

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

ACTION AREA PARCELS

DATE: APRIL 2023
SCALE: 1:12,000
PROJECT NO.
FIGURE: 1105

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Action_Area_Parcels.mxd - sierra.marrs - 4/25/2023 - 4:26:54 PM

COMMUNITY DEVELOPMENT DEPARTMENT
616 NE 4th Avenue
Camas, WA 98607
www.ci.camas.wa.us

April 18, 2023

Caleigh Belkoff
Georgia Pacific
401 NE Adams Street
Camas, WA 98607
Sent via email caleigh.belkoff@gapac.com

RE: Georgia Pacific In-water Over-water removal project (SHOR23-01)

Dear Ms. Belkoff,

Thank you for your application submittal for the GP In-water/Over-water removal project. There are items that remain to be addressed with your application. The purpose of this letter is to inform you that the above application submitted on March 30, 2023 has been deemed incomplete in accordance with Camas Municipal Code (CMC) Section 18.55.130. You have 180 days from the date of application to submit the missing information pursuant to CMC 18.55.130.C. If the below requested information is submitted, staff will again verify whether the application is complete.

Items necessary for completeness:

1. Per the pre-application notes, the $848.00 critical areas review fee is for each type of critical area. The pre-application notes identified 4 types of critical areas to be reviewed (*Fish and Wildlife Habitat Conservation Areas, Frequently Flooded Areas, Wetlands* and *Geologically Hazardous Areas*). One critical area review fee was submitted and therefore the remaining critical area review fee required is $2,544.00 ($848.00 x 3).
2. The critical areas review also needs to address Geologically Hazardous Areas, which is required in the pre-application notes. Refer to SMP Appendix C Section 16.59.060.
3. Per the pre-application notes, a floodplain development permit application is required (see attached).
4. Per SMP Appendix B Section VI.B.2 and per the pre-application notes, a current (within thirty days prior to application) mailing list and mailing labels of owners of real property within three hundred (300) feet of the subject parcel, certified as based on the records of Clark County assessor.
5. Per SMP Appendix B Section VI.B.5, "The narrative shall respond to the applicable Program policies that will be affected by the proposed development or action and how the proposal complies with the regulations of the Program." In addition, the pre-application notes also stated "the required narrative shall demonstrate compliance with the applicable Shoreline Master Program policies and regulations of the SMP."
6. Per SMP Appendix B Section VI.B.7 the following shall be shown on the site and development plans-
   a. The location of the OHWM (label on the overall site plan);
   m. A survey of existing significant trees (if trees are proposed for removal);
7. Per SMP Appendix B Section VII.A and B, provide example of sign content for City review and approval prior to sign installation. See attached revised sign content.
8. Per the pre-application notes, provide proof of mailing or emailing the archaeological predetermination report to the tribes pursuant to CMC 16.31.160.

Once the application is deemed complete, the City will begin its review of the project application and provide subsequent comments/questions. If you have any questions, please contact me at lhollenbeck@cityofcamas.us.

Respectfully,

Lauren Hollenbeck

Lauren Hollenbeck, Senior Planner

1106

Georgia-Pacific
CONSUMER OPERATIONS LLC
401 NE Adams Street, Camas, WA 98607
Telephone: (360) 834-3021

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

June 28, 2023

Lauren Hollenbeck, Senior Planner
City of Camas, Community Development Dept.
616 NE 4th Avenue
Camas, WA 98607

RE: Response to Georgia Pacific In-water Over-water removal project (SHOR23-01) Letter 2 Dated June 12, 2023 Requesting Additional Information Relating to the SEPA Application Submitted on March 30, 2023.

Dear Ms. Hollenbeck,

Please find attached the additional information requested in your June 12, 2023 letter regarding the City of Camas review of our SEPA application and continued support in permitting Georgia Pacific's proposed *In-Water and Overwater Structures Removal Project*.

The City identified a number of items in your letter dated April 18, 2023 requiring additional information which we believe have been addressed. Table 1 provides our response to each of the items noted as necessary for completeness and followed by a number of corresponding attachments.

Table 1. Response to Items Necessary for Application Completeness from Letter 2.

Item #	Items necessary for completeness	GP Response to City of Camas Comments
1	Per the pre-application notes, the $848.00 critical areas review fee is for each type of critical area. The pre-application notes identified 4 types of critical areas to be reviewed (Fish and Wildlife Habitat Conservation Areas, Frequently Flooded Areas, Wetlands and Geologically Hazardous Areas). One critical area review fee was submitted and therefore the remaining critical area review fee required is $2,544.00 ($848.00 x 3). The critical area fee was paid on June 17th.	The remaining critical area fee was paid on June 17th.

2	Per SMP Appendix B Section VI.B.2 and per the pre-application notes, a current (within thirty days prior to application) mailing list and mailing labels of owners of real property within three hundred (300) feet of the subject parcel, certified and created by the Clark County assessor. The mailing list provided does not appear to be certified by the Clark County assessor.	Please find attached the requested certified mailing list and labels provided by Clark County.
3	Per SMP Appendix B Section VI.B.5, "The narrative shall respond to the applicable Program policies that will be affected by the proposed development or action and how the proposal complies with the regulations of the Program." In addition, the pre-application notes also stated, "the required narrative shall demonstrate compliance with the applicable Shoreline Master Program policies and regulations of the SMP." Specifically, the following Shoreline Master Program policies and regulations shall be addressed in a narrative: * Section 5.7.2- Clearing, Grading, Fill, Excavation * Section 6.4.2.1- Dredging * Section 6.4.2.2- Dredge Material Disposal *Section 6.4.5- Shoreline Stabilization - General	The Shoreline Master Program provides reference to Best Management Practices and permitting restrictions. The Narrative currently states: *"A Shoreline Report has been completed for the Project in compliance with requirements and addresses how Project activities potentially impact shoreline and meet compliance requirements for the City's Shoreline Master Program."* General BMPs are listed in Section 6.0. To explicitly address the City's comment, we have added text following this statement in the Narrative (see Section 7.2 of the attached updated Appendix 1-Project Narrative) which states: "*This includes the requirements found in Section 5.7.2 (i.e., Clearing, Grading, Fill, Excavation), Section 6.4.2.1 (i.e., Dredging), Section 6.4.2.2 (i.e., Dredge Material Disposal), and Section 6.4.5 (i.e., Shoreline Stabilization – General) of the City's Shoreline Master Program. Note that most of the requirements of Section 6.4.5 would not apply to this Project as the Project does not involve the establishment of "new or enlarged structural shoreline stabilization measures."* Below we have highlighted some of the issues and topics considered in regard to each of these four sections of the Shoreline Master Program; however, we do not believe that additional changes to the Shoreline Report are warranted:

		• **Section 5.7.2 (Fill) of the Shoreline Master Program** o The Project appears to be in compliance with the requirements found in this section of the Shoreline Master Program' including fill which is addressed in other supporting documents (e.g., Appendices 10, 11, and 12). o The Shoreline Report does say "Approved clean, suitable fill material would be used to cover the retained lower columns and create river bottom contours that match the natural riverbed in this previously dredged location, resulting in restored shallow, nearshore river habitat." Approved fills would be screened as described in Appendix 10 and any subsequent approved plan by DMMO prior to use as required by **Section 5.7**.2 of the Shoreline Master Program. o The Shoreline Report also states that "Ecology has assigned soils on the main Mill parcel as Site No. 15156 for potential presence of hazardous substances regulated under Washington State's Model Toxics Control Act. The presence of contaminants on the parcel has not been evaluated at this time, and no other contaminated or potentially contaminated sites are listed in the Project's action area. o The Shoreline Report also notes that "the action of

		removing treated wood pilings and dolphins may result in a temporary release of contaminants through disturbance of contaminated sediment and exposure of previously buried treated wood, which can act as fresh creosote upon exposure to oxygen in the water (Seattle Public Utilities 2015). Potential effects on aquatic habitats as a result of disturbance of contaminated sediments are expected to be insignificant based on the age of most of the pilings and would not be discernible on the individual level." • **Sections 6.4.2.1 (Dredging) and 6.4.2.2 (Dredging and Material Disposal**) of the Shoreline Master Program: o Section 1.6.1 of the Project's Shoreline Report addresses many of the requirements in Sections 6.4.2.1 of the Shoreline Master Program. A revised SAP is currently in review and the DMMO approve and a suitability determination of dredged materials will be made to by the DMMO which is in compliance with the requirements of Section 6.4.2.2 of the Shoreline Mater Program. • **Section 6.4.5 (Shoreline Stabilization – General**) of the Shoreline Master Program o Most of the measures and requirements found in this Section would not directly apply to the Camas Project

		as the requirements in this section relate to "new, expanded, or enlarged structural shoreline stabilization measures," whereas this project is proposing to remove shoreline features not adding new/expanded/enlarged shoreline features/measures. However, Appendix 12 provides the best management practices that would likely be used.
4	Per SMP Appendix B Section VII.A and B, provide example of sign content for City review and approval prior to sign installation. Include the list of City permits requested on the sign.	Please see the revised version of the signage indicating the list of requested permits and reviews by the City of Camas.

If you have any question, please feel free to contact me at (404) 406-5246, or via email at Samantha.McDowell@gapac.com.

Sam McDowell

Sam McDowell, P.E.
Environmental Manager
Georgia-Pacific

Cc: Matt Tiller-Georgia-Pacific
Steve Negri-Tetra Tech, Inc.

Attachments:

Item 2- Clark County Certified Mailing List and Labels
Item 3-Updated Appendix 1-Project Narrative (Clean and Redline Versions)
Item 4-Signage Example (See electronic version PDF)

COMMUNITY DEVELOPMENT DEPARTMENT
616 NE 4th Avenue
Camas, WA 98607
www.ci.camas.wa.us

June 12, 2023

Sam McDowell
Georgia Pacific
401 NE Adams Street
Camas, WA 98607
Sent via email caleigh.belkoff@gapac.com

RE: Georgia Pacific In-water Over-water removal project (SHOR23-01) – 2nd completeness review letter

Dear Ms. McDowell,

Thank you for your application resubmittal for the GP In-water/Over-water removal project on June 1, 2023. There are a few items that remain to be addressed with your application prior to being deemed complete as follows:

Items necessary for completeness:

1. Per the pre-application notes, the $848.00 critical areas review fee is for each type of critical area. The pre-application notes identified 4 types of critical areas to be reviewed (*Fish and Wildlife Habitat Conservation Areas, Frequently Flooded Areas, Wetlands* and *Geologically Hazardous Areas*). One critical area review fee was submitted and therefore the remaining critical area review fee required is $2,544.00 ($848.00 x 3).

   The remaining critical area fee has not been paid.

2. Per SMP Appendix B Section VI.B.2 and per the pre-application notes, a current (within thirty days prior to application) mailing list and mailing labels of owners of real property within three hundred (300) feet of the subject parcel, certified and created by the Clark County assessor.

   The mailing list provided does not appear to be certified by the Clark County assessor.

3. Per SMP Appendix B Section VI.B.5, "The narrative shall respond to the applicable Program policies that will be affected by the proposed development or action and how the proposal complies with the regulations of the Program." In addition, the pre-application notes also stated "the required narrative shall demonstrate compliance with the applicable Shoreline Master Program policies and regulations of the SMP."

   Specifically, the following Shoreline Master Program policies and regulations shall be addressed in a narrative:
   - Section 5.7.2- Clearing, Grading, Fill, Excavation
   - Section 6.4.2.1- Dredging
   - Section 6.4.2.2- Dredge Material Disposal
   - Section 6.4.5- Shoreline Stabilization - General

4. Per SMP Appendix B Section VII.A and B, provide example of sign content for City review and approval prior to sign installation.

   Include the list of City permits requested on the sign.

Once the application is deemed complete, the City will begin its review of the project application and provide subsequent comments/questions. If you have any questions, please contact me at lhollenbeck@cityofcamas.us.

Respectfully,

Lauren Hollenbeck

Lauren Hollenbeck, Senior Planner

1112

Addendum to Georgia Pacific's Response to the City's Letter #2 Dated June 12, 2023

(Shoreline Master Program Sections Reviewed at the Request of the City)

5.7.2 Clearing, Grading, Fill and Excavation:

1. Clearing and grading shall be scheduled to minimize adverse impacts, including but not limited to, damage to water quality and aquatic life.

   Work is anticipated to span approximately three years, with the actual schedule dependent on the in-water work windows. Ultimately, the demolition schedule will be influenced by weather, river stage, and contractor availability. At this time, demolition is expected to begin in 2023 following receipt of all Project permits and approvals. Project related clearing and grading would be scheduled to minimize adverse impacts to water quality and aquatic life, and would comply with approved in-water work windows (as discussed in the Shoreline Report and displayed in Table 7 of the Project Narrative).

2. Clearing and grading shall not result in substantial changes to surface water drainage patterns off the project site and onto adjacent properties.

   Project related clearing and grading would not result in substantial changes to surface water drainage patterns off the Project site and onto adjacent properties (as discussed in the Shoreline Report).

3. Developments shall include provisions to control erosion during construction and to ensure preservation of native vegetation for bank stability.

   Appropriate stormwater and temporary erosion and sediment control plans would be developed which would comply with the City of Camas' erosion control standards and state requirements (see Appendix F of the Shoreline Report).

4. Grading and grubbed areas shall be planted with a cover crop of native grasses until construction activities are completed.

   The Applicant will work with the City of Camas on a Temporary Erosion and Sediment Control Plan during the final engineering design of the Project to ensure the plan complies with the City's requirements and ordinances. Proposed BMPs are addressed in the submitted Preliminary Stormwater Management Plan [Appendix 12; Appendix B (BMP 120)] of the original submittal).

5. Clearing, filling, or excavation shall not be conducted where shoreline stabilization will be necessary to protect materials placed or removed. Disturbed areas shall be stabilized immediately and revegetated with native vegetation.

   The Applicant will work with the City of Camas on a Temporary Erosion and Sediment Control Plan during the final engineering design of the Project to

ensure the plan complies with the City's requirements and ordinances. Proposed BMPs are addressed in the submitted Preliminary Stormwater Management Plan (Appendix 12; Appendix B of the original submittal).

6. Fills shall be permitted only in conjunction with a permitted use and shall be of the minimum size necessary to support that use. Speculative fills are prohibited.

   Fill quantities would be minimum to the levels necessary, as specified in this provision (see Tables 14 and 15 of the Shoreline Report for estimated quantities and locations of fill).

7. Soil, gravel or another substrate transported to the site for fill shall be screened and documented that it is uncontaminated. Use of polluted dredge material or materials normally disposed of at a solid waste facility is prohibited.

   It is anticipated that fill materials would be derived from on-site sources. However, if off-site sources are needed, they would be screened and documentation made that they are uncontaminated.

8. Fills shall be designed and placed to allow surface water penetration into groundwater supplies where such conditions existed prior to filling.

   Existing soil characteristics in upland fill areas will be determined to confirm soil type to ensure that fill material is consistent with existing conditions and surface permeability to allow surface water penetration to be maintained. As noted in Section 3.0 of the Project Description, the South Wood Chip and North Wood Chip areas will be backfilled with clean specified materials to design grade. Specified material will be consistent with the existing conditions for gradation and permeability. See Figures 5 and 6 of the Preliminary Stormwater Management Plan (Appendix 12 of the original submittal).

9. Fills must protect shoreline ecological functions, including channel migration processes.

   Fills would be designed and placed to protect shoreline ecological functions, including channel migration processes.

10. Fill waterward of OHWM shall only be allowed as a conditional use (except for beach nourishment or enhancement projects) and then only when necessary for the following activities: to support a water-dependent or public access use; cleanup and disposal of contaminated sediments as part of an interagency environmental clean-up plan; expansion or alteration of transportation facilities of statewide significance under specific circumstances; mitigation action; and environmental restoration.

    Fill waterward of the OHWM will be for environmental restoration where structure removals occur overwater. As noted in Section 3.3 of the Project Description, at the Berger Crane fill would be used to cover the retained lower columns creating bottom contours that match the adjacent natural riverbed (see Figure 4 of the Project Narrative).

11. Fills for beach nourishment or enhancement projects are subject to a substantial development permit. In the Columbia River, fills shall be prohibited between the OHWM and minus fifteen (-15) feet CRD, unless shallow water habitat will be created as mitigation.

    N/A: The Project is not a beach nourishment or enhancement project.

12. Excavation below the OHWM is considered dredging and subject to provisions under that section in Chapter 6.

    Noted

13. Upon completion of construction, remaining cleared areas shall be replanted with native species as approved by the city. Replanted areas shall be maintained such that within three (3) years' time the vegetation is fully re-established.

    The Applicant will work with the City of Camas on a Temporary Erosion and Sediment Control Plan during the final engineering design of the Project to ensure the plan complies with the City's requirements and ordinances. See Figures 5 and 6 of the Preliminary Stormwater Management Plan (Appendix 12 of the original submittal).

14. For the purposes of this Program, preparatory work associated with the conversion of land to non-forestry uses and/or developments shall not be considered a forest practice and shall be reviewed in accordance with the provisions for the proposed non-forestry use, the general provisions of this Program, and shall be limited to the minimum necessary to accommodate an approved use.

    N/A: The Project does not include the conversion of land to non-forestry uses and/or developments.

6.4.2.1 Dredging:

1. New dredging shall be permitted only where it is demonstrated by a qualified professional that the proposed water-dependent or water-related uses will not result in significant or ongoing adverse impacts to water quality, fish and wildlife habitat conservation areas and other critical areas, flood holding capacity, natural drainage and water circulation patterns, significant plant communities, prime agricultural land, and public access to shorelines. When such impacts are unavoidable, they shall be minimized and mitigated such that they result in no net loss of functions.

    As noted in Section 4.3 of the Shoreline Report dredging would occur to provide access to the Dock Warehouse piers for removal of the over-water structures and support pilings which is expected to provide long-term benefits to aquatic habitats in the area. Dredged areas will not be backfilled to prevent impact on flood holding capacity, natural drainage and water circulation, and is along the currently industrialized shoreline.

2. Maintenance dredging of established navigation channels and basins shall be restricted to management of previously dredged or existing authorized location, depth and width.

   N/A: Dredging will not occur within established navigation channel or basin areas. As noted in Section 1.3 of the Shoreline Report, no part of the project would affect the federal navigation channel.

3. Dredging and dredge disposal shall be prohibited on or in archaeological sites that are listed on the National Register of Historic Places, the Washington Heritage Register, or the Clark County Historic Register until such time that they have been reviewed and approved by the city and the Department of Archaeology and Historic Preservation (DAHP).

   N/A: Dredging and dredge disposal will not occur on or in archaeological sites listed on the National Register of Historic Places, the Washington Heritage Register, or the Clark County Historic Register.

4. Dredging shall be prohibited between the OHWM and minus fifteen (-15) feet CRD, unless shallow water habitat will be created to mitigate for the dredging project.

   As noted in Section 4.3.1 of the Shoreline Report, dredging is to provide access to the Dock Warehouse piers to remove over-water structures and supporting piles providing long-term benefits to aquatic habitats. As noted in Section 1.6.1 of the Shoreline Report, filling at the Berger Crane Foundation area will create shallow water habitat.

5. New dredging activity is prohibited in the following locations:

   a. Along net positive drift sectors and where geohydraulic-hydraulic processes are active and accretion shore forms would be damaged, altered, or irretrievably lost;

   b. In shoreline areas with bottom materials that are prone to significant sloughing and refilling due to currents or tidal activity which result in the need for continual maintenance dredging;

   c. In habitats identified as critical to the life cycle of officially designated or protected fish, shellfish, or wildlife;

   N/A: Dredging is not occurring in active geohydraulic-hydraulic areas, where significant sloughing due to currents or tidal activity will occur or in a habitat critical to fish, shellfish or wildlife life cycle.

6. Dredging and dredge disposal shall be scheduled to protect biological productivity (including but not limited to, fish runs, spawning, and benthic productivity) and to minimize interference with fishing activities. Dredging activities shall not occur in areas

used for commercial fishing (including but not limited to, drift netting and crabbing) during a fishing season unless specifically addressed and mitigated for in the permit.

Dredging will occur within the in-water work window and is not occurring in an area used for commercial fishing. As noted in Section 5.0 of the Project Description dredging will occur within the regulatory in-water work window for the Camas Slough, between August 1 and February 28

7. Dredging techniques that cause minimum dispersal and broadcast of bottom arterial shall be used, and only the amount of dredging necessary shall be permitted.

Dredging is planned to be limited for only the amount required to provide access for removing over-water structures. As noted in Section 6.1 of the Project Description best practices for dredging will be implemented including, but not limited, to those to minimize sediment loss and turbidity.

8. Dredging waterward of the OHWM shall be permitted only:

a. For navigation or navigational access;

b. In conjunction with a water-dependent use of water bodies or adjacent shorelands;

c. As part of an approved habitat improvement project;

d. To improve water flow or water quality, provided that all dredged material shall be contained and managed so as to prevent it from reentering the water;

e. In conjunction with a bridge, navigational structure or wastewater treatment facility for which there is a documented public need and where other feasible sites or routes do not exist.

As noted in Section 1.1 of the Project Description Narrative, the purpose of the project includes the removal of structures from state lands enabling termination and/or reduction of a State Aquatic Lands Lease and termination of several State Aquatic Lands easements.

6.4.2.2 Dredge Material Disposal

1. Dredge material disposal shall be avoided. Dredge disposal shall be permitted only where it is demonstrated by a qualified professional that the proposed water-dependent or water related uses will not result in significant or ongoing adverse impacts to water quality, fish and wildlife habitat conservation areas and other critical areas, flood holding capacity, natural drainage and water circulation patterns, significant plant communities, prime agricultural land, and public access to shorelines. When such impacts are unavoidable, they shall be minimized and mitigated such that they result in no net loss of functions.

As noted in Section 6.1 of the Project Description, dredge material disposal will be coordinated with the Dredge Material Management Program for the state of Washington to ensure that dredged sediment will be disposed of at an acceptable location as noted

2. Near shore or landside disposal of dredge materials shall not be located upon, adversely affect, or diminish:

    a. Stream mouths, wetlands, or significant plant communities (approved mitigation plans may justify exceptions);

    b. Prime agricultural land except as enhancement;

    c. Natural resources including but not limited to sand and gravel deposits, timber, or natural recreational beaches and waters except for enhancement purposes;

    d. Designated or officially recognized wildlife habitat and concentration areas;

    e. Water quality, quantity, and drainage characteristics; and

    f. Public access to shorelines and water bodies.

    As noted in Section 6.1 of the Project Description if disposed on land and if the material is found suitable it will be disposed of at the Lady Island Dredge Materials Area where dredged material from the Columbia River and Camas Slough has been stored under agreement with the Washington Department of Natural Resources.

3. Dredged material shall be disposed of on land only at sites reviewed and approved by the USACOE and the Shoreline Administrator. Applicants shall demonstrate that the proposed site will ultimately be suitable for a use permitted by this Program. Disposal shall be undertaken such that:

    a. The smallest possible land area is affected, unless dispersed disposal is authorized as a condition of permit approval for soil enhancement or other purposes;

    b. Shoreline ecological functions and processes will be preserved, including protection of surface and ground water;

    c. Erosion, sedimentation, floodwaters or runoff will not increase adverse impacts to shoreline ecological functions and processes or property; and

    d. Sites will be adequately screened from view of local residents or passersby on public rights-of-way to the maximum extent practicable (e.g., combination of fencing and vegetation). The following conditions shall apply to land disposal sites:

As noted in Section 6.1 of the Project Description if disposed on land and if the material is found suitable it will be disposed of at the Lady Island Dredge Materials Area where dredged material from the Columbia River and Camas Slough has been stored under agreement with the Washington Department of Natural Resources.

4. The following conditions shall apply to land disposal sites:

   a. Underground springs and aquifers shall be identified and protected.

   b. Containment dikes and adequate settling basins shall be built and maintained so that the water discharged from the site carries a minimum of suspended sediment. Required basins shall be designed to maintain at least one foot of standing water at all times to encourage proper settling.

   c. Proper diversion of surface discharge shall be provided to maintain the integrity of the natural streams, wetlands, and drainage ways.

   d. There shall be a single point of ingress and egress for removal of the de-watered material.

   e. Runoff shall be directed through grassy swales or other treatment features that assures protection of water quality and a location that maximizes circulation and fishing.

   f. Sites shall be revegetated with appropriate native species as soon as possible to retard erosion and restore wildlife habitat and other critical areas functions;

   g. Vegetation shall be maintained to ensure continued existence by the property owner; and

   h. Dredge materials deposited upland and not part of a permitted dike or levee shall constitute fill, and when deposited within the jurisdiction of this Program, shall comply with the fill regulations.

   As noted in section 6.1 of the Project Description, sediment sampling and analysis is planned to evaluate sediment quality and determine suitability for reuse or disposal. Coordination with the City and other agencies will be done regarding any reuse at the site. Dredged material, if disposed at an upland facility, will be disposed of at the Lady Island Dredge Materials Area where dredged material from the Camas Slough and Columbia River have been stored under agreement with the Washington Department of Natural Resources. If used as fill at the site all requirements of the shoreline program will be adhered to.

5. Dredged material shall be disposed of in water only at sites approved by the USACOE and the Administrator. Disposal techniques that cause minimum dispersal and broadcast of bottom material shall be used, and only if:

a. Land disposal is infeasible, less consistent with this Program, or prohibited by law;

b. Nearshore disposal as part of a program to restore or enhance shoreline ecological functions and processes is not feasible;

c. Offshore habitat will be protected, restored, or enhanced;

d. Adverse effects on water quality or biologic resources from contaminated materials will be mitigated;

e. Shifting and dispersal of spoil will be minimal; and

f. Water quality will not be adversely affected.

As noted in section 6.1 of the Project Description dredged material, if disposed of in water, will be disposed in coordination and with approval of the DMMP. Disposal will be done in a manner that minimizes dispersal and impacts to water quality.

6. The deposition of dredged materials in water or wetlands shall be permitted only:

a. To improve wildlife habitat;

b. To correct material distribution problems adversely affecting fish habitat;

c. To create, expand, rehabilitate, or enhance a beach when permitted under this Program and any required state or federal permit;

d. When land deposition is demonstrated to be more detrimental to shoreline resources than water deposition; or

e. In approved, open-water disposal sites.

Dredged material will not be disposed of in wetland areas. In water disposal of dredged material, if done, will be coordinated with the DMMO and the City of Camas.

6.4.1 General Requirements:

1. Structural shoreline modifications shall only be allowed where it can be demonstrated that the proposed activities are necessary to support or protect allowed legally existing shoreline use or primary structure that is in danger of loss or substantial damage or are necessary for reconfiguration of the shoreline or bed lands for an allowed water-dependent use or for shoreline mitigation or enhancement purposes.

As described in the Shoreline Report and the Project Narrative, the purpose of the Project is to abate, remove, and demolish structures associated with former

riverfront operations of the pulp and paper mill which are no longer utilized. The existence of these structures is in compliance with legally allowed activities and shoreline use. As discussed below (for item 2) implementation of this Project would enhance shoreline condition in the area.

2. Modifications shall only be allowed when impacts are avoided, minimized, and mitigated to assure no net loss of shoreline ecological functions.

   As described in the Shoreline Report and the Project Narrative, the Project would result in an increase in shoreline ecological function, as the purpose of the Project is to abate, remove, and demolish structures associated with former riverfront operations of the pulp and paper mill which are no longer utilized. As a result, the shoreline conditions would be moved to a more "natural" and less disturbed condition long-term following the Project's completion.

3. In-water work shall be scheduled to protect biological productivity (including but not limited to fish runs, spawning, and benthic productivity). In-water work shall not occur in areas used for commercial fishing during a fishing season unless specifically addressed and mitigated for in the permit.

   Project related in-water work would be scheduled to minimize adverse impacts to water quality and aquatic life and would conform to in-water work windows (as discussed in the Shoreline Report and displayed in Table 7 of the Project Narrative).

6.4.5 Shoreline Stabilization – General:

1. New shoreline stabilization for new development is prohibited unless it can be demonstrated that the proposed use cannot be developed without shore protection or is necessary to restore ecological functions or hazardous substance remediation.

   N/A: The Project involves the removal of existing shoreline structures, not the addition or creation of new shoreline structures or stabilization features.

2. Pursuant to WAC 173-26-231(3) (a) (B), new or enlarged structural shoreline stabilization measures for an existing primary structure, including residences, should not be allowed unless there is conclusive evidence, documented by a geotechnical analysis, that the structure is in danger from shoreline erosion caused by tidal action, currents, or waves not, for example, from upland conditions such as poorly managed stormwater or vegetation removal. Normal sloughing, erosion of steep bluffs, or shoreline erosion itself, without a scientific or geotechnical analysis, is not demonstration of need. The geotechnical analysis should evaluate on-site drainage issues and address drainage problems away from the shoreline edge before considering structural shoreline stabilization. The erosion control structure will not result in a net loss of shoreline ecological functions.

   N/A: The Project does not include new or enlarged shoreline structures or stabilization features.

3. Proposed designs for new or expanded shore stabilization shall be designed in accordance with applicable Ecology and WDFW guidelines using best available science. The applicant shall provide the following information in a report by a qualified professional: (a) evidence that alternative solutions (non-structural) are not feasible or do not provide sufficient protection; and (b) demonstrate that future stabilization measures would not be required on the project site.

   N/A: The Project does not include new or expanded shore structures or stabilization features.

4. Land subdivisions or lot line adjustments shall be designed to assure that future development of the newly-created lots will not require structural stabilization for subsequent development to occur.

   N/A: The Project does not include land subdivisions or lot line adjustments.

5. New or expanded structural shoreline stabilization for existing structures (e.g. roads, railroads, public facilities) is prohibited unless there is conclusive evidence documented by a geotechnical analysis that there is a significant possibility that the structure will be damaged within three years as a result of shoreline erosion caused by stream processor waves, and only when significant adverse impacts are mitigated to ensure no net loss of shoreline ecological functions or processes.

   N/A: The Project does not include new or expanded structural shoreline stabilization for existing structures.

6. Replacement of an existing shoreline stabilization structure with a similar structure is permitted if there is a demonstrated need to protect existing primary uses, structures or public facilities (e.g., roads, bridges, railways, and utility systems) from erosion caused by stream undercutting or wave action; provided that the existing shoreline stabilization structure is removed from the shoreline as part of the replacement activity. Proposed designs for new or expanded shore stabilization shall be designed in accordance with applicable Ecology and WDFW guidelines and certified by a qualified professional.

   N/A: The Project does not include the replacement of an existing shoreline stabilization structure.

7. Replacement walls or bulkheads shall not encroach waterward of the ordinary high water mark or existing structure unless the residence was occupied prior to January 1, 1992, and there is overriding safety or environmental concerns. In such cases, the replacement structure shall about the existing shoreline stabilization structure.

   N/A: The Project does not include the replacement of walls or bulkheads.

8. Where a geotechnical analysis confirms a need to prevent potential damage to a primary structure, but the need is not as immediate as three years, the analysis may still be used to justify more immediate authorization for shoreline stabilization using bioengineering approaches.

Noted

9. Shoreline stabilization projects that are part of a fish habitat enhancement project meeting the criteria of RCW 77.55.181 may be exempt and regulated under the state process. Stabilization projects that are not part of such a fish enhancement project will be regulated by this Program.

   N/A: The Project is not a shoreline stabilization project that is part of a fish habitat enhancement effort.

10. Small-scale or uncomplicated shoreline stabilization projects (e.g., tree planting projects) shall be reviewed by a qualified professional to ensure that the project has been designed using best available science.

    N/A: The Project is not a "small-scale or uncomplicated shoreline stabilization project;" however, the analysis presented in the application was prepared by qualified professionals (as discussed in the Shoreline Report).

11. Large-scale or more complex shoreline stabilization projects (e.g., Projects requiring fill or excavation, placing objects in the water, or hardening the bank) shall be designed by a qualified professional using best available science. The city may require that a qualified professional monitor construction or to construct the project.

    The Project was designed by qualified professionals using best available science. The Applicant acknowledges that the City of Camas may require that separate third party qualified professionals monitor construction of the Project.

12. If the project is publicly funded then it must include appropriate provisions for public access to the shoreline, not create barriers to public access if in existence, and incorporate ecological restoration measures if feasible.

    N/A: The Project is not publicly funded.

13. Standards for new stabilization structures when found to be necessary include limiting the size to minimum, using measures to assure no net loss of shoreline ecological functions, using soft approaches, and mitigating for impacts.

    N/A: The Project does not include new stabilization structures.

5.4 Flood Prevention and Flood Damage Minimization:

1. Development in floodplains shall not significantly or cumulatively increase flood hazard or be inconsistent with an adopted comprehensive flood hazard management plan.

   The Project would not significantly or cumulatively increase flood hazard or be inconsistent with an adopted comprehensive flood hazard management plan. The analysis supporting this is presented in the Project's "Frequently Flooded Areas Report and Flood Hazard Assessment" and the "Certification of No-Rise Report for Removal of Structures along Camas Slough."

2. New development or uses in the shoreline jurisdiction, including subdivision of land, shall not be established when it would be reasonably foreseeable that the development or use would require structural flood hazard reduction measures within the channel migration zone or floodway.

   N/A: It is not reasonably foreseeable that the development or use of the Project would require structural flood hazard reduction measures within the channel migration zone or floodway (see the Project's "Frequently Flooded Areas Report and Flood Hazard Assessment" and the "Certification of No-Rise Report for Removal of Structures along Camas Slough" reports).

3. Allow new structural flood hazard reduction measures in the shoreline jurisdiction only when it can be demonstrated by scientific and engineering analysis that they are necessary to protect existing development, that non-structural measures are not feasible, and that impacts ecological function and priority species and habitats can be successfully mitigated so as to assure no net loss of shoreline ecological function.

   N/A: Then Project does not involve or require new structural flood hazard reduction measures (see the Project's "Frequently Flooded Areas Report and Flood Hazard Assessment" and the "Certification of No-Rise Report for Removal of Structures along Camas Slough" reports).

4. The areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for Clark County, Washington, and incorporated areas" dated September 5, 2012, and any revisions thereto, with accompanying Flood Insurance Rate Maps (FIRM). The study is the official report provided by the Federal Insurance Administration that includes flood profiles, the Flood Insurance Rate Maps, and the water surface elevation of the base flood. The study and FIRM are on file at the City of Camas (616 NE 4th Avenue, Camas, WA) and the City website (www.cityofcamas.us). The best available information for flood hazard area identification as outlined in CMC Section 16.57.050(I) shall be the basis for regulation until a new FIRM is issued that incorporates data utilized. In addition, Map 27 Potential Channel Migration Zone (CMZ) Areas (Inventory and Characterization Report Volume 1, Lewis and Salmon-Washougal is hereby incorporated by reference.

   Noted

5. When necessary, in-stream structures shall be located, designed, and maintained in such a manner that minimizes flood potential and the damage affected by flooding.

   N/A: The Project involves the removal of existing shoreline structures, not the addition or creation of new in-stream structures.

6. Fills shall be avoided in the shoreline and in critical areas or buffers except where the applicant clearly demonstrates that the geohydraulic characteristics will not be altered in a way that increases flood velocity or risk of damage. See Section 5.7.2 of this Program for additional and specific requirements for fills placement. Pile or pier supports or other support methods shall be utilized instead of fills whenever feasible.

As noted in the Shoreline Report the project has been designed to avoid and minimize impacts to the shoreline and critical areas to the extent possible. Permanent impacts to the Shoreline areas would result from placement of fill where the riverbank and riverbed would be shaped to new shallow nearshore topographic contours following removals; however, the Project would reduce the overall amount of previously placed artificial fill along the riverbank.

7. Dikes and levees shall not be placed in the floodway except for current deflectors necessary for protection of bridges and roads.

   N/A: The Project involves the removal of existing shoreline structures, not the addition or creation of new dikes or levees.

8. Removal of gravel for flood management purposes shall be consistent with the adopted flood hazard reduction plan, the provisions of this Program, and only allowed after a biological and geomorphological study determines that extraction has a long-term flood hazard reduction benefit and does not result in net loss of ecological functions.

   N/A: The Project does not include the removal of gravel for flood management purposes.

9. Removal of beaver dams to control or limit flooding shall be avoided where feasible and allowed only in coordination with WDFW and receipt of all applicable state permits.

   N/A: The Project does not include the removal of beaver dams to control or limit flooding.

5.3 Critical Areas Protection:

Critical Areas Regulations are found in Appendix C of this program and are specifically at Chapters 16.51 through 16.61. Provisions of the Critical Areas Regulations that are not consistent with the Shoreline Management Act, RCW Chapter 90.58, and supporting Washington Administrative Code chapters shall not apply in shoreline jurisdiction. These regulations are integral and applicable to this Program, except that:

1. Non-conforming uses and development within the shoreline jurisdiction shall be subject to both this Program and Appendix C, and where there is a conflict, the most protective of environmental functions shall apply;

   See response below.

2. The Fish and Wildlife Habitat Conservation Area buffers for Stream Type S in Appendix C, Section 16.61.040 are modified as follows for the following areas:

   a. Columbia River, SR-14 to SE Third Avenue2 at twenty-feet (20').
   See response below.

b. Washougal River, lots fronting on First Avenue between SE Garfield Street and NE Third Street, twenty-feet (20') from the top of slopes exceeding forty-percent (40%).

See response below.

c. Lacamas Lake buffers from OHWM shall not extend landward of NE Leadbetter Road.

See response below.

d. Columbia River, lots fronting on SE 12th Avenue and SE 11th Avenue between SE Polk Street and SE Front Street, shall be twenty-percent (20%) of lot depth as measured from the OHWM.

See response below.

3. CMC Chapter 16.57 Frequently Flooded Areas applies within shoreline jurisdiction but is not incorporated as specific regulations of this SMP.

See response below.

Sub-Section 5.3.1 Applicable Critical Areas

For purposes of this Program, the following critical areas, as defined in Appendix C will be protected under this Program: Wetlands; Critical Aquifer Recharge Areas; Frequently Flooded Areas; Geologically Hazardous Areas; and Fish and Wildlife Habitat Conservation Areas.

See response below.

Sub-Section 5.3.2 General Provisions

1. Shoreline uses, activities, developments and their associated structures and equipment shall be located, designed and operated to protect the ecological processes and functions of critical areas.

See response below.

2. Provisions of the Critical Areas Regulations that are not consistent with the Shoreline Management Act Chapter, 90.85 RCW, and supporting Washington Administrative Code chapters shall not apply in shoreline jurisdiction.

See response below.

3. Where appropriate, new or redevelopment proposals shall integrate protection of wetlands, fish and wildlife habitat, and flood hazard reduction with other stream management provisions, such as retention of channel migration zones, to the extent they are within the shoreline jurisdictional area to ensure no net loss of ecological functions.

See response below.

4. Critical areas within the shoreline jurisdiction shall be regulated for any use, development or activity, as provided in accordance with this Program, and Appendix C, whether a permit or written statement of exemption is required.

See response below.

5. If provisions of Appendix C and other parts of this Program conflict, the provisions most protective of ecological and historic resources shall apply.

See response below.

6. Unless otherwise stated, critical area buffers shall be protected and/or enhanced in accordance with this Program and Appendix C. These provisions do not extend the shoreline jurisdiction beyond the limits specified in this Program as defined in Section 2.1 Applicability.

See response below.

7. In addition to compensatory mitigation, unavoidable adverse impacts may be addressed through restoration efforts.

The following responds to the provisions listed above for Critical Areas. Appendix C of the Camas Shoreline Master Program, as adopted by Ordinance No. 21-003, defines critical areas. These include Wetlands; Critical Aquifer Recharge Areas; Frequently Flooded Areas; Geologically Hazardous Areas; and Fish and Wildlife Habitat Conservation Areas. The Project's potential effects on these critical areas, as well as how the Project has been designed and would be implemented in compliance with the city and county's critical areas ordinances is addressed in various Project related documents. These include:

- *The "Shoreline and Critical Areas Review and Impacts Assessment[1]," which addresses wetlands critical areas as well as fish and wildlife habitat conservation areas.*
- *The "Geologically Hazardous Area and Critical Aquifer Recharge Review - Addendum to the Shoreline and Critical Areas Review and Impacts Assessment," which addresses geologically hazardous areas and critical aquifer recharge areas.*
- *The "Frequently Flooded Areas Report and Flood Hazard Assessment for Demolition of Encroachments," the "Certification of No-Rise and Description of Flood Hazard for Demolition of One Dolphin," and the "No-Rise Report for*

[1] This document has been prepared to meet the requirements of the City of Camas and Clark County Shoreline Master Programs and requirements for critical areas reports (Camas Municipal Code [CMC] 16.51.140 and Clark County Code [CCC] 40.440, 40.450, and 40.460). It has also been developed to provide information relevant to the SEPA process.

Removal of Structures along Camas Slough," which addresses frequently flooded areas.

- *The "Biological Assessment," which further addresses fish and wildlife habitat conservation areas (in addition to the information provided in the "Shoreline and Critical Areas Review and Impacts Assessment")*

As discussed in these documents, the Project has been designed to avoid and minimize impacts to critical areas to the extent possible, and measures have been proposed to minimize impacts when complete avoidance is not possible. In addition, the assessments and measure proposed to address the critical areas ordinances for the City of Camas would also address critical areas as defined by Clark County.

4.3.5.4 Management Policies:

In addition to the other applicable policies and regulations of this Program the following management policies shall apply:

1. Promote infill and redevelopment in developed shoreline areas with the goal of achieving full utilization of the shoreline, while encouraging environmental remediation and restoration of the shoreline, where applicable.

   The Project would not promote the "infill" and/or "redevelopment" of the shoreline area, as the purpose of the Project is to abate, remove, and demolish structures associated with former riverfront operations of the pulp and paper mill which are no longer utilized. However, as described in the Shoreline Report and the Project Narrative, the Project would promote the environmental remediation and restoration of the shoreline.

2. Encourage the transition of uses from non-water-oriented to water-oriented uses.

   N/A: The Project would not have an effect on the non-water-oriented versus water-oriented uses of the area.

3. Water-oriented uses are encouraged, however new non-water-oriented uses may be allowed.

   N/A: The Project would not have an effect on the non-water-oriented versus water-oriented uses of the area.

4. Visual or physical public access should be a priority. Where possible, industrial and commercial facilities should be designed to permit pedestrian waterfront activities.

   N/A: The Project would not have an effect on the public's access to the affected area (as public access to the area is currently restricted).

4.3.4 Medium Intensity Shoreline Designation:

Note that only Sub-Sections 4.3.4.3 and 4.3.4.4 are applicable to the Project (as Sub-Section 4.3.4.1 and 4.3.4.2 appear to contain term definitions and the purpose of the designations).

Sub-Section 4.3.4.3 Areas Designated:

1. The Medium Intensity shoreline designation applies to areas as shown on a copy of the Camas Shoreline Designations Map in Appendix A.

Noted

2. The Medium Intensity shoreline designation in the northeast portion of Lacamas Lake is intended to provide a center for mixed use development including:

a. Water dependent uses that increase the public's ability to enjoy public waters.

Noted

b. Water oriented uses as part of mixed-use development that increase opportunities for commercial and higher intensity residential use in a design that improves the public's ability to enjoy the physical and aesthetic qualities of the shoreline.

Noted

c. To mitigate adverse impacts of higher intensity, use on the shoreline, and the cumulative impacts of anticipated development of the contiguous upland parcel, no development approval shall be granted until substantial development permits are approved that include:

i) Designation of the general mix of uses and facilities that improve the public's ability to enjoy the qualities of the shoreline.

N/A: The Project would have no direct effect on the "public's ability to enjoy the qualities of the shoreline" as no public access is currently granted to this area; however, the Project would increase the ecological condition of the area, which could have indirect benefits to the "public's ability to enjoy the qualities of the shoreline."

ii) Relocation of the existing Leadbetter Road landward of its existing location to provide a minimum 100-foot shoreline buffer outside of the MI area together with removal of the road subgrade and provision of soil substrate and planting a community of native vegetation equivalent to a native climax forest.

N/A: The Project does not affect the location of the existing Leadbetter Road.

iii) Provision of a public trail parallel to the shoreline located to minimize impacts on ecological functions within the restored buffer area and including connections perpendicular to the water to provide direct access to the water's edge for uses such as fishing or viewing.

N/A: The Project does not affect the public's access to the water's edge for uses such as fishing or viewing.

Sub-Section 4.3.4.4 Management Policies:
In addition to the other applicable policies and regulations of this Program the following management policies shall apply:

1. The scale and density of new uses and development should be compatible with sustaining shoreline ecological functions and processes, and the existing residential character of the area.

   The Project would improve the ecological functions and processes of the shoreline, but would have no effect on the existing residential character of the area.

2. Public access and joint use (rather than individual) of recreational facilities should be promoted.

   N/A: The Project would not have an effect on the public's access to the affected area (see previous responses)

3. Access, utilities, and public services to serve proposed development within shorelines should be constructed outside shorelines to the extent feasible and be the minimum necessary to adequately serve existing needs and planned future development.

   N/A: The Project does not involve the development of new access, utilities, and public services.

4. Public or private outdoor recreation facilities should be provided with proposals for subdivision development and encouraged with all shoreline development if compatible with the character of the area. Priority should be given first to water dependent and then to water-enjoyment recreation facilities.

   N/A: The Project is not a new "shoreline development," and instead is a proposal to abate, remove, and demolish structures associated with former riverfront operations of the pulp and paper mill which are no longer utilized.

5. Commercial development should be limited to water-oriented uses. Non-water oriented commercial uses should only be allowed as part of mixed-use developments where the primary use is residential and where there is a substantial public benefit with respect to the goals and policies of this Program such as providing public access or restoring degraded shorelines.

   As noted in the Shoreline Report the Project will provide a benefit to the Shoreline environment through the removal of river obstructions; removal of creosote pilings; removal of debris and providing new shallow water habitat. Removal of infrastructure that is no longer used will increase safety for public accessing the waterway.

4.3.1.4 Management Policies:

In addition to the other applicable policies and regulations of this Program the following management policies shall apply:

1. New over-water structures should be allowed only for water-dependent uses or ecological restoration.

   N/A: The Project does not include new over-water structures (see previous responses).

2. Shoreline uses and modifications should be designed and managed to prevent degradation of water quality and natural hydrographic conditions.

   The Project has been designed to prevent degradation of water quality and natural hydrographic conditions (see the Shoreline Report). Once implemented, the Project is expected to increase shoreline ecological function, by removing structures associated with former riverfront operations of the pulp and paper mill which are no longer utilized.

3. In-water uses should be allowed where impacts can be mitigated to ensure no net loss of ecological functions. Permitted in-water uses must be managed to avoid impacts to shoreline functions. Unavoidable impacts must be minimized and mitigated.

   The Project is expected to result in an increase in ecological functions (see previous responses).

4. On navigable waters or their beds, all uses, and developments should be located and designed to: (a) minimize interference with surface navigation; (b) consider impacts to public views; and (c) allow for the safe, unobstructed passage of fish and wildlife, particularly species dependent on migration.

   The purpose of the Project is to abate, remove, and demolish structures associated with former riverfront operations of the pulp and paper mill which are no longer utilized. As a result, the Project is not expected to adversely affect surface navigation, impact public views in the long term, or impede fish and wildlife movement.

5. Multiple or shared use of over-water and water access facilities should be encouraged to reduce the impacts of shoreline development and increase effective use of water resources.

   N/A: The Project would not create new over-water structures (see previous responses).

6. Structures and activities permitted should be related in size, form, design, and intensity of use to those permitted in the immediately adjacent upland area. The size of new over-water structures should be limited to the minimum necessary to support the structure's intended use.

N/A: The Project would not create new over-water structures (see previous responses).

7. Natural light should be allowed to penetrate to the extent necessary to discourage salmonid predation and to support nearshore habitat unless other illumination is required by state or federal agencies.

   The Project involves the abatement, removal, and demolition of structures associated with former riverfront operations of the pulp and paper mill which are no longer utilized. As a result, light levels in the affected area would be expected to increase, not decrease, following completion of the Project.

8. Aquaculture practices should be encouraged in those waters and beds most suitable for such use. Aquaculture should be discouraged where it would adversely affect the strength or viability of native stocks or unreasonably interfere with navigation.

   N/A: The Project does not include aquaculture practices.

9. Given that the aquatic designation is waterward of the OHWM, then when the proposed use, development, activity or modification requires use of adjacent upland property, then it must also be allowed within the upland shoreline designation.

   Noted

COMMUNITY DEVELOPMENT DEPARTMENT
616 NE 4th Avenue
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www.ci.camas.wa.us

July 27, 2023

Sam McDowell
Georgia Pacific
401 NE Adams Street
Camas, WA 98607
Sent via email samantha.mcdowell@gapac.com

RE: Georgia Pacific In-water Over-water removal project (SHOR23-01) – technically complete review letter

Dear Ms. McDowell,

The purpose of this letter is to inform you that the above application submitted on March 30, 2023, and resubmitted June 1 and July 20, 2023, has been **deemed complete** in accordance with the Camas Municipal Code (CMC) Section 18.55.130. Staff will begin reviewing the application and contact you if/when we have review comments and/or questions.

Do not hesitate to reach out should you have any questions.

Respectfully,

Lauren Hollenbeck

Lauren Hollenbeck, Senior Planner

NOTICE OF APPLICATION FOR SHORELINE SUBSTANTIAL DEVELOPMENT PERMIT AND SHORELINE CONDITIONAL USE PERMIT Georgia Pacific In-Water and Over-Water Removal Project (File No. SHOR23-01)

[Consolidated files: Critical Areas Review (CA23-04), State Environmental Policy Act (SEPA23-04), Archaeological Review* (ARCH23-03)]

NOTICE IS HEREBY GIVEN that an application for the "Georgia Pacific In-Water and Over-Water Removal Project" requesting permit approval for the removal of certain unused in-water and over-water structures associated with the previous operations of the pulp and paper mill along the riverbank. The project is located within the shoreline designations of "Aquatic", "Medium Intensity" and "High Intensity".

Application Materials: The project was filed with the City of Camas on March 30, 2023, resubmitted June 1, and July 20, 2023, and deemed technically complete on July 27, 2023. The application included the following documents, which are available for review from the Community Development Department (*616 NE 4th Avenue*): Project narratives, Shoreline report, SEPA checklist, stormwater management plan, critical areas reports and archaeological report*. Application materials are available for review from the Community Development Department during regular business hours Monday-Friday 8am-5pm.

Comment Deadline: Written public comments must be received in the next 30 days, by **September 2nd,** before 5:00 p.m. Mailed public comments may be directed to the Community Development Department, c/o Shoreline Administrator, 616 NE Fourth Avenue, Camas, WA 98607, or emailed to *communitydevelopment@cityofcamas.us.*

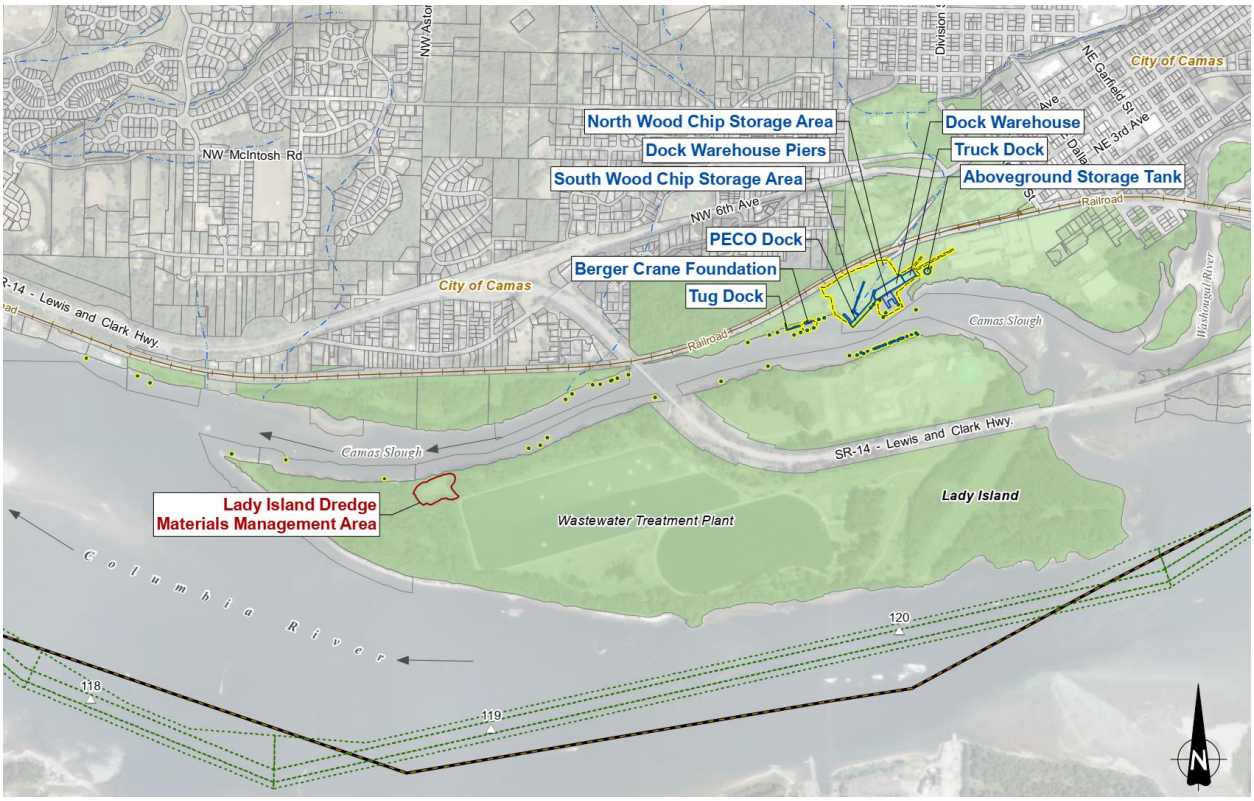
A public hearing is required for the development proposal and will be scheduled at a later date. A separate public notice for the public hearing will be mailed to all property owners within 300-feet of the subject development, posted on the city website and published in the Post Record.

For questions related to this application, please contact Lauren Hollenbeck, Senior Planner, at (360) 817-7253 or lhollenbeck@cityofcamas.us.

*consistent with RCW 42.56.300, Archaeological information is exempt from public disclosure.

Published in the Post Record on August 3, 2023 Legal Publication #825030
Posted at Camas City Hall, Camas Library, City of Camas website at: http://www.cityofcamas.us
Mailed to property owners within 300-feet on August 2, 2023

VICINITY MAP



In re: Georgia Pacific In-Water Over-Water Structures Removal

) NO. SHOR23-01 & SEPA23-04
)
) AFFIDAVIT OF MAILING
)
)
)
)
)
Respondent.)

STATE OF WASHINGTON)
) ss.
CLARK COUNTY)

I, Carey Certo, on oath says:

I, Carey Certo, on August 2, 2023, I directed a true and correct copy of the Notice of Application and SEPA Determination of Non-Significance be served upon the parties herein, in the above-entitled action, by depositing with the U.S. Post Office, Camas, Washington, a postage-prepaid envelope containing same addressed as follows: See attached list.

Carey Certo
SIGNATURE

SUBSCRIBED and SWORN to before me this 3rd day of August, 2023.

AIREANNA BALDWIN NOTARY PUBLIC STATE OF WASHINGTON My Comm. Expires October 01, 2024 No. 183848

Aireanna Baldwin
Notary Public in and for the State of Washington, residing at Clark County
My appointment expires: 10/01/2024

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ZIEGLER MARK R TRUSTEE
2120 THE STRAND #7
MANHATTAN BEACH, CA 90266

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820 NW 4TH AVE
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RONHAAR BRITTNI ANNA & RONHAAR TIMOTHY JAMES
728 NE 4TH AVE
CAMAS, WA 98607

LIU SHANNON & LIU SIMENI
545 NW MITCHELL CT
CAMAS, WA 98607

CARTER STEVE & CARTER KATHLEEN
14018 NW 9TH AVE
VANCOUVER, WA 98685

HUTCHISON JAMES & NIOSI WILLEMINA
1010 NW 4TH AVE
CAMAS, WA 98607

FMG INVESTMENTS LLC
314 NE BIRCH STREET
CAMAS, WA 98607

FORT JAMES CAMAS LLC
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ATLANTA , GA 30348

ELDREDGE MATT SCOTT & ELDREDGE KATHLEEN DEVINE
223 SE GARFIELD ST
CAMAS, WA 98607

NICHOLS KENNETH G & NICHOLS DEBORAH
18714 ROBERTS ROAD KP N
VAUGHN, WA 98394

DICKERSON RANDY S
1900 SE 97TH AVE
VANCOUVER, WA 98664

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PO BOX 105681
ATLANTA , GA 30348

FMG BODY SHOP LLC
314 NE BIRCH ST
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA, GA 30348

H & R PROPERTIES LLC
81 ROCKWOOD DR
STEVENSON, WA 98648

H & R PROPERTIES LLC
81 ROCKWOOD DR
STEVENSON, WA 98648

BUSBY BRETT & BUSBY MANDY
1235 NW 5TH AVE
CAMAS, WA 98607

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SAULLES ADAM & SAULLES KATELYNN
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CAMAS, WA 98607

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17412 EVERGREEN HIGHWAY
VANCOUVER, WA 98683

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ROBINSON JODIE L
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GONZALEZ KATHLEEN & DANIEL
CHRISTOPHER L
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MINICH NATHAN D & MINICH
JENNIFER K
568 NW MITCHELL ST
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SHAPIRO ALAN TRUSTEE
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OTS LLC
2375 SE 8TH AVE
CAMAS, WA 98607

METRO PROPERTY GROUP INC
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METRO PROPERTY GROUP INC
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METRO PROPERTY GROUP INC
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MOEHRING CARL B
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LA CENTER, WA 98629

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ESHGHI MAHSA
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BECK ALYSSA & BECK CONNOR
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DAMIEN R
1172 N P CIR
WASHOUGAL, WA 98671

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AUSTIN
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DAMASCUS, OR 97089

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CAMAS, WA 98607

MARTINEZ JORGE A & MARTINEZ AMANDA R
500 NW 5TH AVE
CAMAS, WA 98607

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CAMAS, WA 98607

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PO BOX 105681
ATLANTA, GA 30348

JAMES RIVER II INC
PO BOX 105681
ATLANTA, GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA, GA 30348

MELTON ALYSSA
1234 NW 5TH AVE
CAMAS, WA 98607

GIANNONE FRANKLIN D & GIANNONE ALEXIS L
840 NW 4TH AVE
CAMAS, WA 98607

FERGUSON ROBERT & FERGUSON VIVE
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MINER BRIAN D
960 NW 4TH AVE
CAMAS, WA 98607

DUISEN PETER J
1000 NW 4TH AVE
CAMAS, WA 98607

HOBBS BENJAMIN C
542 NW MITCHELL ST
CAMAS, WA 98607

MOORSE SHANE & LOWIN SUSAN
536 NW MITCHELL ST
CAMAS, WA 98607

JING ANDREW QIUHANG & CHE CHUNMEI
1327 NW 5TH AVE
CAMAS, WA 98607

MCDONNELL CELESTE
2040 SW 6TH AVE
CAMAS, WA 98607

LEMONS JESSICA TRUSTEE ETAL
2153 SW 6TH AVE
CAMAS, WA 98607

CHASE CORY & WOHLGEMUTH DEANNA
2422 SW 6TH AVE
CAMAS, WA 98607

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

BROWN MATTHEW R & BROWN KATE M
1512 SW 7TH CIR
CAMAS, WA 98607

NICHOLS CLARK A & NICHOLS MARY S
1940 SW 6TH AVE
CAMAS, WA 98607

MILLER LARRY & TURNER CHARLES
1540 SW 7TH CIR
CAMAS, WA 98607

RINTA AARON & RINTA BONNIE
16112 NE 30TH AVENUE
RIDGEFIELD, WA 98642

REITER MICHAEL & REITER MOLLY
2702 SW 6TH AVE
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THOMPSON DENNIS G
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BURK DOLORES
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LA BOLA LLC
2508 SW 6TH AVE
CAMAS, WA 98607

COLLIER A R & COLLIER C P
4308 SW 5TH AVE
CAMAS, WA 98607

BUCKLEY MICHELE & BUCKLEY RUTH
7226 NE 155TH ST
KENMORE, WA 98028

WILKINS JERRY & WILKINS KIMBERLY
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CAMAS, WA 98607

METRO PROPERTIES INC
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CAMAS, WA 98607

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ATLANTA , GA 30348

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4110 SW 5TH AVE
CAMAS, WA 98607

BURKARD SCOTT & BURKARD ANITA
1530 SW 7TH CIRCLE
CAMAS, WA 98607

DEHART ALLEN R
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CAMAS, WA 98607

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VANCOUVER, WA 98663

SNYDER CAROLINE M & SNYDER KEGAN M
2060 SW 6TH AVE
CAMAS, WA 98607

THORNTON LORI & SKELTON WILLIAM
2434 SW 6TH AVE
CAMAS, WA 98607

CHEN CHENYAO & HUANG CHENG-FANG
15091 NW FRANCESCA DR
PORTLAND, OR 97229

WILKINS JERRY & WILKINS KIMBERLY
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BUCHHOLZ RONALD H
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CAMAS, WA 98607

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MEYER KATHERINE ESTATE
519 NW 7TH AVE
CAMAS, WA 98607

OTS LLC
2375 SE 8TH AVE
CAMAS, WA 98607

LSR VENTURES LLC
225 NE 4TH AVE
CAMAS, WA 98607

STE WING INVESTMENT LLC
20028 SE THIRD CIRCLE
CAMAS, WA 98607

LOCKE MELVIN S JR & LOCKE CHERYL R
217 NE 4TH AVE
CAMAS, WA 98607

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VANCOUVER, WA 98661

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FORT JAMES CAMAS LLC
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FORT JAMES CAMAS LLC
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VANCOUVER, WA 98661

CHAU WING C & CHAU NIM HUNG &
CHAU STELLA TRUSTEES
2908 SE 149TH CT
VANCOUVER, WA 98683

HAMBREWS LLC
2300 E 3RD LOOP SUITE 110
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CLARA STREET BLOCK BUILDING LLC
33316 SE 34TH ST
WASHOUGAL, WA 98671

BAFUS GARY & BAFUS JANICE
TRUSTEES
226 SE GARFIELD ST
CAMAS, WA 98607

CLARA STREET BLOCK BUILDING LLC
33316 SE 34TH ST
WASHOUGAL, WA 98671

HAMBREWS LLC
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ELLEN L
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TEJADA ROSSANA
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FORT WORTH, TX 76131

HOFER JAY & HOFER SANDRA M
5509 NE 292ND CT
CAMAS, WA 98607

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ATLANTA , GA 30348

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ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
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ATLANTA , GA 30348

FORT JAMES CAMAS LLC
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ATLANTA , GA 30348

JHTM PROPERTIES LLC
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CAMAS, WA 98607

JHTM PROPERTIES LLC
636 SE 3RD AVE
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447 NW FARGO ST
CAMAS, WA 98607

NGUYEN JIMMY ETAL
540 NW MITCHELL COURT
CAMAS, WA 98607

CHVANOV SERGEY & MIKAILENKO ALLA
550 NW MITCHELL CT
CAMAS, WA 98607

SMITH ALLEN MONROE & SMITH RUTH ELIZABETH
800 NW 4TH AVE
CAMAS, WA 98607

GRIMES GEOFFREY & GRIMES KRISTEN L
404 NW FARGO ST
CAMAS, WA 98607

MORIARTY GRANT
531 NW MITCHELL CT
CAMAS, WA 98607

ESPEDAL ERIC M & ESPEDAL KIMBERLY L
557 NW MITCHELL CT
CAMAS, WA 98607

RONHAAR RONALD E
1123 NW 4TH AVE
CAMAS, WA 98607

PARRISH FRED & PARRISH JEANNIE
1317 NW 5TH AVE
CAMAS, WA 98607

CALLAN JAMES B & CALLAN ALLISON M
514 NW MITCHELL ST
CAMAS, WA 98607

COLLIER ALBERT & COLLIER CAROL
4308 SW 6TH AVE
CAMAS, WA 98607

RICHARDS DEWAYNE O & RICHARDS CARMEN E
1522 SW 7TH CIR
CAMAS, WA 98607

COULTER GREGG E & COULTER CATHRINA M
2219 SW 6TH AVE
CAMAS, WA 98607

MOUNTAIN DEBORAH RANEY
2207 SW 6TH AVE
CAMAS, WA 98607

SCOTT KEITH & SCOTT KRYSTAL
3920 SW 5TH AVE
CAMAS, WA 98607

LINDBERG WAYNE
380 SW PARK ST
CAMAS, WA 98607

INGRAM SCOTT A & INGRAM BRENDA M
2050 SW 6TH AVE
CAMAS, WA 98607

FERRER DEBORAH LYNN
2520 SW 6TH AVE
CAMAS, WA 98607

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METRO PROPERTIES INC
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CAMAS, WA 98607

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ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
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FORT JAMES CAMAS LLC
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FORT JAMES CAMAS LLC
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ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

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ATLANTA , GA 30348

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ATLANTA , GA 30348

FORT JAMES CAMAS LLC
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ATLANTA , GA 30348

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HUSUM, WA 98623

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CAMAS, WA 98607

HOLOVE JEFFREY LEE
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CAMAS, WA 98607

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REZAIE MOHAMMADREZA
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CAMAS, WA 98607

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BEACH RAYME & BEACH JERRY
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CAMAS, WA 98607

CITY OF CAMAS
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KIM SUNG BUM & KIM SUNG HEE
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CAMAS, WA 98607

KELL JOHN K & KELL PAMELA K
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PETON JOHN
1301 NW 5TH AVE
CAMAS, WA 98607

GIBSON JAMES F & GIBSON DIANA Y
4720 SW 5TH AVE
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CAMAS, WA 98607

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CAMAS, WA 98607

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CAMAS, WA 98607

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FORT JAMES CAMAS LLC
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ATLANTA , GA 30348

JHTM PROPERTIES LLC
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CAMAS, WA 98607

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CAMAS, WA 98607

ROWLAND LARRY D & ROWLAND LINDA I
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CAMAS, WA 98607

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WASHOUGAL, WA 98671

BERTHEL JOANN F
835 NW 4TH AV
CAMAS, WA 98607

BLOW KEVIN ROLAND & BLOW JANICE MARIE
901 NW 4TH AVE
CAMAS, WA 98607

EKSTROM GLEN & EKSTROM CHELSEY
1015 NW 4TH AVE
CAMAS, WA 98607

KERR JOHN & KERR VICKI
1117 NW 5TH AVE
CAMAS, WA 98607

SANDERS BUFORD D
1109 NW 4TH AVE
CAMAS, WA 98607

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PMB 364
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BRANDLEY REINARD DIRK TRUSTEES
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DIDYK IVAN YURYEVICH
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20415 NE 244TH ST
BATTLE GROUND, WA 98604

LOMELAND DUSTY & LOMELAND REBECCA
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CAMAS, WA 98607

BABCOCK JOHN S
2228 SW 6TH AVE
CAMAS, WA 98607

NELSON LUCAS & NELSON SURAPHA
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BATTLE GROUND, WA 98604

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CAMAS, WA 98607

ROMANO KESS
3016 SW 6TH AVE
CAMAS, WA 98607

VOLOVIK VLADISLAV P &
NIAFIODAVA YULIYA V
12109 NE 40TH CIRCLE
VANCOUVER, WA 98682

NAGY BRENT & NAGY CHRIS R
3028 SW 6TH AVE
CAMAS, WA 98607

JACOBY STEVEN & JACOBY SUSAN ANN
1828 SW 6TH AVE
CAMAS, WA 98607

DO VINCENT & NGUYEN HELEN
4412 SW 6TH AVE
CAMAS, WA 98607

MARSHALL RICHARD C & MARSHALL CASSANDRA R
1186 NW 10TH AVE
CAMAS, WA 98607

ANDERSON DALE & ANDERSON LETA (C/B)
% DEA INVESTMENTS PMB 364
VANCOUVER, WA 98683

ANDERSON DALE E & ANDERSON LETA L TRUSTEES ETAL
4420 SW 5TH AVE
CAMAS, WA 98607

ANDERSON DALE E & ANDERSON LETA TRUSTEE
PMB 364
VANCOUVER, WA 98683

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4646 SW 5TH AVE
CAMAS, WA 98607

MARSHALL RICHARD C & MARSHALL CASSANDRA R
2722 SW 6TH AVE
CAMAS, WA 98607

SUNDSETH MARK & SUNDSETH MARGARET F
2706 SW 6TH AVE
CAMAS, WA 98607

MARSHALL RICHARD C & MARSHALL CASSANDRA R
1186 NW 10TH AVE
CAMAS, WA 98607

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

LATIMER JEFFREY & LATIMER KRISTINE
1313 NW 5TH AVE
CAMAS, WA 98607

DLS PROPERTIES INC
5687 S 6TH WAY
RIDGEFIELD, WA 98642

TABAAK SERWAH
1307 NW 5TH AVE
CAMAS, WA 98607

RODRIGUEZ TYRONE & RODRIGUEZ YOKO
339 SE EVERETT RD
CAMAS, WA 98607

ZEMAN MICHAEL & ZEMAN DEBRA
1311 NW 5TH AVE
CAMAS, WA 98607

NOTICE OF APPLICATION FOR SHORELINE SUBSTANTIAL DEVELOPMENT PERMIT AND SHORELINE CONDITIONAL USE PERMIT Georgia Pacific In-Water and Over-Water Removal Project (File No. SHOR23-01)

[Consolidated files: Critical Areas Review (CA23-04), State Environmental Policy Act (SEPA23-04), Archaeological Review* (ARCH23-03)]

NOTICE IS HEREBY GIVEN that an application for the "Georgia Pacific In-Water and Over-Water Removal Project" requesting permit approval for the removal of certain unused in-water and over-water structures associated with the previous operations of the pulp and paper mill along the riverbank. The project is located within the shoreline designations of "Aquatic", "Medium Intensity" and "High Intensity".

Application Materials: The project was filed with the City of Camas on March 30, 2023, resubmitted June 1, and July 20, 2023, and deemed technically complete on July 27, 2023. The application included the following documents, which are available for review from the Community Development Department (*616 NE 4th Avenue*): Project narratives, Shoreline report, SEPA checklist, stormwater management plan, critical areas reports and archaeological report*. Application materials are available for review from the Community Development Department during regular business hours Monday-Friday 8am-5pm.

Comment Deadline: Written public comments must be received in the next 30 days, by **September 2nd,** before 5:00 p.m. Mailed public comments may be directed to the Community Development Department, c/o Shoreline Administrator, 616 NE Fourth Avenue, Camas, WA 98607, or emailed to *communitydevelopment@cityofcamas.us.*

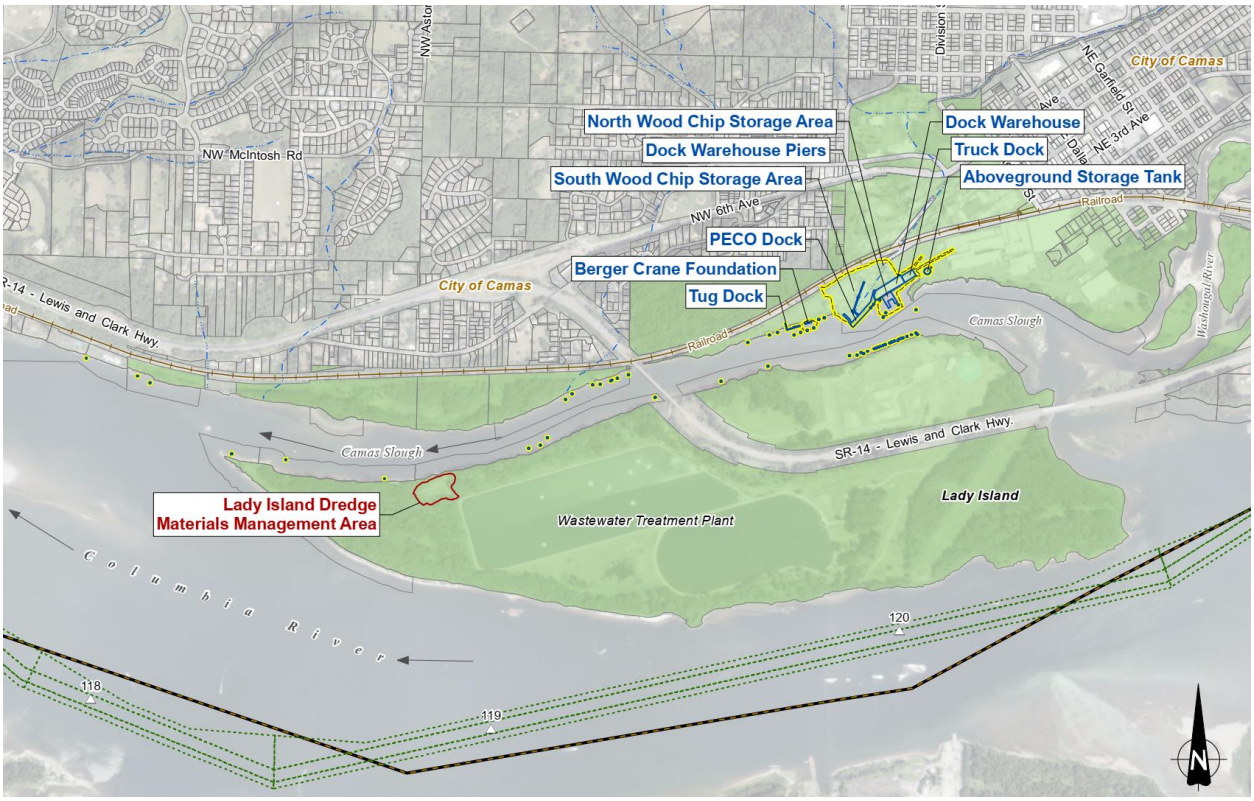
A public hearing is required for the development proposal and will be scheduled at a later date. A separate public notice for the public hearing will be mailed to all property owners within 300-feet of the subject development, posted on the city website and published in the Post Record.

For questions related to this application, please contact Lauren Hollenbeck, Senior Planner, at (360) 817-7253 or lhollenbeck@cityofcamas.us.

*consistent with RCW 42.56.300, Archaeological information is exempt from public disclosure.

Published in the Post Record on August 3, 2023 Legal Publication #825030
Posted at Camas City Hall, Camas Library, City of Camas website at: http://www.cityofcamas.us
Mailed to property owners within 300-feet on August 2, 2023

VICINITY MAP



State Environmental Policy Act
Determination of Non-Significance

CASE NO: SEPA23-04 Georgia Pacific In-Water Over-Water Removal Project

APPLICANT: Sam McDowell
Georgia Pacific
401 NE Adams Street
Camas, WA 98607

REQUEST: Remove and/or demolish several structures associated with the prior operations at the Camas Mill that are located in-water and/or overwater on the Columbia River and Camas Slough.

LOCATION: Tax parcels: 08370-000, 09104-4013, 09104-4015, 09104-4027, 50090-1000, 50090-2000, 50090-3000, 50090-4000, 50081-4000, 50081-4001, 50081-7000, 50081-8000 between river mile 117 and 121.

LEGAL DESCRIPTION: The Project area lies within the City of Camas in Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16, Willamette Meridian

SEPA DETERMINATION: Determination of Non-Significance (DNS)

COMMENT DEADLINE: **August 17, 2023, at 5:00pm**

As lead agency under the State Environmental Policy Act (SEPA) Rules [Chapter 197-11, Washington Administrative Code (WAC)], the City of Camas must determine if there are possible significant adverse environmental impacts associated with this proposal. The options include the following:

- DS = Determination of Significance (The impacts cannot be mitigated through conditions of approval and, therefore, requiring the preparation of an Environmental Impact Statement (EIS).
- MDNS = Mitigated Determination of Non-Significance (The impacts can be addressed through conditions of approval), or;
- DNS = Determination of Non-Significance (The impacts can be addressed by applying the Camas Municipal Code).

Published in the Post Record on August 3, 2023 Legal Publication #825040
Posted at Camas City Hall, Camas Library, City of Camas website at: http://www.cityofcamas.us
Mailed to property owners within 300-feet of the property on August 2, 2023

State Environmental Policy Act
Determination of Non-Significance

Determination:

Determination of Non-Significance (DNS). The City of Camas, as lead agency for review of this proposal, has determined that this proposal does not have a probable significant adverse impact on the environment. An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(e). This decision was made after review of a completed environmental checklist, and other information on file with the City of Camas.

Date of Publication & Comment Period:

Publication date of this DNS is **August 3, 2023,** and is issued under WAC 197-11-340. The lead agency will not act on this proposal until the close of the 14-day comment period, which ends on **August 17, 2023**. Comments may be sent by email to communitydevelopment@cityofcamas.us or regular mail to:

City of Camas SEPA Official
Community Development Department
616 NE Fourth Avenue
Camas, Washington 98607

Responsible Official: Robert Maul (360) 817-1568

Robert Maul, Interim Community Development Director and SEPA official

August 3, 2023
Date of publication

Published in the Post Record on August 3, 2023 Legal Publication #
Posted at Camas City Hall, Camas Library, City of Camas website at: http://www.cityofcamas.us
Mailed to property owners within 300-feet of the property on August 2, 2023

City of Camas WASHINGTON

SECTION I: Applicant and Project Information

GENERAL INFORMATION

1. No work of any kind may begin in a floodplain until a floodplain development permit is issued.
2. The permit may be revoked if any false statements are made in this application.
3. If revoked, all work must cease until a permit is re-issued.
4. The development may not be used or occupied until a Certificate of Compliance is issued.
5. The permit will expire if no work is commenced within 6 months of the date of issue.
6. The permit will not be issued until any other necessary local, state or federal permits have been obtained.

By signing and submitting this application, the Applicant gives consent to the local Floodplain Administrator or his/her representative to make reasonable inspections prior to the issuance of a Certificate of Compliance.

By signing and submitting this application, the Applicant certifies that all statements contained in SECTION I of the application, and in any additional attachments submitted by the Applicant, are true and accurate.

OWNER INFORMATION

Property Owner: Georgia-Pacific Consumer Operations LLC (GP)

Telephone Number: 360-834-8162

Email Address: Shawn.wood@GAPAC.COM

Mailing Address: Georgia-Pacific Consumer Operations LLC
401 NE Adams Street
Camas, Washington 98607

Signature of Property Owner: Shawn J Wood

Date: 5/26/2023

APPLICANT INFORMATION

Applicant: Shawn Wood, VP

Telephone Number: 360-834-8162

Email Address: Shawn.wood@GAPAC.COM

Signature of Applicant: Shawn J Wood

Brief project description: In-water and Overwater Structures Removal Project Camas Mill, Camas, Washington

PROJECT INFORMATION

Project Address: 401 NE Adams Street, Camas, WA

Subdivision: _____

Lot: _____

Block: _____

PROJECT INFORMATION (continued)

Type of Structure:

- ☐ Residential
- ☐ Garage/Shop
- ☒ Non-Residential
  - ⊙ Elevated
  - ○ Floodproofed
- ☐ Combined Use (Residential and Non-Residential)
- ☐ Manufactured Home

Type of Structural Activity:

- ☐ New Structure
- ☐ Addition to Existing Structure*
- ☐ Alteration of Existing Structure*
- ☐ Relocation of Existing Structure **
- ☒ Demolition of Existing Structure
- ☐ Replacement of Existing Structure**

* Substantial Improvement

If the fair market value of an addition or alteration to a structure equals or exceeds 50% of the value of the structure before the addition or alteration, the entire structure must be treated as a substantially improved structure.

Substantial Improvement Evaluation:

Cost of Improvement (a): $ _____N/A_____

Market Value of the Building (b) : $_____

Percent of Value Change (a/b): _____ %

Disclaimer: Substantial Improvement Evaluation must be supported by project cost documentation and approved market evaluation. Attach supporting documentation.

** Relocation or Replacement

A relocated structure or a structure being replaced must be treated as new construction.

Other Development Activities

- ☐ Excavation (not related to a structural development)
- ☐ Clearing
- ☒ Placement of Fill Material
- ☒ Grading
- ☐ Mining
- ☐ Drilling
- ☒ Dredging
- ☐ Watercourse alteration
- ☐ Drainage improvement (including culvert work)
- ☐ Individual water or sewer system (not included to a structural development listed above)
- ☐ Roadway or bridge construction
- ☐ Specify other development not listed above:

_____

PROPERTY OWNER SIGNATURE

I certify that to the best of my knowledge the information contained in the application is true and accurate.

Alan J Wood — Signature of Property Owner:

5/26/2023 — Date:

SECTION II: (To be completed by Floodplain Administrator)

FLOOD INFORMATION

1. The proposed development is located on FIRM map panel: 529, 533, and 534 (number and suffix)
2. Effective date on the FIRM: 9/5/2012 (Panels 529 and 533) and 1/19/2018 (Panel 534)
3. The proposed development is located in Zone within City of Camas or Clark County Shoreline Management Zones. (See Attachment B-IWOW City of Camas No-rise Report).
4. Is the proposed development located within the regulatory floodway: ☐ No ☒ Yes
   (New residential structures, additions, and substantial improvements prohibited; Non-residential: Attach Completed Engineer's Hydraulic Analysis for a No-Rise Certificate)

Structural Development

For structures, the provisions of the flood ordinance specify that the lowest floor be elevated one foot or more above the base flood elevation (BFE).

Base Flood Elevation: N/A (All Structures Removed) ☐ NGVD 29 ☒ NAVD 88 ☐ Unknown (Zone A)

Lowest Floor Elevation for the proposed development is: N/A ☐ NGVD 29 ☐ NAVD 88

Source of Base Flood Elevation: ☒ FIRM ☐ FIS or ☐ other: _____

The following documents are required:

- ☐ An Elevation Certificate (Finished Construction) *
- ☐ Site Plan (Showing location of SFHA and development)

The following documents may be required:

- ☐ Floodproofing Certificate * – required if floodproofing a non-residential structure
- ☒ A No-Rise Certificate * – if any of the proposed non-residential development is in a "regulatory floodway"
- ☐ An elevation study showing BFEs on developments/ subdivisions exceeding 50 lots or 5 acres in Zone A

** Certificates require completion by a Professional Land Surveyor or Registered Professional Engineer as indicated.*

SECTION III: (To be completed by Floodplain Administrator)

Permit Determination

I have determined that the proposed development: ☒ IS ☐ IS NOT (non-conformance described in separate document) in conformance with the local Flood Damage Prevention Ordinance.

The Floodplain Development Permit: ☒ IS ☐ IS NOT (denials are described in separate document) issued subject to any conditions attached to and made part of this permit.

Signature of Floodplain Administrator: Lauren Hollenbeck Date: 10/13/23

CONDITIONS:

SECTION IV: (To be completed by Floodplain Administrator)

Administrative

Final documentation verifying compliance with ordinance

☐ Elevation Certificate attached (Finished Construction)

As-Built lowest floor elevation: _____ ☐ NGVD 29 ☐ NAVD 88

Work Inspected by: _____

Certificate of Compliance

Certificate of Compliance is issued and the development is found to be in compliance with all applicable ordinances.

Lauren Hollenbeck _____ 10/13/23 _____

Signature of Floodplain Administrator — Date

Geologically Hazardous Area and Critical Aquifer Recharge Review

Addendum to the Shoreline Report including Critical Areas Review, Ordinary High Water Determination, and Impact Assessment

In-Water and Overwater Structures Removal Project Camas Mill, Camas, WA

Prepared for:

Georgia-Pacific

Georgia-Pacific Consumer Operations, LLC
Camas, WA

Prepared by:

TETRA TECH

May 2023

Table of Contents

1.0 Introduction 1

2.0 Project Summary 3

3.0 Published Information Used in the Assessment 4

4.0 Conclusion 4

5.0 References 5

List of Figures

Figure 1. Severe Erosion Hazard Map

Figure 2. Steep Slope and Landslide Hazard Map

Figure 3. Critical Aquifer Recharge Area Map

1.0 Introduction

Georgia-Pacific Consumer Operations LLC (GP) is planning to abate, remove, and demolish several structures associated with prior operations at the Camas Mill located in the city of Camas and in unincorporated areas of Clark County, Washington. The structures that GP is proposing to be removed are located in-water and/or overwater on the Columbia River and Camas Slough, and are located within the Shoreline Management Zone of the City of Camas, or are in-water within unincorporated Clark County.

GP submitted the SEPA application on March 30, 2023. Subsequent to the submittal and after initial review, The City of Camas requested that the application address any Geologically Hazardous Areas for completeness, and is the purpose of this addendum.

Although the focus of this addendum is to address Geologically Hazardous Areas as well as review of potential impacts to critical aquifer recharge zones, as discussed in these documents, the Project has been designed to avoid and minimize impacts to critical areas to the extent possible, and measures have been proposed to minimize impacts when complete avoidance is not possible. In addition, the assessments and measures proposed to address the critical areas ordinances for the City of Camas would also address critical areas as defined by Clark County.

Appendix C of the Camas Shoreline Master Program (City of Camas 2021), as adopted by Ordinance No. 21-003, defines critical areas. These include Wetlands; Critical Aquifer Recharge Areas; Frequently Flooded Areas; Fish and Wildlife Habitat Conservation Areas; and Geologically Hazardous Areas. The following provides the description of these critical areas, as defined by the City of Camas (also see Chapter 16.51.070 of the Camas Shoreline Master Program):

- **Wetland critical areas** are defined as important natural resources which provide significant environmental functions including: the control of floodwaters, maintenance of summer stream flows, filtration of pollutants, recharge of ground water, and provision of significant habitat areas for fish and wildlife.
- **Critical aquifer recharge areas (CARA)** are defined as those areas with a critical recharging effect on aquifers used for potable water as defined by WAC 365-190-030(2). CARA have prevailing geologic conditions associated with infiltration rates that create a high potential for contamination of ground water resources or contribute significantly to the replenishment of ground water. These areas include the following:
    - Wellhead Protection Areas;
    - Sole Source Aquifers;
    - Susceptible Ground Water Management Areas;
    - Special Protection Areas (as defined WAC 173-200-090);
    - Moderately or Highly Vulnerable Aquifer Recharge Areas; or

- Moderately or Highly Susceptible Aquifer Recharge Areas.

- **Frequently Flooded Areas** include areas of special flood hazard which are commonly identified as critical areas in local government development regulations.
- **Geologically Hazardous Areas** (Chapter 16.59) include areas susceptible to one or more of the following types of hazards:
    - Erosion hazard;
    - Landslide hazard;
    - Seismic hazard; or
    - Other geological events including, mass wasting, debris flows, rock falls and differential settlement.
- **Fish and wildlife habitat conservation areas** include the following areas:
    - Areas with which state or federally designated endangered, threatened, and sensitive species have a primary association;
    - State priority habitats and areas associated with state priority species;
    - Habitats of local importance as identified by the city's park, recreation and

Open space comprehensive plan as natural open space;

- Naturally occurring ponds under twenty acres;
- Waters of the state;
- Bodies of water planted with game fish by a governmental or tribal entity; or
- State natural area preserves and natural resource conservation areas.

The Project's potential effects on these critical areas, as well as how the Project has been designed and would be implemented in compliance with the city and county's critical areas ordinances is addressed in various Project-related documents. These include:

- The "*Shoreline and Critical Areas Review and Impacts Assessment*[1]*"* (Appendix 2), which addresses wetlands critical areas as well as fish and wildlife habitat conservation areas.
- The "*Frequently Flooded Areas Report and Flood Hazard Assessment for Demolition of Encroachments*" (Appendix 7), the "*No-Rise Report for Removal of Structures along Camas Slough*" (Appendix 8), which addresses frequently flooded areas, and the "*Certification of No-Rise and Description of Flood Hazard for Demolition of One Dolphin*" (Appendix 9)

[1] This document has been prepared to meet the requirements of the City of Camas and Clark County Shoreline Master Programs and requirements for critical areas reports (Camas Municipal Code [CMC] 16.51.140 and Clark County Code [CCC] 40.440, 40.450, and 40.460). It has also been developed to provide information relevant to the SEPA process.

- The "*Biological Assessment*" (Appendix 3), which further addresses fish and wildlife habitat conservation areas (in addition to the information provided in the "*Shoreline and Critical Areas Review and Impacts Assessment"*)
- The "*Geologically Hazardous Area and Critical Aquifer Recharge Review - Addendum to the Shoreline and Critical Areas Review and Impacts Assessment,"* (Appendix 2) which addresses geologically hazardous areas, as well as review of critical aquifer recharge areas.

2.0 Project Summary

The Project area lies within the City of Camas, Washington, except for one dolphin to be removed on the Columbia River that is located outside the city limits within unincorporated Clark County, Washington. The figures provided at the end of this addendum also displays an overview of the Project location in relation to the various mapped critical areas. Additional information including figures is provided in Appendix 1-Project Description Narrative.

The Project area consists of a portion of the Camas Slough, which runs between Lady Island and the city of Camas, Washington, on the north bank of the main channel of the lower Columbia River. Lady Island lies between the Camas Slough and the Columbia River main channel. The Project lies between river mile (RM) 117 and 121, with much of the proposed activity at approximately RM 119 to 120 located in the Camas Slough.

The Project area lies within Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16, Willamette Meridian.

As stated, the structures to be removed are located adjacent to the riverbank are entirely or partly below the OHWM of the Camas Slough and are located within either the City of Camas Shoreline Management Zone or Clark County Shoreline Management Zone.

The Project includes abatement, removal, and demolition of structures associated with former riverfront operations of the pulp and paper mill which are no longer utilized, including structures located on GP property and on State-owned aquatic lands.

The need for the Project is to reduce liability associated with unused structures and remove structures from state lands enabling termination and/or reduction of a State Aquatic Lands lease and termination of several State Aquatic Lands easements.

The structures that GP is proposing to be removed include:

- A warehouse,
- Five docks/piers,
- Conveyor housings,
- An aboveground oil storage tank,
- Crane foundation, and

- Approximately 3,000 pilings that are associated with the above structures, serve as mooring dolphins, or are abandoned.

3.0 Published Information Used in the Assessment

The attached figures utilized publicly available information from Clark County Severe Erosion, Steep Slope/Landslide, and Critical Aquafer Recharge Areas. All data is available as GIS served data via: https://gis.clark.wa.gov/arcgisfed/rest/services. There are no Wellhead Protection Areas in the vicinity of the Project.

4.0 Conclusion

Geologically Hazardous Areas: Within the proposed Project footprint, there are slopes mapped at > 15 percent along the shoreline portion and a small area mapped as severe erosion hazard potential. The areas mapped as severe erosion hazard within the Project footprint likely included previous wood chip piles that have since been removed and will be regraded ton ensure natural flow upon Project completion. The upland portion containing overwater structures would not increase the potential for instability along the shoreline. A preliminary Stormwater Management Plan, including established best management practices that would be implemented, has been submitted for review which includes the uplands containing the old wood chip areas (See Appendix 12, Figure 5).

As noted above, the planned activities does not include development or other activities, including construction of temporary roads or access, that will have a direct impact on the identified geologically hazardous areas as the project consists of demolishing existing buildings and removal of support structures (overwater and in-water). The Preliminary Stormwater Plan developed for this project addresses planned erosion and sediment control, slope protection, and soil stabilization best management practices.

No other mapped potential Geologically Hazardous Areas are noted within Project site boundary (Figures 1 and 2) or would meet erosion hazard definitions in CMC 16.59.020. In-water work (e.g., piling and dolphin removals) will not affect any mapped geologically hazard areas.

Critical Aquifer Recharge Areas: Chapter 16.55 describes Critical Aquifer Recharge Areas. There are no mapped Critical Aquifer Recharge Areas mapped within the upland portion of the Project; however, portions of the Camas Slough are mapped as Category 2 Recharge Areas (Figure 3). Dredging will also occur where the Camas Slough riverbank is to be reshaped following the removal of overwater structures. Note that because this project would remove older infrastructure, dredging will only be implemented to the extent needed to safely remove the features. Unlike most dredging projects, a specific deepening is not a requirement for most of the dredging.

With the exception of some limited dredging anticipated to access some of the overwater supporting structures, this project primarily involves the removal of existing pilings and dolphins within the portion of the project that overlaps the mapped recharge areas of Camas Slough, and will

not have an adverse impact on ground water or otherwise reduce the recharging of the aquifer, and may provide long-term beneficial effects. Dredging will be required to enable barge access to remove piles in one location.

5.0 References

City of Camas. 2015. Camas Shoreline Master Program. Effective July 27, 2015. Available online: https://www.clark.wa.gov/community-planning/shoreline-master-program. Accessed 8/15/2020.

City of Camas. 2016. Camas 2035—Comprehensive Plan. Available online: https://www.cityofcamas.us/images/DOCS/PLANNING/REPORTS/camas2035/camas2035compplan.pdf. Accessed 8/23/2020.

City of Camas. 2019. Camas Zoning Map. Ordinance 19-009. Adopted October 2019. Available online: https://www.cityofcamas.us/images/DOCS/MAPS/zoningmap.pdf. Accessed 8/27/2020.

City of Camas. 2021. Camas Shoreline Master Program. February 2021.

Clark County. 2016. Clark County Comprehensive Growth Management Plan 2015-2035. Chapter 13—Shoreline Master Program. Available online: https://www.clark.wa.gov/community-planning/shoreline-master-program. Accessed 11/10/2020.

Clark County. 2019. Maps Online—Shoreline Designations. Available online: https://www.charts.noaa.gov/ChartCatalog/MapSelect.html. Accessed 8/23/2020.

Figures

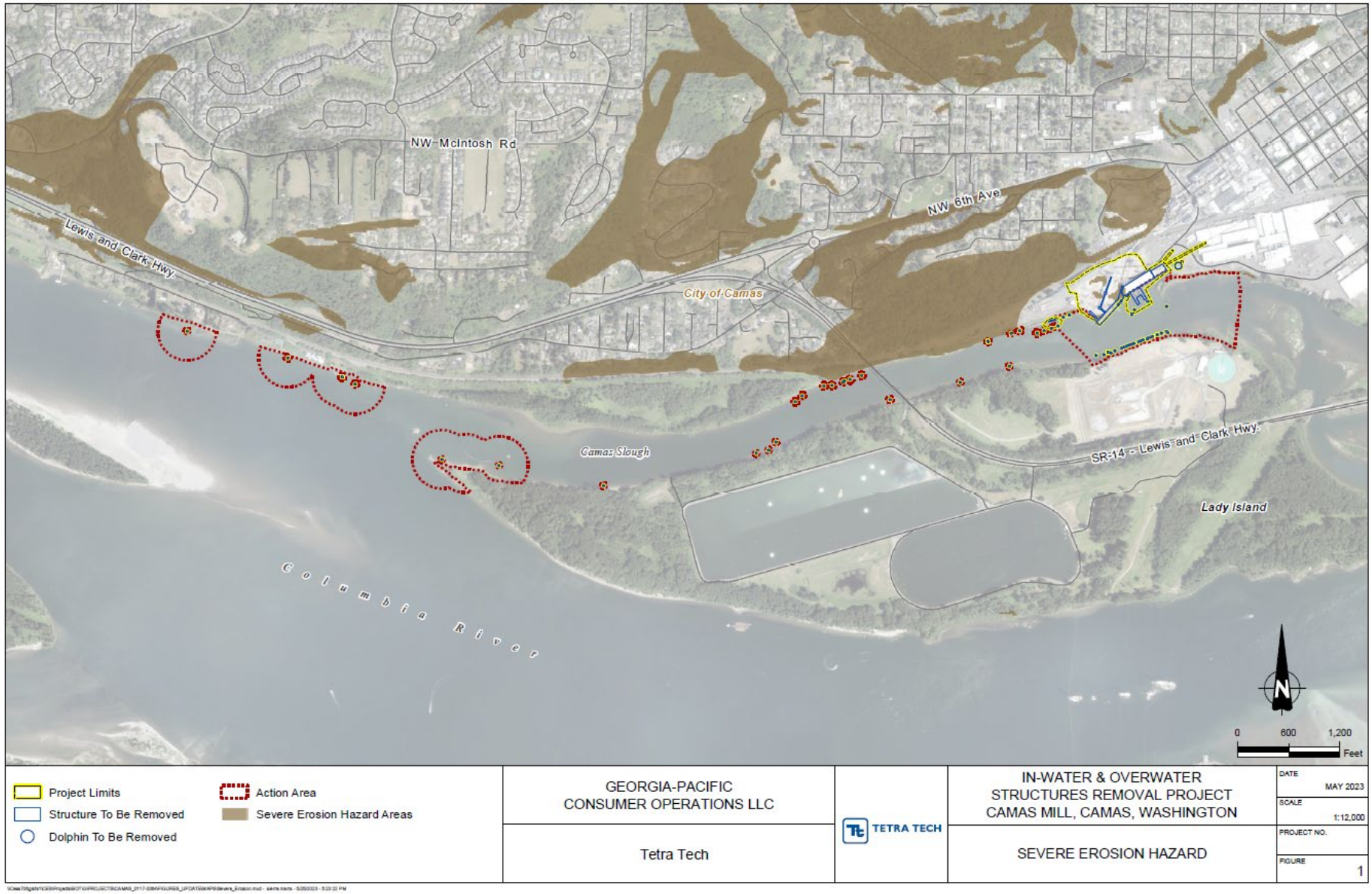


Figure 1. Severe Erosion Hazard Map

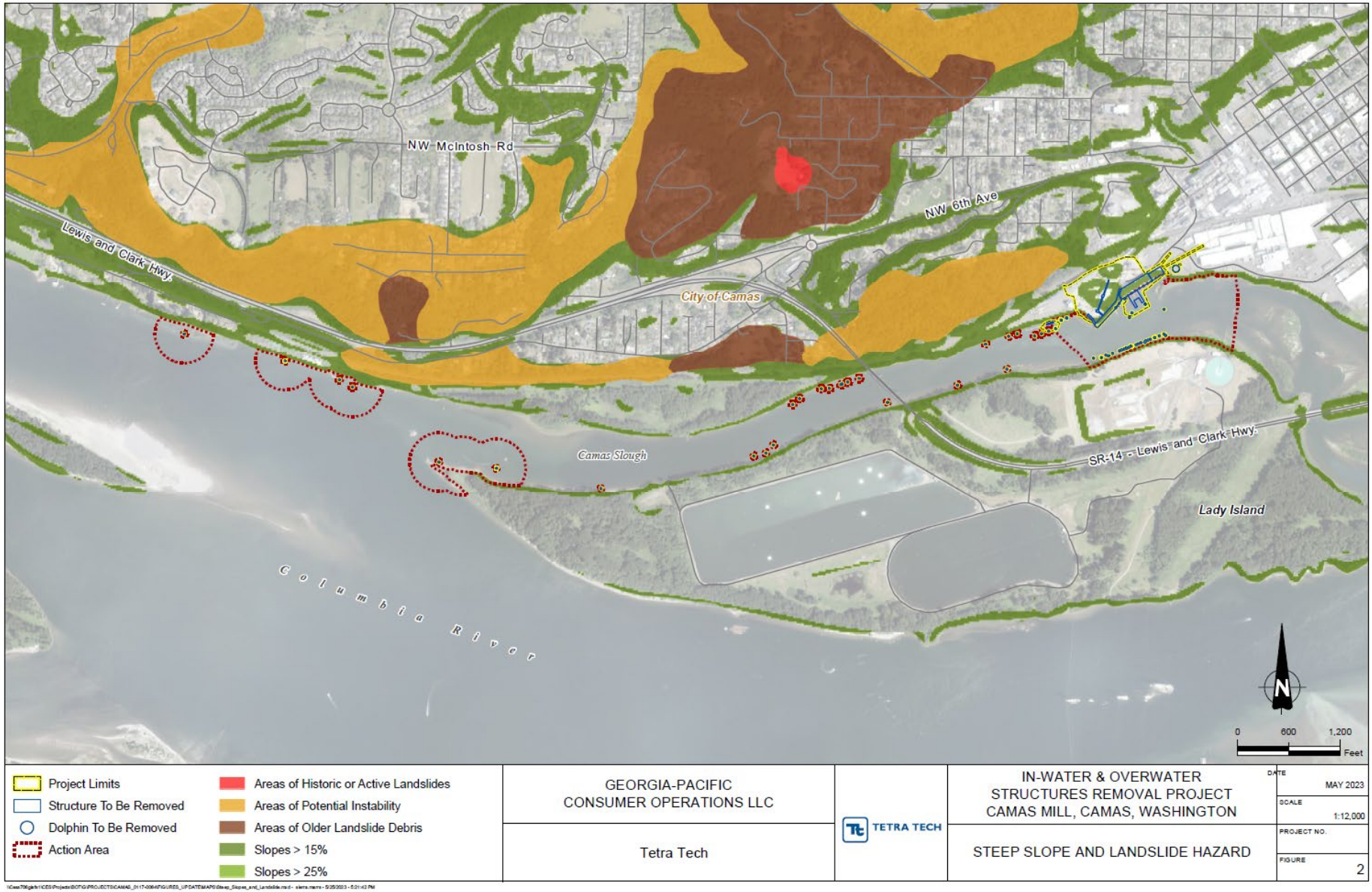


Figure 2. Steep Slope and Landslide Hazard Map

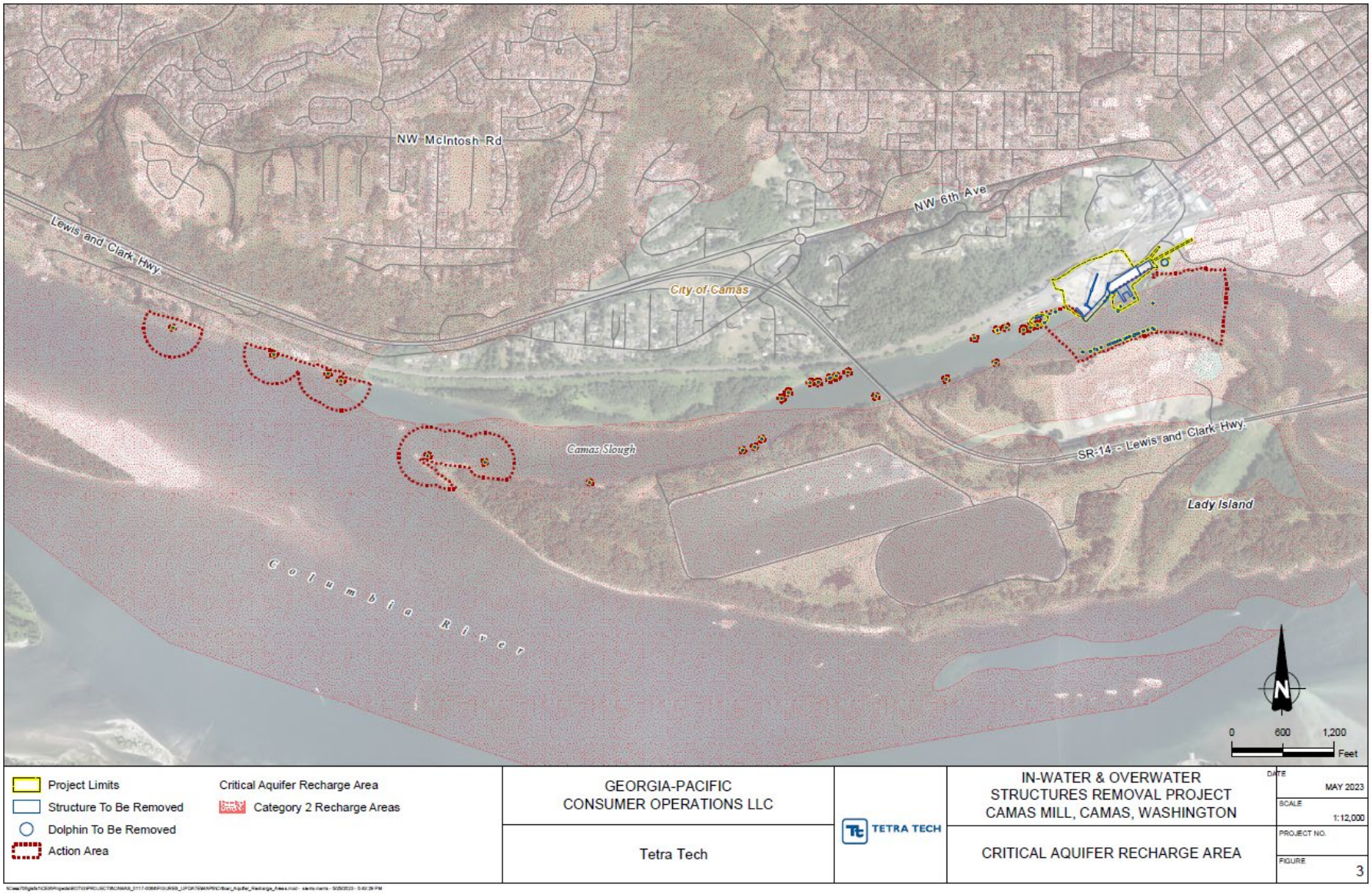
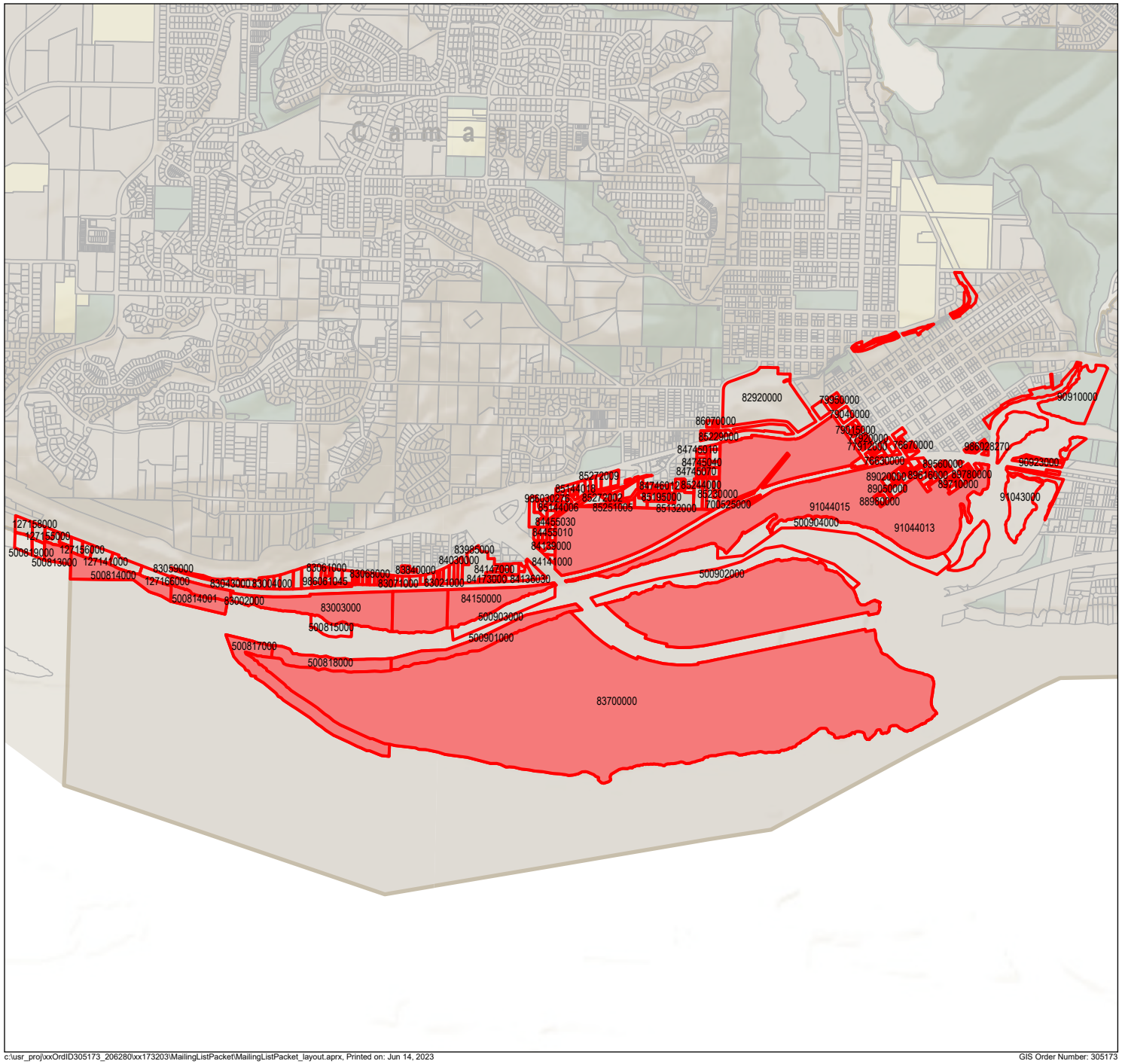
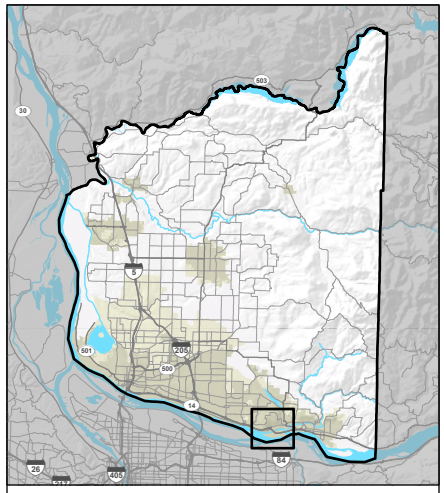


Figure 3. Critical Aquifer Recharge Area Map

County Certified and Created Parcel Map

(for properties within three hundred feet of the subject parcel)





PID(s): 83003000, 83700000, 84150000, 91044015, 500813000, 500814000, 500814001, 500817000, 500818000, 500901000, 300-Foot Buffer

KEY

- Subject Property
- Buffer Selection
- Parcels

CLARK COUNTY, WASHINGTON

N

NOTE: *Information shown on this map was collected from several sources. Clark County accepts no responsibility for any inaccuracies that may be present.*

0 1,000 2,000 3,000 Feet

c:\usr_proj\xxOrdID305173_206280\xx173203\MailingListPacket\MailingListPacket_layout.aprx, Printed on: Jun 14, 2023

GIS Order Number: 305173

County Certified and Created Owner Mailing List and Mailing Labels

(for properties within three hundred feet of the subject parcel;
formatted for both Avery 5160 and 5161 systems)

Owner Name	Mailing Address
ACKERMAN KENNETH A	4646 SW 5TH AVE, CAMAS, WA, 98607
ALBANO THERESA ETAL	PO BOX 1848, VANCOUVER, WA, 98668
ANCHETA REGINALD K & ANCHETA SHARIE	2746 SW 6TH AVE, CAMAS, WA, 98607
ANDERSON DALE & ANDERSON LETA (C/B)	% DEA INVESTMENTS PMB 364, VANCOUVER, WA, 98683
ANDERSON DALE E & ANDERSON LETA L TRUSTEES ETAL	4420 SW 5TH AVE, CAMAS, WA, 98607
ANDERSON DALE E & ANDERSON LETA TRUSTEE	PMB 364, VANCOUVER, WA, 98683
ANDRUS RYAN J	PO BOX 848, CAMAS, WA, 98607
BABCOCK JOHN S	2228 SW 6TH AVE, CAMAS, WA, 98607
BAFUS GARY & BAFUS JANICE TRUSTEES	226 SE GARFIELD ST, CAMAS, WA, 98607
BARAJAS ALEXANDER & BARAJAS EMILY KATE	561 NW MITCHELL CT, CAMAS, WA, 98607
BARKHODAEE PAUL PRIOUZ TRUSTEE 50%	8487 KENDALL RD UNIT 3, MAPLE FALLS, WA, 98266
BATTAN ROMAN S	403 NW FARGO ST, CAMAS, WA, 98607
BAUMAN MARK JONATHAN & BAUMAN REAGAN LYNN	6907 N IVANHOE ST, PORTLAND, OR, 97203
BEACH RAYME & BEACH JERRY	301 SW PARK ST, CAMAS, WA, 98607
BEAL RACHEL & ANAGNOSTOU ALEXANDER	447 NW FARGO ST, CAMAS, WA, 98607
BECK ALYSSA & BECK CONNOR	527 NW ELM ST, CAMAS, WA, 98607
BERTHEL JOANN F	835 NW 4TH AV, CAMAS, WA, 98607
BLOCK JOSEPH A & BLOCK GILLIAN A	37104 SE MT NORWAY DR, WASHOUGAL, WA, 98607
BLOW KEVIN ROLAND & BLOW JANICE MARIE	901 NW 4TH AVE, CAMAS, WA, 98607
BRANDLEY RITA THERESA & BRANDLEY REINARD DIRK TRUSTEES	2824 SW 6TH AVE, CAMAS, WA, 98607
BROWN BEATRICE ETAL	13214 NE 2ND CT, VANCOUVER, WA, 98685
BROWN MATTHEW R & BROWN KATE M	1512 SW 7TH CIR, CAMAS, WA, 98607
BUCHHOLZ RONALD H	300 SW PARK ST, CAMAS, WA, 98607
BUCKLEY MICHELE & BUCKLEY RUTH	7226 NE 155TH ST, KENMORE, WA, 98028
BURK DOLORES	PO BOX 87601, VANCOUVER, WA, 98687
BURKARD SCOTT & BURKARD ANITA	1530 SW 7TH CIRCLE, CAMAS, WA, 98607
BURLINGTON NORTHERN INC	2301 LOU MENK DR, FORT WORTH, TX, 76131
BUSBY BRETT & BUSBY MANDY	1235 NW 5TH AVE, CAMAS, WA, 98607
CALDWELL JULIA ANN	2020 SW 6TH AVE, CAMAS, WA, 98607
CALLAN JAMES B & CALLAN ALLISON M	514 NW MITCHELL ST, CAMAS, WA, 98607
CARTER STEVE	17412 EVERGREEN HIGHWAY, VANCOUVER, WA, 98683
CARTER STEVE & CARTER KATHLEEN	14018 NW 9TH AVE, VANCOUVER, WA, 98685
CASE KEVIN W & CASE TERESA L	1330 NW 5TH AVE, CAMAS, WA, 98607
CHAMBERLAIN MARY E	545 NW ELM, CAMAS, WA, 98607
CHASE CORY & WOHLGEMUTH DEANNA	2422 SW 6TH AVE, CAMAS, WA, 98607
CHAU WING C & CHAU NIM HUNG & CHAU STELLA TRUSTEES	2908 SE 149TH CT, VANCOUVER, WA, 98683
CHEN CHENYAO & HUANG CHENG-FANG	15091 NW FRANCESCA DR, PORTLAND, OR, 97229
CHVANOV SERGEY & MIKAILENKO ALLA	550 NW MITCHELL CT, CAMAS, WA, 98607
CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607
CLARA STREET BLOCK BUILDING LLC	33316 SE 34TH ST, WASHOUGAL, WA, 98671
COLBY ROGER J & COLBY JENNIFER D (C/B)	3345 NW 9TH AVE, CAMAS, WA, 98607
COLLIER A R & COLLIER C P	4308 SW 5TH AVE, CAMAS, WA, 98607
COLLIER ALBERT & COLLIER CAROL	4308 SW 6TH AVE, CAMAS, WA, 98607
COULTER GREGG E & COULTER CATHRINA M	2219 SW 6TH AVE, CAMAS, WA, 98607
COX TERRIE TRUSTEE	15399 SE RIVERSHORE DR, VANCOUVER, WA, 98683

Owner Name	Mailing Address
CROOK STEPHEN R & CHAU MINOU A T TRUSTEES	4110 SW 5TH AVE, CAMAS, WA, 98607
CROSWELL LETICIA M & OVERSTREET DAMIEN R	1172 N P CIR, WASHOUGAL, WA, 98671
CROWE BRANDON J & CROWE ANDREA D	1315 NW 5TH AVE, CAMAS, WA, 98607
DAHLBERG AUDREY & TANZER AUSTIN	16435 SE DOLPHIN RD, DAMASCUS, OR, 97089
DARLING JESSE J & DARLING TRISTA L	26107 SE 6TH CIR, CAMAS, WA, 98607
DAVIS NANA M & DAVIS RONALD C	1316 NE 70TH ST, VANCOUVER, WA, 98665
DEATHERAGE DANIEL J & DEATHERAGE STEPHANIE M	539 NW MITCHELL ST, CAMAS, WA, 98607
DEHART ALLEN R	406 SW PARK ST, CAMAS, WA, 98607
DICKERSON RANDY S	1900 SE 97TH AVE, VANCOUVER, WA, 98664
DIDYK IVAN YURYEVICH	9017 NE 143RD CIR, VANCOUVER, WA, 98662
DIERICKX RUDOLPH P & DIERICKX KEREN R	PO BOX 327, HUSUM, WA, 98623
DLS PROPERTIES INC	5687 S 6TH WAY , RIDGEFIELD, WA, 98642
DO VINCENT & NGUYEN HELEN	4412 SW 6TH AVE, CAMAS, WA, 98607
DUISEN PETER J	1000 NW 4TH AVE, CAMAS, WA, 98607
DUTTON BRYANT B & DUTTON VICKI A	569 NW ELM ST, CAMAS, WA, 98607
EKSTROM GLEN & EKSTROM CHELSEY	1015 NW 4TH AVE, CAMAS, WA, 98607
ELDREDGE MATT SCOTT & ELDREDGE KATHLEEN DEVINE	223 SE GARFIELD ST, CAMAS, WA, 98607
ELLERTSON SAMUEL R & ELLERTSON KAREN R	820 NW 4TH AVE, CAMAS, WA, 98607
ESHGHI MAHSA	207 NE 3RD AVENUE, CAMAS, WA, 98607
ESPEDAL ERIC M & ESPEDAL KIMBERLY L	557 NW MITCHELL CT, CAMAS, WA, 98607
F+R ENTERPRISES INC	5000 NE 51ST ST, VANCOUVER, WA, 98661
FAULDS CHRISTINE M & FAULDS JASON L	450 NW FARGO ST, CAMAS, WA, 98607
FERGUSON ROBERT & FERGUSON VIVE	834 NW 4TH AVE, CAMAS, WA, 98607
FERRER DEBORAH LYNN	2520 SW 6TH AVE, CAMAS, WA, 98607
FISHER KATHERINE	307 SW PARK ST, CAMAS, WA, 98607
FMG BODY SHOP LLC	314 NE BIRCH ST, CAMAS, WA, 98607
FMG INVESTMENTS LLC	314 NE BIRCH STREET, CAMAS, WA, 98607
FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348
FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348
FROST DANIEL E & FROST SHARYN L	512 NW ELM ST, CAMAS, WA, 98607
GASSIN CHRISTOPHER A & EYKHMAN ANNA	508 NW 5TH AVE, CAMAS, WA, 98607
GEORGIA-PACIFIC CORPORATION	PO BOX 105681, ATLANTA, GA, 30348
GIANNONE FRANKLIN D & GIANNONE ALEXIS L	840 NW 4TH AVE, CAMAS, WA, 98607
GIBSON JAMES F & GIBSON DIANA Y	4720 SW 5TH AVE, CAMAS, WA, 98607
GILSON MATT & GILSON ASHLEY	1320 NW 5TH AVE, CAMAS, WA, 98607
GONZALEZ KATHLEEN & DANIEL CHRISTOPHER L	904 NW 4TH AVE, CAMAS, WA, 98607
GRAY POONEH E TRUSTEE	7001 SE TOPPER DR., VANCOUVER, WA, 98664
GREEN CHRISTINA ANN	216-218 SE DALLAS ST, CAMAS, WA, 98607
GRIFFIN CHRISTIE TRUSTEE	1460 N T ST, WASHOUGAL, WA, 98671
GRIFFIN TAMMY R TRUSTEE	19215 SE 34TH ST #376, CAMAS, WA, 98607
GRIMES GEOFFREY & GRIMES KRISTEN L	404 NW FARGO ST, CAMAS, WA, 98607
H & R PROPERTIES LLC	81 ROCKWOOD DR, STEVENSON, WA, 98648
HALSTROM ROBERT E JR & HALSTROM TAMMY L	234 SE GARFIELD ST, CAMAS, WA, 98607
HAMBREWS LLC	2300 E 3RD LOOP SUITE 110, VANCOUVER, WA, 98661
HAMBREWS4 LLC	2300 E 3RD LOOP SUITE 110, VANCOUVER, WA, 98661

Owner Name	Mailing Address
HENRY BRIAN	1928 SW 6TH AVE, CAMAS, WA, 98607
HOBBS BENJAMIN C	542 NW MITCHELL ST, CAMAS, WA, 98607
HOFER JAY & HOFER SANDRA M	5509 NE 292ND CT, CAMAS, WA, 98607
HOLOVE JEFFREY L	4817 NW QUARTZ CT, CAMAS, WA, 98607
HOLOVE JEFFREY LEE	4817 NW QUARTZ CT, CAMAS, WA, 98607
HORNER DALE	4209 NW 127TH ST, VANCOUVER, WA, 98685
HOWARD BRENDON M & HOWARD ELLEN L	1778 N 212TH LANE, BUCKEYE, AZ, 85396
HUTCHISON JAMES & NIOSI WILLEMINA	1010 NW 4TH AVE, CAMAS, WA, 98607
INGRAM SCOTT A & INGRAM BRENDA M	2050 SW 6TH AVE, CAMAS, WA, 98607
JACOBY STEVEN & JACOBY SUSAN ANN	1828 SW 6TH AVE, CAMAS, WA, 98607
JAMES RIVER II INC	PO BOX 105681, ATLANTA, GA, 30348
JHTM PROPERTIES LLC	636 SE 3RD AVE, CAMAS, WA, 98607
JING ANDREW QIUHANG & CHE CHUNMEI	1327 NW 5TH AVE, CAMAS, WA, 98607
KELL JOHN K & KELL PAMELA K	1303 NW 5TH AVE, CAMAS, WA, 98607
KERR JOHN & KERR VICKI	1117 NW 5TH AVE, CAMAS, WA, 98607
KIM SUNG BUM & KIM SUNG HEE	558 NW MITCHELL CT, CAMAS, WA, 98607
KNILANS JOHN C	507 NW 7TH AVE, CAMAS, WA, 98607
KOTEL KIMBERLY	968 NW 4TH AVE, CAMAS, WA, 98607
KUSCHELL ALEXANDRA V	409 SW PARK ST, CAMAS, WA, 98607
LA BOLA LLC	2508 SW 6TH AVE, CAMAS, WA, 98607
LABARON KEVIN & LABARON SUZANNE (C/B)	516 NW 5TH AVE, CAMAS, WA, 98607
LADD NATHAN A & LADD TRISHA A TRUSTEES	1209 NW 5TH AVE, CAMAS, WA, 98607
LAFRANCE SHELLY	8616 NE 97TH CT, VANCOUVER, WA, 98662
LATIMER JEFFREY & LATIMER KRISTINE	1313 NW 5TH AVE, CAMAS, WA, 98607
LEMONS JESSICA TRUSTEE ETAL	2153 SW 6TH AVE, CAMAS, WA, 98607
LINDBERG WAYNE	380 SW PARK ST, CAMAS, WA, 98607
LIU SHANNON & LIU SIMENI	545 NW MITCHELL CT, CAMAS, WA, 98607
LOCKE MELVIN S JR & LOCKE CHERYL R	217 NE 4TH AVE , CAMAS, WA, 98607
LOMELAND DUSTY & LOMELAND REBECCA	2244 SW 6TH AVE, CAMAS, WA, 98607
LSR VENTURES LLC	225 NE 4TH AVE, CAMAS, WA, 98607
MARKEL DUANE J	829 NW 4TH AVE, CAMAS, WA, 98607
MARSHALL RICHARD C & MARSHALL CASSANDRA R	1186 NW 10TH AVE, CAMAS, WA, 98607
MARSHALL RICHARD C & MARSHALL CASSANDRA R	2722 SW 6TH AVE, CAMAS, WA, 98607
MARTINEZ JORGE A & MARTINEZ AMANDA R	500 NW 5TH AVE, CAMAS, WA, 98607
MCDONNELL CELESTE	2040 SW 6TH AVE , CAMAS, WA, 98607
MCMAHON MARCELLA R	1201 NW 5TH AVE, CAMAS, WA, 98607
MELTON ALYSSA	1234 NW 5TH AVE, CAMAS, WA, 98607
METRO PROPERTIES INC	PO BOX 528, CAMAS, WA, 98607
METRO PROPERTY GROUP INC	PO BOX 528, CAMAS, WA, 98607
MEYER KATHERINE ESTATE	519 NW 7TH AVE, CAMAS, WA, 98607
MILLER KAMI & KNUTH JASON	PO BOX 698, LA CENTER, WA, 98629
MILLER LARRY & TURNER CHARLES	1540 SW 7TH CIR, CAMAS, WA, 98607
MINER BRIAN D	960 NW 4TH AVE, CAMAS, WA, 98607
MINICH NATHAN D & MINICH JENNIFER K	568 NW MITCHELL ST, CAMAS, WA, 98607
MOEHRING RACHELLE L & MOEHRING CARL B	28501 NE HANCOCK RD, CAMAS, WA, 98607

Owner Name	Mailing Address
MOORSE SHANE & LOWIN SUSAN	536 NW MITCHELL ST, CAMAS, WA, 98607
MORIARTY GRANT	531 NW MITCHELL CT, CAMAS, WA, 98607
MOUNTAIN DEBORAH RANEY	2207 SW 6TH AVE, CAMAS, WA, 98607
NAGY BRENT & NAGY CHRIS R	3028 SW 6TH AVE, CAMAS, WA, 98607
NELSON LUCAS & NELSON SURAPHA	20415 NE 244TH ST, BATTLE GROUND, WA, 98604
NGUYEN JIMMY ETAL	540 NW MITCHELL COURT, CAMAS, WA, 98607
NICHOLS CLARK A & NICHOLS MARY S	1940 SW 6TH AVE, CAMAS, WA, 98607
NICHOLS KENNETH G & NICHOLS DEBORAH	18714 ROBERTS ROAD KP N, VAUGHN, WA, 98394
OTS LLC	2375 SE 8TH AVE, CAMAS, WA, 98607
PARRISH FRED & PARRISH JEANNIE	1317 NW 5TH AVE, CAMAS, WA, 98607
PATTULLO DONA & PATTULLO JAMES	115 NE DALLAS ST, CAMAS, WA, 98607
PERSONETT DARREN & PERSONETT MIA	533 NE 7TH AVE, CAMAS, WA, 98607
PETON JOHN	1301 NW 5TH AVE, CAMAS, WA, 98607
PIPKIN LORNA J & PIPKIN KEVIN J TRUSTEES	534 NE 5TH AVE, CAMAS, WA, 98607
REISWIG CAROLINE	1221 NE 5TH AVE, CAMAS, WA, 98607
REITER MICHAEL & REITER MOLLY	2702 SW 6TH AVE, CAMAS, WA, 98607
REZAIE MOHAMMADREZA	5942 NW 38TH AVE APT 927, CAMAS, WA, 98607
RICHARDS DEWAYNE O & RICHARDS CARMEN E	1522 SW 7TH CIR, CAMAS, WA, 98607
RINTA AARON & RINTA BONNIE	16112 NE 30TH AVENUE, RIDGEFIELD, WA, 98642
RIVERVIEW COMMUNITY BANK	PO BOX 872290, VANCOUVER, WA, 98687
RIVERVIEW SAVINGS BANK	PO BOX 872290, VANCOUVER, WA, 98687
ROBERTSON JOHNNY RAY (C/B)	535 NW ELM ST, CAMAS, WA, 98607
ROBINSON ALEXANDER W & ROBINSON JODIE L	718 NW 4TH AVE, CAMAS, WA, 98607
RODRIGUEZ TYRONE & RODRIGUEZ YOKO	339 SE EVERETT RD, CAMAS, WA, 98607
ROMANO KESS	3016 SW 6TH AVE, CAMAS, WA, 98607
RONHAAR BRITTNI ANNA & RONHAAR TIMOTHY JAMES	728 NE 4TH AVE, CAMAS, WA, 98607
RONHAAR RONALD E	1123 NW 4TH AVE, CAMAS, WA, 98607
ROWLAND LARRY D & ROWLAND LINDA I	548 NW 5TH ST, CAMAS, WA, 98607
RUPLEY JADA R	970 NW 4TH AVE, CAMAS, WA, 98607
SANDERS BUFORD D	1109 NW 4TH AVE, CAMAS, WA, 98607
SANDOVAL RAYMON B & SANDOVAL ROSA E	2346 SW 6th Avenue, CAMAS, WA, 98607
SAULLES ADAM & SAULLES KATELYNN	1239 NW 5TH AVE, CAMAS, WA, 98607
SCHUH GLENDA L	1 ALPINE PLACE, LONGVIEW, WA, 98632
SCOTT KEITH & SCOTT KRYSTAL	3920 SW 5TH AVE, CAMAS, WA, 98607
SHAPIRO ALAN TRUSTEE	4222 SW 5TH AVE, CAMAS, WA, 98607
SHELBY GREG A (C/B)	419 E ST, WASHOUGAL, WA, 98671
SMITH ALLEN MONROE & SMITH RUTH ELIZABETH	800 NW 4TH AVE, CAMAS, WA, 98607
SNYDER CAROLINE M & SNYDER KEGAN M	2060 SW 6TH AVE, CAMAS, WA, 98607
STE WING INVESTMENT LLC	20028 SE THIRD CIRCLE, CAMAS, WA, 98607
SUNDSETH MARK & SUNDSETH MARGARET F	2706 SW 6TH AVE, CAMAS, WA, 98607
TABAAK SERWAH	1307 NW 5TH AVE, CAMAS, WA, 98607
TEJADA ROSSANA	555 NW ELM ST, CAMAS, WA, 98607
THOMPSON DENNIS G	2546 SW 6TH AVE, CAMAS, WA, 98607
THORNTON LORI & SKELTON WILLIAM	2434 SW 6TH AVE, CAMAS, WA, 98607
US BANK OF WASHINGTON NATIONAL ASSOCIATION	PO BOX 460169, HOUSTON, TX, 77056

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VAN TASSEL MICHELLE L & VAN TASSEL ERIC JAMES ETAL	2908 E 13TH ST, VANCOUVER, WA, 98661
VEGDAHL SONJA B & NELSON TIMOTHY A	809 4TH AVE, CAMAS, WA, 98607
VOLOVIK VLADISLAV P & NIAFIODAVA YULIYA V	12109 NE 40TH CIRCLE, VANCOUVER, WA, 98682
VORA YASHAIL	11937 SE REDHAWKS LN, HAPPY VALLEY, OR, 97086
WALKER STEVE & WALKER ELAINE	721 NW 4TH AVE, CAMAS, WA, 98607
WASHINGTON STATE DEPT OF TRANSPORTATION	4100 MAIN ST, VANCOUVER, WA, 98663
WILKINS JERRY & WILKINS KIMBERLY	2316 SW 6TH AVE, CAMAS, WA, 98607
ZEMAN MICHAEL & ZEMAN DEBRA	1311 NW 5TH AVE, CAMAS, WA, 98607
ZIEGLER MARK R TRUSTEE	2120 THE STRAND #7, MANHATTAN BEACH, CA, 90266

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RUPLEY JADA R
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CAMAS, WA 98607

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PO BOX 105681
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FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

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ATLANTA, GA 30348

FORT JAMES CAMAS LLC
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DARLING JESSE J & DARLING TRISTA L
26107 SE 6TH CIR
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FORT JAMES CAMAS LLC
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KNILANS JOHN C
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METRO PROPERTY GROUP INC
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2908 E 13TH ST
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COLBY ROGER J & COLBY JENNIFER D (C/B)
3345 NW 9TH AVE
CAMAS, WA 98607

LAFRANCE SHELLY
8616 NE 97TH CT
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DICKERSON RANDY S
1900 SE 97TH AVE
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DUTTON BRYANT B & DUTTON VICKI A
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CAMAS, WA 98607

DICKERSON RANDY S
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SCHUH GLENDA L
1 ALPINE PLACE
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RIVERVIEW SAVINGS BANK
PO BOX 872290
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JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
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CAMAS, WA 98607

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JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

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FORT JAMES CAMAS LLC
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SHELBY GREG A (C/B)
419 E ST
WASHOUGAL, WA 98671

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

MARKEL DUANE J
829 NW 4TH AVE
CAMAS, WA 98607

WALKER STEVE & WALKER ELAINE
721 NW 4TH AVE
CAMAS, WA 98607

ALBANO THERESA ETAL
PO BOX 1848
VANCOUVER, WA 98668

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534 NE 5TH AVE
CAMAS, WA 98607

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2120 THE STRAND #7
MANHATTAN BEACH, CA 90266

ELLERTSON SAMUEL R & ELLERTSON KAREN R
820 NW 4TH AVE
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LIU SHANNON & LIU SIMENI
545 NW MITCHELL CT
CAMAS, WA 98607

CARTER STEVE & CARTER KATHLEEN
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HUTCHISON JAMES & NIOSI WILLEMINA
1010 NW 4TH AVE
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FMG INVESTMENTS LLC
314 NE BIRCH STREET
CAMAS, WA 98607

FORT JAMES CAMAS LLC
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ELDREDGE MATT SCOTT & ELDREDGE KATHLEEN DEVINE
223 SE GARFIELD ST
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NICHOLS KENNETH G & NICHOLS DEBORAH
18714 ROBERTS ROAD KP N
VAUGHN, WA 98394

DICKERSON RANDY S
1900 SE 97TH AVE
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PO BOX 105681
ATLANTA , GA 30348

FMG BODY SHOP LLC
314 NE BIRCH ST
CAMAS, WA 98607

FORT JAMES CAMAS LLC
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ATLANTA , GA 30348

H & R PROPERTIES LLC
81 ROCKWOOD DR
STEVENSON, WA 98648

H & R PROPERTIES LLC
81 ROCKWOOD DR
STEVENSON, WA 98648

BUSBY BRETT & BUSBY MANDY
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CARTER STEVE
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ROBINSON JODIE L
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GRIMES GEOFFREY & GRIMES
KRISTEN L
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CHRISTOPHER L
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RONHAAR RONALD E
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MINICH NATHAN D & MINICH
JENNIFER K
568 NW MITCHELL ST
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SHAPIRO ALAN TRUSTEE
4222 SW 5TH AVE
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OTS LLC
2375 SE 8TH AVE
CAMAS, WA 98607

METRO PROPERTY GROUP INC
PO BOX 528
CAMAS, WA 98607

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MOEHRING CARL B
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ESHGHI MAHSA
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BECK ALYSSA & BECK CONNOR
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DAMIEN R
1172 N P CIR
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16435 SE DOLPHIN RD
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MARTINEZ JORGE A & MARTINEZ AMANDA R
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FORT JAMES CAMAS LLC
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ATLANTA , GA 30348

JAMES RIVER II INC
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MELTON ALYSSA
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GIANNONE FRANKLIN D & GIANNONE ALEXIS L
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FERGUSON ROBERT & FERGUSON VIVE
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BATTAN ROMAN S
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CAMAS, WA 98607

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MINER BRIAN D
960 NW 4TH AVE
CAMAS, WA 98607

DUISEN PETER J
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HOBBS BENJAMIN C
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CAMAS, WA 98607

MOORSE SHANE & LOWIN SUSAN
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CAMAS, WA 98607

JING ANDREW QIUHANG & CHE CHUNMEI
1327 NW 5TH AVE
CAMAS, WA 98607

MCDONNELL CELESTE
2040 SW 6TH AVE
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LEMONS JESSICA TRUSTEE ETAL
2153 SW 6TH AVE
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NICHOLS CLARK A & NICHOLS MARY S
1940 SW 6TH AVE
CAMAS, WA 98607

MILLER LARRY & TURNER CHARLES
1540 SW 7TH CIR
CAMAS, WA 98607

RINTA AARON & RINTA BONNIE
16112 NE 30TH AVENUE
RIDGEFIELD, WA 98642

REITER MICHAEL & REITER MOLLY
2702 SW 6TH AVE
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THOMPSON DENNIS G
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CAMAS, WA 98607

WASHINGTON STATE DEPT OF TRANSPORTATION
4100 MAIN ST
VANCOUVER, WA 98663

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PO BOX 87601
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LA BOLA LLC
2508 SW 6TH AVE
CAMAS, WA 98607

COLLIER A R & COLLIER C P
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BUCKLEY MICHELE & BUCKLEY RUTH
7226 NE 155TH ST
KENMORE, WA 98028

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2316 SW 6TH AVE
CAMAS, WA 98607

METRO PROPERTIES INC
PO BOX 528
CAMAS, WA 98607

FORT JAMES CAMAS LLC
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CROOK STEPHEN R & CHAU MINOU A T TRUSTEES
4110 SW 5TH AVE
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BURKARD SCOTT & BURKARD ANITA
1530 SW 7TH CIRCLE
CAMAS, WA 98607

DEHART ALLEN R
406 SW PARK ST
CAMAS, WA 98607

WASHINGTON STATE DEPT OF TRANSPORTATION
4100 MAIN ST
VANCOUVER, WA 98663

SNYDER CAROLINE M & SNYDER KEGAN M
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CAMAS, WA 98607

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2434 SW 6TH AVE
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CHEN CHENYAO & HUANG CHENG-FANG
15091 NW FRANCESCA DR
PORTLAND, OR 97229

WILKINS JERRY & WILKINS KIMBERLY
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CAMAS, WA 98607

BUCHHOLZ RONALD H
300 SW PARK ST
CAMAS, WA 98607

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PO BOX 105681
ATLANTA , GA 30348

MEYER KATHERINE ESTATE
519 NW 7TH AVE
CAMAS, WA 98607

OTS LLC
2375 SE 8TH AVE
CAMAS, WA 98607

LSR VENTURES LLC
225 NE 4TH AVE
CAMAS, WA 98607

STE WING INVESTMENT LLC
20028 SE THIRD CIRCLE
CAMAS, WA 98607

LOCKE MELVIN S JR & LOCKE CHERYL R
217 NE 4TH AVE
CAMAS, WA 98607

F+R ENTERPRISES INC
5000 NE 51ST ST
VANCOUVER, WA 98661

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

ACKERMAN KENNETH A
4646 SW 5TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

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ATLANTA , GA 30348

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ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

HAMBREWS4 LLC
2300 E 3RD LOOP SUITE 110
VANCOUVER, WA 98661

CHAU WING C & CHAU NIM HUNG &
CHAU STELLA TRUSTEES
2908 SE 149TH CT
VANCOUVER, WA 98683

HAMBREWS LLC
2300 E 3RD LOOP SUITE 110
VANCOUVER, WA 98661

CLARA STREET BLOCK BUILDING LLC
33316 SE 34TH ST
WASHOUGAL, WA 98671

BAFUS GARY & BAFUS JANICE
TRUSTEES
226 SE GARFIELD ST
CAMAS, WA 98607

CLARA STREET BLOCK BUILDING LLC
33316 SE 34TH ST
WASHOUGAL, WA 98671

HAMBREWS LLC
2300 E 3RD LOOP SUITE 110
VANCOUVER, WA 98661

COLBY ROGER J & COLBY JENNIFER D
(C/B)
3345 NW 9TH AVE
CAMAS, WA 98607

HOWARD BRENDON M & HOWARD
ELLEN L
1778 N 212TH LANE
BUCKEYE, AZ 85396

TEJADA ROSSANA
555 NW ELM ST
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

HOFER JAY & HOFER SANDRA M
5509 NE 292ND CT
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

LADD NATHAN A & LADD TRISHA A
TRUSTEES
1209 NW 5TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA, GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

NGUYEN JIMMY ETAL
540 NW MITCHELL COURT
CAMAS, WA 98607

GRIMES GEOFFREY & GRIMES KRISTEN L
404 NW FARGO ST
CAMAS, WA 98607

RONHAAR RONALD E
1123 NW 4TH AVE
CAMAS, WA 98607

COLLIER ALBERT & COLLIER CAROL
4308 SW 6TH AVE
CAMAS, WA 98607

MOUNTAIN DEBORAH RANEY
2207 SW 6TH AVE
CAMAS, WA 98607

INGRAM SCOTT A & INGRAM BRENDA M
2050 SW 6TH AVE
CAMAS, WA 98607

METRO PROPERTIES INC
PO BOX 528
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

LABARON KEVIN & LABARON SUZANNE (C/B)
516 NW 5TH AVE
CAMAS, WA 98607

VEGDAHL SONJA B & NELSON TIMOTHY A
809 4TH AVE
CAMAS, WA 98607

CHVANOV SERGEY & MIKAILENKO ALLA
550 NW MITCHELL CT
CAMAS, WA 98607

MORIARTY GRANT
531 NW MITCHELL CT
CAMAS, WA 98607

PARRISH FRED & PARRISH JEANNIE
1317 NW 5TH AVE
CAMAS, WA 98607

RICHARDS DEWAYNE O & RICHARDS CARMEN E
1522 SW 7TH CIR
CAMAS, WA 98607

SCOTT KEITH & SCOTT KRYSTAL
3920 SW 5TH AVE
CAMAS, WA 98607

FERRER DEBORAH LYNN
2520 SW 6TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

BARKHODAEE PAUL PRIOUZ TRUSTEE 50%
8487 KENDALL RD UNIT 3
MAPLE FALLS , WA 98266

BEAL RACHEL & ANAGNOSTOU ALEXANDER
447 NW FARGO ST
CAMAS, WA 98607

SMITH ALLEN MONROE & SMITH RUTH ELIZABETH
800 NW 4TH AVE
CAMAS, WA 98607

ESPEDAL ERIC M & ESPEDAL KIMBERLY L
557 NW MITCHELL CT
CAMAS, WA 98607

CALLAN JAMES B & CALLAN ALLISON M
514 NW MITCHELL ST
CAMAS, WA 98607

COULTER GREGG E & COULTER CATHRINA M
2219 SW 6TH AVE
CAMAS, WA 98607

LINDBERG WAYNE
380 SW PARK ST
CAMAS, WA 98607

SANDOVAL RAYMON B & SANDOVAL ROSA E
2346 SW 6th Avenue
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

MCMAHON MARCELLA R
1201 NW 5TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

METRO PROPERTY GROUP INC
PO BOX 528
CAMAS, WA 98607

HENRY BRIAN
1928 SW 6TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

RIVERVIEW COMMUNITY BANK
PO BOX 872290
VANCOUVER, WA 98687

BROWN BEATRICE ETAL
13214 NE 2ND CT
VANCOUVER, WA 98685

DIERICKX RUDOLPH P & DIERICKX KEREN R
PO BOX 327
HUSUM, WA 98623

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

HALSTROM ROBERT E JR & HALSTROM TAMMY L
234 SE GARFIELD ST
CAMAS, WA 98607

US BANK OF WASHINGTON NATIONAL ASSOCIATION
PO BOX 460169
HOUSTON, TX 77056

CARTER STEVE & CARTER KATHLEEN
14018 NW 9TH AVE
VANCOUVER, WA 98685

CALDWELL JULIA ANN
2020 SW 6TH AVE
CAMAS, WA 98607

GILSON MATT & GILSON ASHLEY
1320 NW 5TH AVE
CAMAS, WA 98607

HOLOVE JEFFREY LEE
4817 NW QUARTZ CT
CAMAS, WA 98607

DICKERSON RANDY S
1900 SE 97TH AVE
VANCOUVER, WA 98664

CASE KEVIN W & CASE TERESA L
1330 NW 5TH AVE
CAMAS, WA 98607

REZAIE MOHAMMADREZA
5942 NW 38TH AVE APT 927
CAMAS, WA 98607

ANCHETA REGINALD K & ANCHETA SHARIE
2746 SW 6TH AVE
CAMAS, WA 98607

DEATHERAGE DANIEL J & DEATHERAGE STEPHANIE M
539 NW MITCHELL ST
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

DAVIS NANA M & DAVIS RONALD C
1316 NE 70TH ST
VANCOUVER, WA 98665

HOLOVE JEFFREY L
4817 NW QUARTZ CT
CAMAS, WA 98607

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

DICKERSON RANDY S
1900 SE 97TH AVE
VANCOUVER, WA 98664

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

KUSCHELL ALEXANDRA V
409 SW PARK ST
CAMAS, WA 98607

FISHER KATHERINE
307 SW PARK ST
CAMAS, WA 98607

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

BEACH RAYME & BEACH JERRY
301 SW PARK ST
CAMAS, WA 98607

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

KIM SUNG BUM & KIM SUNG HEE
558 NW MITCHELL CT
CAMAS, WA 98607

KELL JOHN K & KELL PAMELA K
1303 NW 5TH AVE
CAMAS, WA 98607

PETON JOHN
1301 NW 5TH AVE
CAMAS, WA 98607

GIBSON JAMES F & GIBSON DIANA Y
4720 SW 5TH AVE
CAMAS, WA 98607

GIBSON JAMES F & GIBSON DIANA Y
4720 SW 5TH AVE
CAMAS, WA 98607

BARAJAS ALEXANDER & BARAJAS EMILY KATE
561 NW MITCHELL CT
CAMAS, WA 98607

CROWE BRANDON J & CROWE ANDREA D
1315 NW 5TH AVE
CAMAS, WA 98607

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FAULDS CHRISTINE M & FAULDS JASON L
450 NW FARGO ST
CAMAS, WA 98607

ROWLAND LARRY D & ROWLAND LINDA I
548 NW 5TH ST
CAMAS, WA 98607

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

GRIFFIN CHRISTIE TRUSTEE
1460 N T ST
WASHOUGAL, WA 98671

BERTHEL JOANN F
835 NW 4TH AV
CAMAS, WA 98607

BLOW KEVIN ROLAND & BLOW JANICE MARIE
901 NW 4TH AVE
CAMAS, WA 98607

EKSTROM GLEN & EKSTROM CHELSEY
1015 NW 4TH AVE
CAMAS, WA 98607

KERR JOHN & KERR VICKI
1117 NW 5TH AVE
CAMAS, WA 98607

SANDERS BUFORD D
1109 NW 4TH AVE
CAMAS, WA 98607

ANDERSON DALE E & ANDERSON LETA TRUSTEE
PMB 364
VANCOUVER, WA 98683

BAUMAN MARK JONATHAN & BAUMAN REAGAN LYNN
6907 N IVANHOE ST
PORTLAND, OR 97203

RONHAAR RONALD E
1123 NW 4TH AVE
CAMAS, WA 98607

WASHINGTON STATE DEPT OF TRANSPORTATION
4100 MAIN ST
VANCOUVER, WA 98663

GRIFFIN TAMMY R TRUSTEE
19215 SE 34TH ST #376
CAMAS, WA 98607

VORA YASHAIL
11937 SE REDHAWKS LN
HAPPY VALLEY, OR 97086

BRANDLEY RITA THERESA &
BRANDLEY REINARD DIRK TRUSTEES
2824 SW 6TH AVE
CAMAS, WA 98607

DIDYK IVAN YURYEVICH
9017 NE 143RD CIR
VANCOUVER, WA 98662

GRAY POONEH E TRUSTEE
7001 SE TOPPER DR.
VANCOUVER, WA 98664

COX TERRIE TRUSTEE
15399 SE RIVERSHORE DR
VANCOUVER, WA 98683

NELSON LUCAS & NELSON SURAPHA
20415 NE 244TH ST
BATTLE GROUND, WA 98604

LOMELAND DUSTY & LOMELAND
REBECCA
2244 SW 6TH AVE
CAMAS, WA 98607

BABCOCK JOHN S
2228 SW 6TH AVE
CAMAS, WA 98607

NELSON LUCAS & NELSON SURAPHA
20415 NE 244TH ST
BATTLE GROUND, WA 98604

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

ROMANO KESS
3016 SW 6TH AVE
CAMAS, WA 98607

VOLOVIK VLADISLAV P &
NIAFIODAVA YULIYA V
12109 NE 40TH CIRCLE
VANCOUVER, WA 98682

NAGY BRENT & NAGY CHRIS R
3028 SW 6TH AVE
CAMAS, WA 98607

JACOBY STEVEN & JACOBY SUSAN
ANN
1828 SW 6TH AVE
CAMAS, WA 98607

DO VINCENT & NGUYEN HELEN
4412 SW 6TH AVE
CAMAS, WA 98607

MARSHALL RICHARD C & MARSHALL
CASSANDRA R
1186 NW 10TH AVE
CAMAS, WA 98607

ANDERSON DALE & ANDERSON LETA
(C/B)
% DEA INVESTMENTS PMB 364
VANCOUVER, WA 98683

ANDERSON DALE E & ANDERSON
LETA L TRUSTEES ETAL
4420 SW 5TH AVE
CAMAS, WA 98607

ANDERSON DALE E & ANDERSON
LETA TRUSTEE
PMB 364
VANCOUVER, WA 98683

ACKERMAN KENNETH A
4646 SW 5TH AVE
CAMAS, WA 98607

MARSHALL RICHARD C & MARSHALL
CASSANDRA R
2722 SW 6TH AVE
CAMAS, WA 98607

SUNDSETH MARK & SUNDSETH
MARGARET F
2706 SW 6TH AVE
CAMAS, WA 98607

MARSHALL RICHARD C & MARSHALL
CASSANDRA R
1186 NW 10TH AVE
CAMAS, WA 98607

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

LATIMER JEFFREY & LATIMER
KRISTINE
1313 NW 5TH AVE
CAMAS, WA 98607

DLS PROPERTIES INC
5687 S 6TH WAY
RIDGEFIELD, WA 98642

TABAAK SERWAH
1307 NW 5TH AVE
CAMAS, WA 98607

RODRIGUEZ TYRONE & RODRIGUEZ
YOKO
339 SE EVERETT RD
CAMAS, WA 98607

ZEMAN MICHAEL & ZEMAN DEBRA
1311 NW 5TH AVE
CAMAS, WA 98607

BLOCK JOSEPH A & BLOCK GILLIAN A
37104 SE MT NORWAY DR
WASHOUGAL, WA 98607

KOTEL KIMBERLY
968 NW 4TH AVE
CAMAS, WA 98607

RUPLEY JADA R
970 NW 4TH AVE
CAMAS, WA 98607

GEORGIA-PACIFIC CORPORATION
PO BOX 105681
ATLANTA, GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA, GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

DARLING JESSE J & DARLING TRISTA L
26107 SE 6TH CIR
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA, GA 30348

PERSONETT DARREN & PERSONETT MIA
533 NE 7TH AVE
CAMAS, WA 98607

KNILANS JOHN C
507 NW 7TH AVE
CAMAS, WA 98607

US BANK OF WASHINGTON NATIONAL ASSOCIATION
PO BOX 460169
HOUSTON, TX 77056

METRO PROPERTY GROUP INC
PO BOX 528
CAMAS, WA 98607

VAN TASSEL MICHELLE L & VAN TASSEL ERIC JAMES ETAL
2908 E 13TH ST
VANCOUVER, WA 98661

COLBY ROGER J & COLBY JENNIFER D (C/B)
3345 NW 9TH AVE
CAMAS, WA 98607

LAFRANCE SHELLY
8616 NE 97TH CT
VANCOUVER, WA 98662

DICKERSON RANDY S
1900 SE 97TH AVE
VANCOUVER, WA 98664

DUTTON BRYANT B & DUTTON VICKI A
569 NW ELM ST
CAMAS, WA 98607

DICKERSON RANDY S
1900 SE 97TH AVE
VANCOUVER, WA 98664

SCHUH GLENDA L
1 ALPINE PLACE
LONGVIEW, WA 98632

RIVERVIEW SAVINGS BANK
PO BOX 872290
VANCOUVER, WA 98687

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA, GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

SHELBY GREG A (C/B)
419 E ST
WASHOUGAL, WA 98671

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

MARKEL DUANE J
829 NW 4TH AVE
CAMAS, WA 98607

WALKER STEVE & WALKER ELAINE
721 NW 4TH AVE
CAMAS, WA 98607

ALBANO THERESA ETAL
PO BOX 1848
VANCOUVER, WA 98668

PIPKIN LORNA J & PIPKIN KEVIN J TRUSTEES
534 NE 5TH AVE
CAMAS, WA 98607

ZIEGLER MARK R TRUSTEE
2120 THE STRAND #7
MANHATTAN BEACH, CA 90266

ELLERTSON SAMUEL R & ELLERTSON KAREN R
820 NW 4TH AVE
CAMAS, WA 98607

RONHAAR BRITTNI ANNA & RONHAAR TIMOTHY JAMES
728 NE 4TH AVE
CAMAS, WA 98607

LIU SHANNON & LIU SIMENI
545 NW MITCHELL CT
CAMAS, WA 98607

CARTER STEVE & CARTER KATHLEEN
14018 NW 9TH AVE
VANCOUVER, WA 98685

HUTCHISON JAMES & NIOSI WILLEMINA
1010 NW 4TH AVE
CAMAS, WA 98607

FMG INVESTMENTS LLC
314 NE BIRCH STREET
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

ELDREDGE MATT SCOTT & ELDREDGE KATHLEEN DEVINE
223 SE GARFIELD ST
CAMAS, WA 98607

NICHOLS KENNETH G & NICHOLS DEBORAH
18714 ROBERTS ROAD KP N
VAUGHN, WA 98394

DICKERSON RANDY S
1900 SE 97TH AVE
VANCOUVER, WA 98664

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FMG BODY SHOP LLC
314 NE BIRCH ST
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

H & R PROPERTIES LLC
81 ROCKWOOD DR
STEVENSON, WA 98648

H & R PROPERTIES LLC
81 ROCKWOOD DR
STEVENSON, WA 98648

BUSBY BRETT & BUSBY MANDY
1235 NW 5TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

SAULLES ADAM & SAULLES KATELYNN
1239 NW 5TH AVE
CAMAS, WA 98607

CARTER STEVE
17412 EVERGREEN HIGHWAY
VANCOUVER, WA 98683

ROBINSON ALEXANDER W & ROBINSON JODIE L
718 NW 4TH AVE
CAMAS, WA 98607

GRIMES GEOFFREY & GRIMES KRISTEN L
404 NW FARGO ST
CAMAS, WA 98607

GONZALEZ KATHLEEN & DANIEL CHRISTOPHER L
904 NW 4TH AVE
CAMAS, WA 98607

RONHAAR RONALD E
1123 NW 4TH AVE
CAMAS, WA 98607

MINICH NATHAN D & MINICH JENNIFER K
568 NW MITCHELL ST
CAMAS, WA 98607

SHAPIRO ALAN TRUSTEE
4222 SW 5TH AVE
CAMAS, WA 98607

OTS LLC
2375 SE 8TH AVE
CAMAS, WA 98607

METRO PROPERTY GROUP INC
PO BOX 528
CAMAS, WA 98607

METRO PROPERTY GROUP INC
PO BOX 528
CAMAS, WA 98607

METRO PROPERTY GROUP INC
PO BOX 528
CAMAS, WA 98607

METRO PROPERTY GROUP INC
PO BOX 528
CAMAS, WA 98607

MOEHRING RACHELLE L & MOEHRING CARL B
28501 NE HANCOCK RD
CAMAS, WA 98607

FMG BODY SHOP LLC
314 NE BIRCH ST
CAMAS, WA 98607

MILLER KAMI & KNUTH JASON
PO BOX 698
LA CENTER, WA 98629

ANDRUS RYAN J
PO BOX 848
CAMAS, WA 98607

PATTULLO DONA & PATTULLO JAMES
115 NE DALLAS ST
CAMAS, WA 98607

ESHGHI MAHSA
207 NE 3RD AVENUE
CAMAS, WA 98607

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

CHAMBERLAIN MARY E
545 NW ELM
CAMAS, WA 98607

ROBERTSON JOHNNY RAY (C/B)
535 NW ELM ST
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

GREEN CHRISTINA ANN
216-218 SE DALLAS ST
CAMAS, WA 98607

BECK ALYSSA & BECK CONNOR
527 NW ELM ST
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FROST DANIEL E & FROST SHARYN L
512 NW ELM ST
CAMAS, WA 98607

CROSWELL LETICIA M & OVERSTREET DAMIEN R
1172 N P CIR
WASHOUGAL, WA 98671

DAHLBERG AUDREY & TANZER AUSTIN
16435 SE DOLPHIN RD
DAMASCUS, OR 97089

HORNER DALE
4209 NW 127TH ST
VANCOUVER, WA 98685

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

REISWIG CAROLINE
1221 NE 5TH AVE
CAMAS, WA 98607

GASSIN CHRISTOPHER A & EYKHMAN ANNA
508 NW 5TH AVE
CAMAS, WA 98607

MARTINEZ JORGE A & MARTINEZ AMANDA R
500 NW 5TH AVE
CAMAS, WA 98607

PIPKIN LORNA J & PIPKIN KEVIN J TRUSTEES
534 NE 5TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JAMES RIVER II INC
PO BOX 105681
ATLANTA, GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

MELTON ALYSSA
1234 NW 5TH AVE
CAMAS, WA 98607

GIANNONE FRANKLIN D & GIANNONE ALEXIS L
840 NW 4TH AVE
CAMAS, WA 98607

FERGUSON ROBERT & FERGUSON VIVE
834 NW 4TH AVE
CAMAS, WA 98607

BATTAN ROMAN S
403 NW FARGO ST
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

MINER BRIAN D
960 NW 4TH AVE
CAMAS, WA 98607

DUISEN PETER J
1000 NW 4TH AVE
CAMAS, WA 98607

HOBBS BENJAMIN C
542 NW MITCHELL ST
CAMAS, WA 98607

MOORSE SHANE & LOWIN SUSAN
536 NW MITCHELL ST
CAMAS, WA 98607

JING ANDREW QIUHANG & CHE CHUNMEI
1327 NW 5TH AVE
CAMAS, WA 98607

MCDONNELL CELESTE
2040 SW 6TH AVE
CAMAS, WA 98607

LEMONS JESSICA TRUSTEE ETAL
2153 SW 6TH AVE
CAMAS, WA 98607

CHASE CORY & WOHLGEMUTH DEANNA
2422 SW 6TH AVE
CAMAS, WA 98607

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

BROWN MATTHEW R & BROWN KATE M
1512 SW 7TH CIR
CAMAS, WA 98607

NICHOLS CLARK A & NICHOLS MARY S
1940 SW 6TH AVE
CAMAS, WA 98607

MILLER LARRY & TURNER CHARLES
1540 SW 7TH CIR
CAMAS, WA 98607

RINTA AARON & RINTA BONNIE
16112 NE 30TH AVENUE
RIDGEFIELD, WA 98642

REITER MICHAEL & REITER MOLLY
2702 SW 6TH AVE
CAMAS, WA 98607

THOMPSON DENNIS G
2546 SW 6TH AVE
CAMAS, WA 98607

WASHINGTON STATE DEPT OF TRANSPORTATION
4100 MAIN ST
VANCOUVER, WA 98663

BURK DOLORES
PO BOX 87601
VANCOUVER, WA 98687

LA BOLA LLC
2508 SW 6TH AVE
CAMAS, WA 98607

COLLIER A R & COLLIER C P
4308 SW 5TH AVE
CAMAS, WA 98607

BUCKLEY MICHELE & BUCKLEY RUTH
7226 NE 155TH ST
KENMORE, WA 98028

METRO PROPERTIES INC
PO BOX 528
CAMAS, WA 98607

CROOK STEPHEN R & CHAU MINOU A T TRUSTEES
4110 SW 5TH AVE
CAMAS, WA 98607

DEHART ALLEN R
406 SW PARK ST
CAMAS, WA 98607

SNYDER CAROLINE M & SNYDER KEGAN M
2060 SW 6TH AVE
CAMAS, WA 98607

CHEN CHENYAO & HUANG CHENG-FANG
15091 NW FRANCESCA DR
PORTLAND, OR 97229

BUCHHOLZ RONALD H
300 SW PARK ST
CAMAS, WA 98607

MEYER KATHERINE ESTATE
519 NW 7TH AVE
CAMAS, WA 98607

LSR VENTURES LLC
225 NE 4TH AVE
CAMAS, WA 98607

LOCKE MELVIN S JR & LOCKE CHERYL R
217 NE 4TH AVE
CAMAS, WA 98607

WILKINS JERRY & WILKINS KIMBERLY
2316 SW 6TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

BURKARD SCOTT & BURKARD ANITA
1530 SW 7TH CIRCLE
CAMAS, WA 98607

WASHINGTON STATE DEPT OF TRANSPORTATION
4100 MAIN ST
VANCOUVER, WA 98663

THORNTON LORI & SKELTON WILLIAM
2434 SW 6TH AVE
CAMAS, WA 98607

WILKINS JERRY & WILKINS KIMBERLY
2316 SW 6TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

OTS LLC
2375 SE 8TH AVE
CAMAS, WA 98607

STE WING INVESTMENT LLC
20028 SE THIRD CIRCLE
CAMAS, WA 98607

F+R ENTERPRISES INC
5000 NE 51ST ST
VANCOUVER, WA 98661

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

ACKERMAN KENNETH A
4646 SW 5TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

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ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

HAMBREWS4 LLC
2300 E 3RD LOOP SUITE 110
VANCOUVER, WA 98661

CHAU WING C & CHAU NIM HUNG & CHAU STELLA TRUSTEES
2908 SE 149TH CT
VANCOUVER, WA 98683

HAMBREWS LLC
2300 E 3RD LOOP SUITE 110
VANCOUVER, WA 98661

BAFUS GARY & BAFUS JANICE TRUSTEES
226 SE GARFIELD ST
CAMAS, WA 98607

HAMBREWS LLC
2300 E 3RD LOOP SUITE 110
VANCOUVER, WA 98661

HOWARD BRENDON M & HOWARD ELLEN L
1778 N 212TH LANE
BUCKEYE, AZ 85396

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

HOFER JAY & HOFER SANDRA M
5509 NE 292ND CT
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

LADD NATHAN A & LADD TRISHA A TRUSTEES
1209 NW 5TH AVE
CAMAS, WA 98607

CLARA STREET BLOCK BUILDING LLC
33316 SE 34TH ST
WASHOUGAL, WA 98671

CLARA STREET BLOCK BUILDING LLC
33316 SE 34TH ST
WASHOUGAL, WA 98671

COLBY ROGER J & COLBY JENNIFER D (C/B)
3345 NW 9TH AVE
CAMAS, WA 98607

TEJADA ROSSANA
555 NW ELM ST
CAMAS, WA 98607

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA, GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

BARKHODAEE PAUL PRIOUZ TRUSTEE 50%
8487 KENDALL RD UNIT 3
MAPLE FALLS , WA 98266

VEGDAHL SONJA B & NELSON TIMOTHY A
809 4TH AVE
CAMAS, WA 98607

NGUYEN JIMMY ETAL
540 NW MITCHELL COURT
CAMAS, WA 98607

SMITH ALLEN MONROE & SMITH RUTH ELIZABETH
800 NW 4TH AVE
CAMAS, WA 98607

MORIARTY GRANT
531 NW MITCHELL CT
CAMAS, WA 98607

RONHAAR RONALD E
1123 NW 4TH AVE
CAMAS, WA 98607

CALLAN JAMES B & CALLAN ALLISON M
514 NW MITCHELL ST
CAMAS, WA 98607

RICHARDS DEWAYNE O & RICHARDS CARMEN E
1522 SW 7TH CIR
CAMAS, WA 98607

MOUNTAIN DEBORAH RANEY
2207 SW 6TH AVE
CAMAS, WA 98607

LABARON KEVIN & LABARON SUZANNE (C/B)
516 NW 5TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

BEAL RACHEL & ANAGNOSTOU ALEXANDER
447 NW FARGO ST
CAMAS, WA 98607

CHVANOV SERGEY & MIKAILENKO ALLA
550 NW MITCHELL CT
CAMAS, WA 98607

GRIMES GEOFFREY & GRIMES KRISTEN L
404 NW FARGO ST
CAMAS, WA 98607

ESPEDAL ERIC M & ESPEDAL KIMBERLY L
557 NW MITCHELL CT
CAMAS, WA 98607

PARRISH FRED & PARRISH JEANNIE
1317 NW 5TH AVE
CAMAS, WA 98607

COLLIER ALBERT & COLLIER CAROL
4308 SW 6TH AVE
CAMAS, WA 98607

COULTER GREGG E & COULTER CATHRINA M
2219 SW 6TH AVE
CAMAS, WA 98607

SCOTT KEITH & SCOTT KRYSTAL
3920 SW 5TH AVE
CAMAS, WA 98607

LINDBERG WAYNE
380 SW PARK ST
CAMAS, WA 98607

INGRAM SCOTT A & INGRAM BRENDA M
2050 SW 6TH AVE
CAMAS, WA 98607

FERRER DEBORAH LYNN
2520 SW 6TH AVE
CAMAS, WA 98607

SANDOVAL RAYMON B & SANDOVAL ROSA E
2346 SW 6th Avenue
CAMAS, WA 98607

METRO PROPERTIES INC
PO BOX 528
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

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ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

MCMAHON MARCELLA R
1201 NW 5TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

METRO PROPERTY GROUP INC
PO BOX 528
CAMAS, WA 98607

HENRY BRIAN
1928 SW 6TH AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

RIVERVIEW COMMUNITY BANK
PO BOX 872290
VANCOUVER, WA 98687

BROWN BEATRICE ETAL
13214 NE 2ND CT
VANCOUVER, WA 98685

DIERICKX RUDOLPH P & DIERICKX KEREN R
PO BOX 327
HUSUM, WA 98623

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

HALSTROM ROBERT E JR & HALSTROM TAMMY L
234 SE GARFIELD ST
CAMAS, WA 98607

US BANK OF WASHINGTON NATIONAL ASSOCIATION
PO BOX 460169
HOUSTON, TX 77056

CARTER STEVE & CARTER KATHLEEN
14018 NW 9TH AVE
VANCOUVER, WA 98685

CALDWELL JULIA ANN
2020 SW 6TH AVE
CAMAS, WA 98607

GILSON MATT & GILSON ASHLEY
1320 NW 5TH AVE
CAMAS, WA 98607

HOLOVE JEFFREY LEE
4817 NW QUARTZ CT
CAMAS, WA 98607

DICKERSON RANDY S
1900 SE 97TH AVE
VANCOUVER, WA 98664

CASE KEVIN W & CASE TERESA L
1330 NW 5TH AVE
CAMAS, WA 98607

REZAIE MOHAMMADREZA
5942 NW 38TH AVE APT 927
CAMAS, WA 98607

ANCHETA REGINALD K & ANCHETA SHARIE
2746 SW 6TH AVE
CAMAS, WA 98607

DEATHERAGE DANIEL J & DEATHERAGE STEPHANIE M
539 NW MITCHELL ST
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

DAVIS NANA M & DAVIS RONALD C
1316 NE 70TH ST
VANCOUVER, WA 98665

HOLOVE JEFFREY L
4817 NW QUARTZ CT
CAMAS, WA 98607

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

DICKERSON RANDY S
1900 SE 97TH AVE
VANCOUVER, WA 98664

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

KUSCHELL ALEXANDRA V
409 SW PARK ST
CAMAS, WA 98607

FISHER KATHERINE
307 SW PARK ST
CAMAS, WA 98607

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

BEACH RAYME & BEACH JERRY
301 SW PARK ST
CAMAS, WA 98607

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

KIM SUNG BUM & KIM SUNG HEE
558 NW MITCHELL CT
CAMAS, WA 98607

KELL JOHN K & KELL PAMELA K
1303 NW 5TH AVE
CAMAS, WA 98607

PETON JOHN
1301 NW 5TH AVE
CAMAS, WA 98607

GIBSON JAMES F & GIBSON DIANA Y
4720 SW 5TH AVE
CAMAS, WA 98607

GIBSON JAMES F & GIBSON DIANA Y
4720 SW 5TH AVE
CAMAS, WA 98607

BARAJAS ALEXANDER & BARAJAS EMILY KATE
561 NW MITCHELL CT
CAMAS, WA 98607

CROWE BRANDON J & CROWE ANDREA D
1315 NW 5TH AVE
CAMAS, WA 98607

BURLINGTON NORTHERN INC
2301 LOU MENK DR
FORT WORTH, TX 76131

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

JHTM PROPERTIES LLC
636 SE 3RD AVE
CAMAS, WA 98607

FORT JAMES CAMAS LLC
PO BOX 105681
ATLANTA , GA 30348

FAULDS CHRISTINE M & FAULDS JASON L
450 NW FARGO ST
CAMAS, WA 98607

ROWLAND LARRY D & ROWLAND LINDA I
548 NW 5TH ST
CAMAS, WA 98607

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

GRIFFIN CHRISTIE TRUSTEE
1460 N T ST
WASHOUGAL, WA 98671

BERTHEL JOANN F
835 NW 4TH AV
CAMAS, WA 98607

BLOW KEVIN ROLAND & BLOW JANICE MARIE
901 NW 4TH AVE
CAMAS, WA 98607

EKSTROM GLEN & EKSTROM CHELSEY
1015 NW 4TH AVE
CAMAS, WA 98607

KERR JOHN & KERR VICKI
1117 NW 5TH AVE
CAMAS, WA 98607

SANDERS BUFORD D
1109 NW 4TH AVE
CAMAS, WA 98607

ANDERSON DALE E & ANDERSON LETA TRUSTEE
PMB 364
VANCOUVER, WA 98683

BAUMAN MARK JONATHAN & BAUMAN REAGAN LYNN
6907 N IVANHOE ST
PORTLAND, OR 97203

RONHAAR RONALD E
1123 NW 4TH AVE
CAMAS, WA 98607

WASHINGTON STATE DEPT OF TRANSPORTATION
4100 MAIN ST
VANCOUVER, WA 98663

GRIFFIN TAMMY R TRUSTEE
19215 SE 34TH ST #376
CAMAS, WA 98607

VORA YASHAIL
11937 SE REDHAWKS LN
HAPPY VALLEY, OR 97086

BRANDLEY RITA THERESA & BRANDLEY REINARD DIRK TRUSTEES
2824 SW 6TH AVE
CAMAS, WA 98607

DIDYK IVAN YURYEVICH
9017 NE 143RD CIR
VANCOUVER, WA 98662

GRAY POONEH E TRUSTEE
7001 SE TOPPER DR.
VANCOUVER, WA 98664

COX TERRIE TRUSTEE
15399 SE RIVERSHORE DR
VANCOUVER, WA 98683

NELSON LUCAS & NELSON SURAPHA
20415 NE 244TH ST
BATTLE GROUND, WA 98604

LOMELAND DUSTY & LOMELAND REBECCA
2244 SW 6TH AVE
CAMAS, WA 98607

BABCOCK JOHN S
2228 SW 6TH AVE
CAMAS, WA 98607

NELSON LUCAS & NELSON SURAPHA
20415 NE 244TH ST
BATTLE GROUND, WA 98604

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

ROMANO KESS
3016 SW 6TH AVE
CAMAS, WA 98607

VOLOVIK VLADISLAV P & NIAFIODAVA YULIYA V
12109 NE 40TH CIRCLE
VANCOUVER, WA 98682

NAGY BRENT & NAGY CHRIS R
3028 SW 6TH AVE
CAMAS, WA 98607

JACOBY STEVEN & JACOBY SUSAN ANN
1828 SW 6TH AVE
CAMAS, WA 98607

DO VINCENT & NGUYEN HELEN
4412 SW 6TH AVE
CAMAS, WA 98607

MARSHALL RICHARD C & MARSHALL CASSANDRA R
1186 NW 10TH AVE
CAMAS, WA 98607

ANDERSON DALE & ANDERSON LETA (C/B)
% DEA INVESTMENTS PMB 364
VANCOUVER, WA 98683

ANDERSON DALE E & ANDERSON LETA L TRUSTEES ETAL
4420 SW 5TH AVE
CAMAS, WA 98607

ANDERSON DALE E & ANDERSON LETA TRUSTEE
PMB 364
VANCOUVER, WA 98683

ACKERMAN KENNETH A
4646 SW 5TH AVE
CAMAS, WA 98607

MARSHALL RICHARD C & MARSHALL CASSANDRA R
2722 SW 6TH AVE
CAMAS, WA 98607

SUNDSETH MARK & SUNDSETH MARGARET F
2706 SW 6TH AVE
CAMAS, WA 98607

MARSHALL RICHARD C & MARSHALL CASSANDRA R
1186 NW 10TH AVE
CAMAS, WA 98607

CITY OF CAMAS
616 NE 4TH AVE
CAMAS, WA 98607

LATIMER JEFFREY & LATIMER KRISTINE
1313 NW 5TH AVE
CAMAS, WA 98607

DLS PROPERTIES INC
5687 S 6TH WAY
RIDGEFIELD, WA 98642

TABAAK SERWAH
1307 NW 5TH AVE
CAMAS, WA 98607

RODRIGUEZ TYRONE & RODRIGUEZ YOKO
339 SE EVERETT RD
CAMAS, WA 98607

ZEMAN MICHAEL & ZEMAN DEBRA
1311 NW 5TH AVE
CAMAS, WA 98607

County Certified and Created Parcel Mailing List and Mailing Labels

(for properties within three hundred feet of the subject parcel; formatted for both Avery 5160 and 5161 systems)

PID	Situs Address			
84746026	962 NW 4TH AVE	CAMAS	WA	98607
84746024	968 NW 4TH AVE	CAMAS	WA	98607
84746028	970 NW 4TH AVE	CAMAS	WA	98607
91044013			WA	0
79960000			WA	0
79970000			WA	0
79941000	217 NE 6TH AVE	CAMAS	WA	98607
79950000	235 NE 6TH AVE	CAMAS	WA	98607
79930000	201 NE 6TH AVE	CAMAS	WA	98607
79040000			WA	0
86080000	533 NW 7TH AVE	CAMAS	WA	98607
86070000	507 NW 7TH AVE	CAMAS	WA	98607
78960000			WA	0
85229000			WA	0
76680000	424 NE 2ND AVE	CAMAS	WA	98607
77912000	221 NE 3RD AVE	CAMAS	WA	98607
76695000	410 NE 2ND AVE	CAMAS	WA	98607
77790000	224 NE 3RD AVE	CAMAS	WA	98607
84745010	569 NW ELM ST	CAMAS	WA	98607
77810000	216 NE 3RD AVE	CAMAS	WA	98607
89532000			WA	0
89550000	202 SE DALLAS ST	CAMAS	WA	98607
89740000	636 SE 3RD AVE	CAMAS	WA	98607
89590000	219 SE EVERETT ST	CAMAS	WA	98607
89730000			WA	0
89040000	234 E 1ST AVE	CAMAS	WA	98607
89620000			WA	0
89115000			WA	0
89030000			WA	0
89790000			WA	0
89650000			WA	0
89700000	325 SE EVERETT ST	CAMAS	WA	98607
85153000			WA	0
85154000			WA	0
77950000	204 NE 4TH AVE	CAMAS	WA	98607
89710000	331 SE EVERETT ST	CAMAS	WA	98607
84746018	829 NW 4TH AVE	CAMAS	WA	98607
84746012	721 NW 4TH AVE	CAMAS	WA	98607
85144018	520 NW MITCHELL CT	CAMAS	WA	98607
85205000			WA	0
85144016	528 NW MITCHELL CT	CAMAS	WA	98607
85221000	820 NW 4TH AVE	CAMAS	WA	98607
85211000	728 NW 4TH AVE	CAMAS	WA	98607
85144004	545 NW MITCHELL CT	CAMAS	WA	98607
85144024			WA	0

PID	Situs Address			
85251005	1010 NW 4TH AVE	CAMAS	WA	98607
77750000	213 NE CEDAR ST	CAMAS	WA	98607
85158000			WA	0
89500000	223 SE GARFIELD ST	CAMAS	WA	98607
89490000	214 SE FRANKLIN ST	CAMAS	WA	98607
77800000	224 NE 3RD AVE	CAMAS	WA	98607
85228000	504 NW ELM ST	CAMAS	WA	98607
76640000	440 NE 2ND AVE	CAMAS	WA	98607
85151000			WA	0
89770000	325 SE FRANKLIN ST	CAMAS	WA	98607
89780000			WA	0
85272007	1235 NW 5TH AVE	CAMAS	WA	98607
89694000			WA	0
85272004	1239 NW 5TH AVE	CAMAS	WA	98607
85144020	512 NW MITCHELL CT	CAMAS	WA	98607
85195000	718 NW 4TH AVE	CAMAS	WA	98607
85213000	404 NW FARGO ST	CAMAS	WA	98607
85220000	904 NW 4TH AVE	CAMAS	WA	98607
85246000			WA	0
84455030	568 NW MITCHELL ST	CAMAS	WA	98607
127141000	4222 SW 5TH AVE	CAMAS	WA	98607
79030000	230 NE 5TH AVE	CAMAS	WA	98607
82909000	502 NW 7TH AVE	CAMAS	WA	98607
85238000			WA	0
85133000			WA	0
85239000			WA	0
77627000	417 NE 2ND AVE	CAMAS	WA	98607
77770000	318 NE 3RD AVE	CAMAS	WA	98607
76670000	436 NE 2ND AVE	CAMAS	WA	98607
89485000	213 SE GARFIELD ST	CAMAS	WA	98607
76660000	115 NE DALLAS ST	CAMAS	WA	98607
77860000	207 NE 3RD AVE	CAMAS	WA	98607
76650000			WA	0
84745030	545 NW ELM ST	CAMAS	WA	98607
84745040	535 NW ELM ST	CAMAS	WA	98607
89090000			WA	0
89570000	216 SE DALLAS ST	CAMAS	WA	98607
84745050	527 NW ELM ST	CAMAS	WA	98607
89080000			WA	0
85185000	512 NW ELM ST	CAMAS	WA	98607
84745070	511 NW 5TH AVE	CAMAS	WA	98607
84745060	503 NW 5TH AVE	CAMAS	WA	98607
89680000	305 SE EVERETT ST	CAMAS	WA	98607
89020000	112 E 1ST AVE	CAMAS	WA	98607
85272008	1221 NW 5TH AVE	CAMAS	WA	98607

PID	Situs Address			
85244000	508 NW 5TH AVE	CAMAS	WA	98607
85248000	500 NW 5TH AVE	CAMAS	WA	98607
85215000	534 NW 5TH AVE	CAMAS	WA	98607
89714000			WA	0
88990000			WA	0
85230000			WA	0
85182000	1234 NW 5TH AVE	CAMAS	WA	98607
85209000	840 NW 4TH AVE	CAMAS	WA	98607
85272006	834 NW 4TH AVE	CAMAS	WA	98607
85194000	403 NW FARGO ST	CAMAS	WA	98607
88980000			WA	0
84746022	960 NW 4TH AVE	CAMAS	WA	98607
85251000	1000 NW 4TH AVE	CAMAS	WA	98607
84455020	542 NW MITCHELL ST	CAMAS	WA	98607
84455010	536 NW MITCHELL ST	CAMAS	WA	98607
84154000	1327 NW 5TH AVE	CAMAS	WA	98607
83020000	2040 SW 6TH AVE	CAMAS	WA	98607
83840000	2153 SW 6TH AVE	CAMAS	WA	98607
83068000	2422 SW 6TH AVE	CAMAS	WA	98607
83002000			WA	0
84136035	1512 SW 7TH CIR	CAMAS	WA	98607
84020000	1940 SW 6TH AVE	CAMAS	WA	98607
84136011	1540 SW 7TH CIR	CAMAS	WA	98607
84136000	410 SW PARK ST	CAMAS	WA	98607
83013000	2702 SW 6TH AVE	CAMAS	WA	98607
83014000	2546 SW 6TH AVE	CAMAS	WA	98607
83045000			WA	0
83019000	2530 SW 6TH AVE	CAMAS	WA	98607
83042000	2508 SW 6TH AVE	CAMAS	WA	98607
83036000	2070 SW 6TH AVE	CAMAS	WA	98607
83026000	2406 SW 6TH AVE	CAMAS	WA	98607
83063000			WA	0
83018000	2300 SW 6TH AVE	CAMAS	WA	98607
500815000			WA	0
127165000	4110 SW 5TH AVE	CAMAS	WA	98607
84136025	1530 SW 7TH CIR	CAMAS	WA	98607
84136020			WA	0
83059000			WA	0
83036005	2060 SW 6TH AVE	CAMAS	WA	98607
83030000	2434 SW 6TH AVE	CAMAS	WA	98607
83029000	2348 SW 6TH AVE	CAMAS	WA	98607
83046000	2316 SW 6TH AVE	CAMAS	WA	98607
84136015	300 SW PARK ST	CAMAS	WA	98607
79940000	213 NE 6TH AVE	CAMAS	WA	98607
86075000	519 NW 7TH AVE	CAMAS	WA	98607

PID	Situs Address			
79033000			WA	0
79010000	225 NE 4TH AVE	CAMAS	WA	98607
79015000	221 NE 4TH AVE	CAMAS	WA	98607
79000000	217 NE 4TH AVE	CAMAS	WA	98607
82911000	419 NW 6TH AVE	CAMAS	WA	98607
500814001			WA	0
500820000			WA	0
500903000			WA	0
500902000			WA	0
500904000			WA	0
84150000			WA	0
500818000			WA	0
89105000	336 E 1ST AVE	CAMAS	WA	98607
89630000			WA	0
89120000	129 SE CEDAR ST	CAMAS	WA	98607
500901000			WA	0
89640000			WA	0
89150000			WA	0
89110000			WA	0
89615000	203 SE DALLAS ST	CAMAS	WA	98607
89616000	428 SE 2ND AVE	CAMAS	WA	98607
89610000			WA	0
89180000	129 SE DALLAS ST	CAMAS	WA	98607
77920000	323 NE BIRCH ST UNIT 101	CAMAS	WA	98607
77930000	222 NE 4TH AVE	CAMAS	WA	98607
77940000	212 NE 4TH AVE	CAMAS	WA	98607
77910000	303 NE BIRCH ST	CAMAS	WA	98607
89454000	226 SE GARFIELD ST	CAMAS	WA	98607
77900000	231 NE 3RD AVE	CAMAS	WA	98607
77890000	322 NE ADAMS ST	CAMAS	WA	98607
77870000	217 NE 3RD AVE	CAMAS	WA	98607
89510000	235 SE GARFIELD ST	CAMAS	WA	98607
84745020	555 NW ELM ST	CAMAS	WA	98607
77830000	339 NE ADAMS ST	CAMAS	WA	98607
76630000	211 NE 2ND AVE	CAMAS	WA	98607
89560000	203 SE EVERETT ST	CAMAS	WA	98607
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85144006	557 NW MITCHELL CT	CAMAS	WA	98607
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84155000	514 NW MITCHELL ST	CAMAS	WA	98607
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127166000	3920 SW 5TH AVE	CAMAS	WA	98607
84136005	380 SW PARK ST	CAMAS	WA	98607
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83031000	2520 SW 6TH AVE	CAMAS	WA	98607
83037000	2346 SW 6TH AVE	CAMAS	WA	98607
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89100000	117 SE CEDAR ST	CAMAS	WA	98607
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84011000	2010 SW 6TH AVE	CAMAS	WA	98607
84141000			WA	0
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83043000	3240 SW 6TH AVE	CAMAS	WA	98607
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83093000	2214 SW 6TH AVE	CAMAS	WA	98607
83076000	2244 SW 6TH AVE	CAMAS	WA	98607
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986029607	1305 NW 5TH AVE	CAMAS	WA	98607
986030276	1307 NW 5TH AVE	CAMAS	WA	98607
986030275	1309 NW 5TH AVE	CAMAS	WA	98607
986030274	1311 NW 5TH AVE	CAMAS	WA	98607

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Number of Records 300
Number of Pages 7
Date Created 6/14/2023
Employee
Employee Name Jesse Manley

Occupant PID 84746026
962 NW 4TH AVE
CAMAS, WA 98607

Occupant PID 84746024
968 NW 4TH AVE
CAMAS, WA 98607

Occupant PID 84746028
970 NW 4TH AVE
CAMAS, WA 98607

Occupant PID 79941000
217 NE 6TH AVE
CAMAS, WA 98607

Occupant PID 79950000
235 NE 6TH AVE
CAMAS, WA 98607

Occupant PID 79930000
201 NE 6TH AVE
CAMAS, WA 98607

Occupant PID 86080000
533 NW 7TH AVE
CAMAS, WA 98607

Occupant PID 86070000
507 NW 7TH AVE
CAMAS, WA 98607

Occupant PID 76680000
424 NE 2ND AVE
CAMAS, WA 98607

Occupant PID 77912000
221 NE 3RD AVE
CAMAS, WA 98607

Occupant PID 76695000
410 NE 2ND AVE
CAMAS, WA 98607

Occupant PID 77790000
224 NE 3RD AVE
CAMAS, WA 98607

Occupant PID 84745010
569 NW ELM ST
CAMAS, WA 98607

Occupant PID 77810000
216 NE 3RD AVE
CAMAS, WA 98607

Occupant PID 89550000
202 SE DALLAS ST
CAMAS, WA 98607

Occupant PID 89740000
636 SE 3RD AVE
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219 SE EVERETT ST
CAMAS, WA 98607

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CAMAS, WA 98607

Occupant PID 84746012
721 NW 4TH AVE
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520 NW MITCHELL CT
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Occupant PID 85144016
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728 NW 4TH AVE
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545 NW MITCHELL CT
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Project Description Narrative

In-Water and Overwater Structures Removal Project
Camas Mill, Camas, WA

Revised Final June 20, 2023

Prepared for

Georgia-Pacific

Georgia-Pacific Consumer Operations, LLC
Camas, WA

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Exhibit 22 SHOR23-01

Table of Contents

1.0 INTRODUCTION 1

1.1 Project Purpose and Need 1

1.2 Background 2

2.0 PROJECT LOCATION 2

2.1 Land Ownership 3

2.1.1 GP Property 3

2.1.2 State Aquatic Lands Lease Areas 4

3.0 STRUCTURES TO BE REMOVED 4

3.1 Dolphins and Pilings 7

3.2 Dock Warehouse Piers 7

3.3 Berger Crane Foundation 8

3.4 Tug Dock 8

3.5 Riverbank Structures 8

3.5.1 Truck Dock 9

3.5.2 Dock Warehouse 9

3.5.3 PECO Dock 9

3.6 Aboveground Oil Storage Tank 9

3.7 Wood Chip Storage Area and Wood Chip Conveyor Housings 9

3.8 Miscellaneous Debris Removal 10

4.0 COLUMBIA RIVER AND CAMAS SLOUGH 10

5.0 SCHEDULING AND SEQUENCING OF WORK 11

6.0 BEST PRACTICES 12

6.1 Best Practices for Dredging and Dredged Materials Management 13

6.2 Best Practices for Vessel Operations 14

6.3 Best Practices for Piling and Dolphin Removals 15

6.4 Best Management Practices for Demolition Along the Riverbank 17

6.5 Stormwater Management During Demolition Along the Riverbank 17

Exhibit 22 SHOR23-01

7.0 REGULATORY REQUIREMENTS 18

7.1 State Environmental Policy Act 20

7.2 Shoreline Management Act and City of Camas Shoreline Management Program 20

7.3 Critical Areas Ordinances from the Camas Shoreline Master Program 21

7.4 Clean Water Act 22

7.5 Rivers and Harbors Act 23

7.6 Hydraulic Project Approvals 24

7.7 Activities on State-Owned Aquatic Lands 24

8.0 ENVIRONMENTAL REVIEW SUMMARY 24

9.0 DOCUMENTS PRODUCED FOR THIS PROJECT 26

10.0 REFERENCES 27

List of Tables

Table 1. Parcels Included in the Project Area 3
Table 2. Summary of In-Water Structures to be Removed 4
Table 3. Summary of Overwater Structures to be Removed 5
Table 4. Other Structures to Be Removed in Shoreland Zone 5
Table 5. Activities by Structure or Location 6
Table 6. Estimated Amount of Piling to be Removed 7
Table 7. Proposed In-Water Work Windows 12
Table 8. Regulatory Requirements 19

List of Figures

Figure 1 Project Location
Figure 2A Structures to Be Removed and Study Area Map Overview
Figure 2B Structures to Be Removed and Study Area Map – Inset Map 2B
Figure 2C Structures to Be Removed and Study Area Map – Inset Map 2C
Figure 2D Structures to Be Removed and Study Area Map – Inset Map 2D
Figure 2E Structures to Be Removed and Study Area Map – Inset Map 2E
Figure 3 Grading Plan, Berger Crane Foundation
Figure 4 Berger Crane Foundation River Bottom Restoration
Figure 5 Grading Plan—PECO Dock, Dock Warehouse, and Dock Warehouse Piers

Exhibit 22 SHOR23-01

List of Appendices

Appendix A Site and Structure Photographs

Exhibit 22 SHOR23-01

List of Acronyms

CRD	Columbia River Datum
CWA	Clean Water Act of 1972
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FR	*Federal Register*
GP	Georgia-Pacific Consumer Operations LLC
HPA	Hydraulic Project Approval
LA	lease areas, per Aquatic Lands Lease held by GP, 2016
LI DMA	Lady Island dredged materials area
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NRHP	National Register of Historic Places
OHW	ordinary high water
OHWM	ordinary high water mark
R&HA	Rivers and Harbors Act
RCW	Revised Code of Washington
RM	river mile
SEPA	State Environmental Policy Act
SF	square feet
SPCC	Spill, Prevention, Control and Countermeasures
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife

Exhibit 22 SHOR23-01

Note

The contents of this document were originally prepared for Georgia-Pacific Consumer Operations, LLC by Wood Environment & Infrastructure Solutions, Inc. Tetra Tech has updated the document to reflect the current planned Project.

1.0 INTRODUCTION

Georgia-Pacific Consumer Operations LLC (GP) is planning to abate, remove, and demolish several structures associated with prior operations at the Camas Mill located in the city of Camas and in unincorporated areas of Clark County, Washington. The structures that GP is proposing to be removed are located in-water and/or overwater on the Columbia River and Camas Slough, and are located within the Shoreline Management Zone of the City of Camas, or are in-water within unincorporated Clark County.

The purpose of this document is to provide:

- A description of proposed Project activities,
- A brief description of the structures proposed for demolition/removal,
- An explanation of the anticipated regulatory reviews, and
- An overview of the anticipated post-demolition/removal conditions.

GP is the sole organization responsible for maintaining, developing, removing, and deconstructing facilities identified here.

1.1 Project Purpose and Need

The Project purpose is to abate, remove, and demolish structures associated with former riverfront operations of the pulp and paper mill which are no longer utilized, including structures located on GP property and on State-owned aquatic lands.

The need for the Project is to reduce liability associated with unused structures and remove structures from state lands enabling termination and/or reduction of a State Aquatic Lands lease and termination of several State Aquatic Lands easements.

The structures that GP is proposing to be removed include:

- A warehouse,
- Five docks/piers,
- Conveyor housings,
- An aboveground oil storage tank,
- Crane foundation, and
- Approximately 3,000 pilings that are associated with the above structures, serve as mooring dolphins, or are abandoned.

It should be noted that GP is still working to determine which structures will be needed for the future operation of the site. As those decisions are still being made, GP is working to permit the removal of all structures. If certain structures are determined to be needed for future operations, those structures will not be removed from the site, and GP will continue to maintain leases and easements where necessary.

Exhibit 22 SHOR23-01

Photographs of the structures are presented in **Appendix A**. *Overwater structures* are those that were built along the riverbank with structural components that originate below the ordinary high water mark (OHWM), which enabled the structure to extend over the water surface to provide river access. *In-water structures* are built entirely below the OHWM.

1.2 Background

The Camas Mill has been in operation since the 1880s producing pulp and paper through a variety of technologies. The mill covers approximately 190 acres adjacent to the north bank of the Camas Slough, as well as a portion of the approximate 450 acres of Lady Island.

The Mill is active, operating a single paper production line. Camas Mill no longer manufactures pulp, does not currently perform any significant on-site chemical manufacturing/processing, nor does the Mill currently utilize the river for shipping or log transport/storage. Decisions around the future operation of the site has the potential to impact these activities.

2.0 PROJECT LOCATION

The Project area lies within the City of Camas, Washington, except for one dolphin to be removed on the Columbia River that is located outside the city limits within unincorporated Clark County, Washington. **Figure 1** provides an overview of the Project location. Note that figures are presented at the end of this narrative. The Project area consists of a portion of the Camas Slough, which runs between Lady Island and the city of Camas, Washington, on the north bank of the main channel of the lower Columbia River. Lady Island lies between the Camas Slough and the Columbia River main channel. The Project lies between river mile (RM) 117 and 121, with much of the proposed activity at approximately RM 119 to 120 located in the Camas Slough.

The Project area lies within Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16, Willamette Meridian.

As stated, the structures to be removed are located adjacent to the riverbank are entirely or partly below the OHWM of the Camas Slough and are located within either the City of Camas Shoreline Management Zone or Clark County Shoreline Management Zone.

A bathymetric and upland survey of the Project footprint was completed in 2020, and Project drawings are based on that information.

Figures 2A through 2E show the locations of structures GP is proposing to be removed. These locations include:

- Areas along the riverbank within the main Mill site,
- Riverbank locations on Lady Island,
- In-water locations in the Camas Slough, and
- In-water locations extending approximately 3 miles downriver from the Mill on the Columbia River mainstem.

Exhibit 22 SHOR23-01

2.1 Land Ownership

The proposed Project would occur on property owned, leased, or under easement by GP (**Table 1**). The Project area is designated as industrial land use (City of Camas 2016, 2019). Lady Island is designated as industrial land use and is classified as Medium Intensity and High-Intensity shoreline designations (City of Camas 2015, 2019; Clark County 2019).

Table 1. Parcels Included in the Project Area

Assessor Parcel Number	Owner[1/]	Tax Parcel Type Description/Zoning/Location
08370-0000	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/ Lady Island
09104-4013	Georgia-Pacific Corporation	Manufacturing—lumber and wood products/Heavy Industrial
09104-4015	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/ Main Mill Parcel
09104-4027	Specialty Minerals Inc. [2/](GP)	Storage warehouse/Heavy Industrial
50090-1000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-2000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-3000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4001	Fort James Camas, LLC (GP)	Tidelands/Water
50081-7000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-8000	Fort James Camas, LLC (GP)	Tidelands/Water

1/ The previous corporate name, Fort James Camas LLC, is shown on County's tax parcel information.
2/ Specialty Minerals was a part of Fort James Camas, LLC.

2.1.1 GP Property

Structures to be removed along the riverbank are within the main Mill parcel, which supports a large variety of industrial and warehouse structures related to pulp and papermaking processes and materials management and a variety of office and safety-related buildings, and along the shoreline of Lady Island. The Mill has a long history at this location with previous Mill–related structures known to have been present at the locations of the Truck dock, Dock Warehouse, and PECO dock.

The Project area also includes bank locations on Lady Island. Lady Island is owned in its entirety by GP. Lady Island comprises both developed and undeveloped areas, including the wastewater treatment facilities for the Mill, a dredged materials storage area, an industrial landfill, and structures conveying overhead electrical infrastructure. Washington State Route 14 crosses the northeast portion of the island, connecting to the City of Camas via bridges across Camas Slough to the north and east. Undeveloped portions of Lady Island are mainly forested. Project activities on Lady Island include removal of dolphins along the shoreline, potential storage of dredged materials, and treatment of stormwater during demolition at GP's wastewater treatment facilities for any near riverbank demolition.

2.1.2 State Aquatic Lands Lease Areas

GP has an established State Aquatic Lands lease along with several easements with the Washington State Department of Natural Resources (DNR) in Camas Slough and the Columbia River for use of state bedlands and tidelands.

One dolphin located downriver of the main mill site at approximate RM 117 is on State Aquatic bedlands within Clark County. This area is known as lease area (LA) 1, and the single dolphin at this location would be removed.

3.0 STRUCTURES TO BE REMOVED

Table 2 summarizes structures GP is proposing to be removed from in-water locations, and also indicates which LAs or easement the structures are located within. An estimate of the disturbance area, as well as the quantity of fill or dredging needed, is also provided. A complete impacts analysis on aquatic areas including methods and results discussion will be provided in an updated *Shoreline Report, In-Water and Overwater Structures Removal Project* (Wood 2020).

Table 2. Summary of In-Water Structures to be Removed

Structure to be Demolished	Location within State Aquatic Lands Lease Area Number or Easement	In-water Filling or Dredging required?	Estimated Disturbance Area (SF)	Estimated Quantity of Fill (+) or Dredge (-) (Cubic Yards) Below OHWM
Dolphins and piling	Lease Areas (LA): 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19	None	890	-0-
Downriver dolphin in Clark County	LA 1	None	30	-0-
Dock Warehouse piers access dredging[1/]	LA 17	Dredging	58,710	-10,500
Berger Crane foundation[2/]	LA 17	Filling	19,370	+3,500
Tug Dock	LA 17	None	-0-	-0-
Approximate net change in fill or dredge				-7,000 CY

Notes:
1/ Dock Warehouse piers disturbance area is the area of the dredge prism, and the quantity of dredge is that to be removed to provide barge access to the structure.
2/ Berger Crane foundation has a riverbed footprint of 300 SF, of which 100 SF will be retained below the new sediment line at the end of the Project. Area of disturbance here reflects the extent of the fill prism to create new riverbed topography and cover the retained portion.

Abbreviations:
CY = cubic yard
DNR = Washington State Department of Natural Resources
LA = DNR Lease Area
SF = square feet

Overwater structures are located on the north bank of the Camas Slough. **Table 3** summarizes the overwater structures GP is proposing to be removed. **Table 4** summarizes the other structures to be removed that are upland of the riverbank and within the City's Shoreland zone.

Table 3. Summary of Overwater Structures to be Removed

Structure to be Demolished	Filling or Excavation/Dredging	Ground Disturbance Area (SF)	Fill (+)/Excavate (-) Quantity (Cubic Yard)	
			Below existing OHWM	Above existing OHWM
Riverbank Structures: Truck Dock, Dock Warehouse & PECO Dock	Excavation/dredging and filling	40,450	+1,230 / -2,990	+18,300 / -17,100
Approximate net change in fill or dredge at Riverbank			- 1,760	+1,200

Note:
Together, the Truck Dock, Dock Warehouse, and PECO Dock cover approximately 1,055 lineal feet along the riverbank. Given the contiguous nature of the structures, removal activities are summarized for all three structures together.

Abbreviation:
OHWM = ordinary high water mark
SF = square feet

Table 4. Other Structures to Be Removed in Shoreland Zone

Structure	Filling or Excavation	Total Ground Disturbance (SF)	Notes
Aboveground Oil Storage Tank	None	-0-	Demolition is to slab, and no ground disturbance planned
South Wood Chip Storage Area	Excavate remaining wood chips and backfill to previous grade	155,580	Approximately 11,100 CY of fill for restoration of area topography (all located landward of OHWM)
Product Conveyor Housing[1]	None	-0-	Elevated housing
Wood Chip Conveyor Housings[1/]	None	-0-	Elevated housing

Note:
1/ Conveyor housings are elevated and cross over the Wood Chip Storage Areas and the Truck Dock area. The adjacent North Wood Chip Storage Area is approximately 3.0 acres of upland habitat outside of the shoreline zone, but will be graded and reclaimed collectively with activities proposed in the South Wood Chip Storage Area.

Abbreviations:
CY = cubic yard
OHWM = ordinary high water mark
SF = square feet

The planned final grades and landscaping activities are shown on the following figures:

- **Figure 3:** Grading Plan, Berger Crane Foundation
- **Figure 4:** Berger Crane Foundation River Bottom Restoration
- **Figure 5:** Grading Plan—PECO Dock, Dock Warehouse, Dock Warehouse Piers, and Wood Chip Storage Areas

Planning-level approaches for demolition and the other proposed activities are summarized by structure type and location in **Table 5**. The actual type, size, and quantity of equipment used, production rates and work schedule, along with Project sequencing will be determined by GP in collaboration with the contractor selected to do the work and in adherence to conditions of approvals. Additional details for each structure are provided after **Table 5**.

Table 5. Activities by Structure or Location

Structures to be Removed	Activities and Methods
Pilings and dolphins	• Demolition would be accessed from river barges. • Pilings would be removed following best management practices for derelict piling removals (DNR 2017, EPA 2016). • Extracted pilings and attached sediment would be contained on the barge deck until off-loaded to an upland location, per state requirements for creosote pile and best management practices. • All tire bumpers would be removed to barges and disposed of at an approved upland location.
Dock Warehouse Piers	• Demolition would be from river barges for most of the removal. • Riverbed dredging would be required to enable demolition barge access to the piers. • All utilities and miscellaneous supporting materials from the piers would be removed. • Pier decking would be cut, rigged, and removed, then piling caps would be rigged and removed, followed by pile removal.
Berger Crane foundation	• Due to the massive nature of this strong foundation, demolition may require more than a single method. • Methods may include mechanical approaches using demolition claws and/or expanding demolition grouts, for example. • Access would be either from land or from barge or both and would be up to the contractor to determine best approach. • Demolition is planned to reduce structure down to the river's water stage level estimated to be at approximately +2 feet CRD. • Every effort will be made to ensure that demolition debris is confined to the foundation removal location and removed from the site. • Retaining the foundation's lower columns in place would avoid excessive disturbance to riverbed sediment. • Fill would be used to cover the retained lower columns, creating bottom contours that match the adjacent natural riverbed in this previously dredged location. • Clean fill materials will be specified at the minimum size that is coarse enough to be stable for this location.
Tug Dock	• The metal access gangway and the floating dock would be removed.
Three Adjacent Riverbank Structures: Truck Dock, Dock Warehouse, and PECO Dock	• Demolition would be staged primarily from the riverbank, but some pilings at the westernmost extent may be removed using equipment with barge access. • Miscellaneous materials would be removed prior to beginning structure demolition • For the Truck Dock and PECO Dock, asphalt and concrete decking would be cut or broken and removed, followed by removal of piling caps. • Support beams would then be rigged and lifted for removal. • For the Dock Warehouse, demolition would occur starting from upland-facing side toward the riverbank, leaving the riverside wall to last to reduce risk of materials falling toward the river. • Pilings below and between structures along the riverbank would be removed by access from the riverbank. • The riverbank would be reshaped to shallower slopes (5 to 1 and 4 to 1), grading to steeper slopes to match existing grades. • Final surfacing materials would be specified as the finest materials that is coarse enough to remain stable in this location. • Final surfaces would be sampled and analyzed to ensure compliance with the State's anti-degradation standards.
Aboveground Storage Tank	• Tank will be deconstructed and removed from the site. • Aboveground pipelines and associated utilities would be removed from vicinity. • Tank slab would be retained.

Exhibit 22 SHOR23-01

Structures to be Removed	Activities and Methods
South Wood Chip area and Conveyor Housings	• Linear metal conveyor housings would be removed from above the South Wood Chip Storage Area. • Conveyor support foundations would remain following demolition. • Wood chips remaining in the area would be removed from the site as part of this Project. • Wood chip area would be backfilled with clean specified materials to design grades.
North Wood Chip area	• Area outside of the shoreline zone and would be completed as part of an overall grading plan for the historic wood chip storage area. • Wood chips remaining in the area would be removed from the site as part of this Project. • Wood chip area would be backfilled with clean specified materials to design grades.

Abbreviations:
CRD =Columbia River Datum
OHWM = Ordinary High Water Mark

3.1 Dolphins and Pilings

Approximately 3,000 pilings and dolphins made of wood, carbon steel H-Piling, concrete-filled pipe, and concrete would be removed from locations in the Camas Slough, extending approximately 3 miles downriver from the Mill to RM 117 (see **Figures 2A–2E; Appendix A, Photographs 7 and 8**). Many of these were previously used for log rafting.

Dolphins are groups of 3, 5, 7, or 9 piles individually installed at an angle and all bound together to create a sturdy structure for mooring or to protect an adjacent structure from potential impacts (see **Appendix A**, **Photograph 8**, for example of a Dolphin).

Table 6 lists the locations and approximate number of dolphins and pilings proposed for removal.

Table 6. Estimated Amount of Piling to be Removed

Location	In-water or Overwater	Approximate Number of Pilings 1/
Open-water dolphins and pilings	In-water	250
One downriver dolphin in Clark County	In-water	9
Piling at riverbank that is associated with in-water structures 2/	In-water	200
Piling associated with overwater structure foundations 3/	Overwater	2,500
Estimated Total Number of Pilings		**Approximately 3,000**

1/ Numbers of pilings are estimates and the total estimated number has been rounded up.
2/ In-water pilings include pilings associated with mooring dolphins, remnant riverbank pilings, sheet pilings, and pilings supporting the Dock Warehouse Piers, and pilings at the Tug Dock.
3/ Overwater pilings include pilings associated with the foundations supporting the Dock Warehouse, PECO Dock, and Truck Dock along the riverbank.

3.2 Dock Warehouse Piers

Three piers servicing the warehouse extend up to approximately 175 feet from the warehouse into the Camas Slough (**Figure 2E; Appendix A, Photograph 4**). The piers are decked with concrete and supported by 54 octagonal, solid concrete piles, along with 21 concrete-filled carbon steel pipe piles with concrete pile caps. Most of the piles are protected with truck tires that function as bumpers.

Exhibit 22 SHOR23-01

Dredging of sediments in the vicinity of the piers will be required to enable a demolition crane barge to access the piers for removal.

3.3 Berger Crane Foundation

The Berger crane foundation is located approximately 1,000 feet west of the PECO dock located in the Camas Slough (**Figure 2E**). The foundation is a remnant from a previously demolished dock initially built in 1948. This 90-foot-long, massive concrete foundation stands completely within the river approximately 40 feet from the top of the riverbank (**Appendix A, Photograph 5**).

This wall-like structure previously supported a large crane that lifted logs from the river to a wood mill. The dock and wood mill were demolished in 2002, or shortly thereafter, but the large foundation was retained. Several concrete piers are pocketed into the bedrock below the riverbed to provide stability for the foundation.

The approximately 300-square-foot (SF) foundation would be demolished down to the river stage. Approved clean suitable fill material would be used to cover the retained lower columns, create bottom contours that match the natural riverbed in this previously dredged location, and create river habitat.

3.4 Tug Dock

The Tug Dock is a 2,600 SF floating dock structure lying west of the Berger Crane foundation (**Figure 2E**). The Tug Dock is approximately 180 feet long and lies approximately parallel to the riverbank 30 feet from shore. Built in 1984, the Tug Dock provided boat moorage and access to the river. This floating dock structure is held in place by pilings and is accessed from the top of the riverbank by an 80-foot-long, modern, metal gangway. Four large guidance/mooring dolphins in this location would also be removed.

3.5 Riverbank Structures

Together, the Truck Dock, Dock Warehouse, and PECO Dock cover approximately 1,055 continuous feet of riverbank with about 12,100 SF of total area currently perched overwater. Following potential removal, approximately 40,450 SF along the riverbank would no longer have structures.

Following potential structure removal, the riverbank would be reshaped to 5 to 1 and 4 to 1 slopes transitioning to about 2 to 1 and slightly steeper to match existing grades. The final riverbank surface would be covered with the finest material that is coarse enough to be stable for the location. The eastern extent of this location is largely behind a small peninsula and is known to be an area of river deposition, while the western extent protrudes into the river and would be subject to more river currents than the eastern extent and require coarser material.

A portion of the completed riverbank above ordinary high water would be revegetated with native plant species.

Exhibit 22 SHOR23-01

3.5.1 Truck Dock

This approximately 3,700 SF flat, asphalt- and concrete-covered area provides truck access to the loading bays on the east end of the Dock Warehouse (**Figure 2E; Appendix A, Photograph 1**). This dock is supported by approximately 320 pilings constructed from wood and pipe along approximately 350 feet of the riverbank. The dock is protected by a 100-foot-long marginal sheet-pile bulkhead at the water's edge. Following removal, approximately 1,140 SF of overwater area would be uncovered.

Elevated conveyors formerly conveyed materials between buildings. The product conveyor housings in the vicinity of the Dock Warehouse would be removed, starting from the building and moving to a support at an inland location that allows for the remaining portions of the housing to be retained.

3.5.2 Dock Warehouse

Situated between the Truck Dock and the PECO Dock on the Riverbank (**Figure 2E**), the Dock Warehouse is a 23,500 SF, three-story (lower/loading dock, first, and second floors) concrete and wooden structure (**Appendix A, Photographs 3 and 4**). The Dock Warehouse extends along approximately 400 lineal feet of riverbank. It is supported by approximately 1,020 pilings with concrete pier foundations along the upper riverbank and upland side.

Originally constructed in 1934 at the site of a previous dock, the building was used to house paper shipped through the Mill. The concrete and wooden building was covered with exterior sheet metal siding in 1980. Following demolition, approximately 7,041 SF of overwater shading would be removed.

3.5.3 PECO Dock

The PECO Dock is located west of the Dock Warehouse and was constructed in 1983 (**Figure 2E**). This 305-foot-long marginal dock was built largely overwater to support a 9-ton crane (manufactured by PECO) and used to offload wood chips from river barges. The dock is approximately 13,200 SF in area and supported by approximately 170 carbon steel H-pilings (**Appendix A, Photograph 5**). Approximately 450 dilapidated wood pilings from a previous structure are also beneath the dock. An additional 200 to 300 wood and steel pipe pilings along the riverbank between and around the PECO Dock and Dock Warehouse would also be removed.

3.6 Aboveground Oil Storage Tank

A non-operational 40,000-gallon steel aboveground oil storage tank located approximately 100 feet east of the Truck Dock and 150 feet north of the shoreline would be deconstructed and removed down to ground level (**Figure 2E; Appendix A, Photograph 9**). This aboveground storage tank was decommissioned and cleaned in 2015. The tank and its associated pipes and utilities would be removed.

3.7 Wood Chip Storage Area and Wood Chip Conveyor Housings

There are two distinct previously used wood chip storage areas, the South Wood Chip Storage Area and the North Wood Chip Storage Area. The South Wood Chip Storage Area was previously used to

Exhibit 22 SHOR23-01

store wood chips for pulping at the Mill (**Figure 2E**). Currently most of the wood chips have been removed with minor amounts of wood chips remaining. The removal resulted in a depression that will be backfilled to the design grades with clean structural materials. Elevated conveyors formerly conveyed wood chips from the PECO Dock to the South Wood Chip Storage Area (**Appendix A, Photograph 2**). The conveyor housings would be removed, and the foundation for the supports would remain.

The North Wood Chip Storage Area was also previously used to store wood chips for pulping at the Mill (**Figure 2E**). This area is located outside of the shoreline zone but would be part of the overall grading and reclamation plan that will include the entire wood chip storage area (i.e., north and south). As this area will no longer be considered a location at the mill with industrial activity, this area will be designed to allow drainage to naturally flow back to Camas Slough.

3.8 Miscellaneous Debris Removal

Unspecified debris that currently exists along the riverbank or in-water in the Project vicinity and within lease areas would be removed by the demolition contractor. Examples of miscellaneous debris include cable, chain, floating deck walkways, unidentified metal scrap, and broken pilings. Debris would be loaded to barges or to upland location and taken off-site to approved disposal locations.

4.0 COLUMBIA RIVER AND CAMAS SLOUGH

The Columbia River and Camas Slough form the majority of the Project area. Water elevations of the Columbia River and Camas Slough in the Project reach are determined by dam operations and river water withdrawal upriver, basin-wide precipitation, and to a smaller extent by diurnal tidal fluctuations from the Pacific Ocean 120 miles downstream. The mean range of the tidal prism is approximately 1.19 feet, with a diurnal range of 1.85 feet in the Project area. Camas Slough river stage is also influenced by flows from the unregulated Washougal River.

Even though the Columbia River is a highly regulated system with numerous dams, its discharge hydrograph and resulting river water elevations (stage) vary considerably between seasons and years. Generally, peak high river stage occurs most years in late May or June as a result of snowpack runoff. Low river stages tend to occur in September or October when precipitation is regionally low and at the end of summer irrigation. At the end of the growing season and return of winter precipitation, river stage levels trend to higher levels. Intense winter storms can produce an intermediate high stage for short durations during any of the months of November through January. River stage is an important factor in safely accessing the structures for demolition.

The U.S. Army Corps of Engineers (USACE) currently maintains the 17-foot-deep and 300-foot-wide federal navigation channel in the Columbia River adjacent to the south side of Lady Island. The navigation channel is authorized to be 27 feet deep, but currently is maintained at a shallower depth considered adequate for the primarily tug and barge traffic that traverse the area (USACE 2008). In August 2020, the USACE confirmed under Section 408 of the Rivers and Harbors Act of 1899 that this In-water/Overwater Structures Removal Project would not alter, occupy, or use a federal authorized

Exhibit 22 SHOR23-01

Project due to the natural depth of the channel (Letter to J. Dambrun, GP from V.A. Ringold, Planning Chief, USACE Regulatory Branch, Portland, Oregon, August 20, 2020).

The Columbia River Datum (CRD) is the adopted fixed low water reference plane for the river. CRD is a USACE nontidal datum defined at distinct river miles relative to the North American Vertical Datum of 1988 (NAVD88[1]). The datum is calculated using observations from the low river stages of the year, generally August through October, due to the masking of the tidal signal from strong seasonal river runoff during other portions of the year. Depending on river flow, water levels can be significantly higher than Columbia River Datum.

As mentioned above, the river is tidal in the Project area. River tides are monitored by the National Oceanic and Atmospheric Administration (NOAA) at the Washougal Station (9440047) located approximately 1.5 miles upriver. To be clear, although this is a tidal river reach, the river has fresh water, as the saltwater wedge does not extend upriver to the Project location.

River stage levels are monitored and forecasted for Vancouver Washington, a gage operated by NOAA, Northwest River Forecast Center, sited at RM 105 or about 15 miles downriver. There are no river gages within the Project area. In general, the river in the Project area is known to fluctuate across roughly 15 feet of elevation based on known river hydrographs and observations made at the site. There are no river dikes in the Project area.

5.0 SCHEDULING AND SEQUENCING OF WORK

Removal of the in-water and overwater structures would occur in a manner that is not disruptive to operations at the Mill. Work below OHWM would occur during regulatory in-water work windows for the Camas Slough in the Project reach. Joint agency coordination between DNR, Washington Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries), would establish the regulatory in-water and overwater work windows for the Project.

In-water work windows are cognizant of biologically sensitive periods. Project-specific allowances are necessary to reduce repeated reentry while accomplishing the removal of structures, and to allow safe operations of vessels. One of the key time considerations is the need to access and complete removal of some structures.

The Project has reviewed published agency requirements, site habitat locations and characteristics, river hydrographs, and other available information on species likely to be present. A *Biological Assessment* has been developed which evaluates potential effects of Project activities on threatened and endangered species. Based on this research, the in-water work windows shown in **Table 7** are proposed for joint agency consideration.

[1]. National Oceanographic and Atmospheric Administration, Notification of Updates to Columbia River Datum (CRD) References at 5 Ports® Stations in the Columbia River: https://tidesandcurrents.noaa.gov/crd.html, accessed December 12, 2020.

Table 7. Proposed In-Water Work Windows

Proposed In-Water Work Windows	Allowed Activity during the Work Window
Year-round, provided work does not violate water quality standards	
	Extract pilings using vibratory equipment or direct pulling, except for concrete piles.
	Structure demolition conducted overwater or below the OHWM, but outside the wetted perimeter of the river (in-the-dry).
	Excavation/dredging for riverbank reshaping, but outside the wetted perimeter of the river (in-the-dry).
	Fill placement for riverbank/riverbed shaping, but outside the wetted perimeter of the river (in-the-dry).
	Fill placed at upland locations (e.g., North and South Wood Chip Area)
	Above OHWM miscellaneous debris removal activities
August 1 to February 28	
	Extraction of concrete piles at the Dock Warehouse piers
	Riverbed dredging
	Below OHWM miscellaneous debris removal activities
	Riverbank fill placement in the wet
	Berger Crane foundation demolition
November 1 to February 28	
	Riverbed filling—new riverbed at Berger Crane foundation

An in-water work window to allow dredging is proposed, which would begin in August. This is early enough in the work season to allow these removal activities to be completed prior to the bulk of the peak juvenile salmonid outmigration in the spring/summer and the peak run timing for Pacific eulachon in the late winter/early spring. An early start timeframe for these structure removal activities below the OWHM will not result in adverse effects to any fish or other aquatic species, or to other river-dwelling species.

With the above construction work windows available, work would span approximately three years, with the actual schedule dependent on the in-water work windows. Ultimately, the demolition schedule will also be influenced by weather, river stage, and contractor availability. At the time of this document development, demolition is expected to begin in 2023 following receipt of all Project permits and approvals.

6.0 BEST PRACTICES

The In-Water/Overwater Structures Removal Project would be accomplished in a manner that is sensitive to and protective of the environment. Best practices will be implemented throughout the Project by first identifying potential detrimental effects and implementing methods that eliminate or reduce the potential effect. These best practices have been identified for dredging, dredged materials management, vessel operations, piling and dolphin removal, and structure demolition along the riverbank, including construction stormwater management.

Exhibit 22 SHOR23-01

6.1 Best Practices for Dredging and Dredged Materials Management

As stated, dredging will be required and includes:

- Reshaping the Camas Slough riverbank following the removal of overwater structures; and
- Deepening to -10 feet (CRD) an 1,800 SF area surrounding the Dock Warehouse Piers to enable access for demolition barges.

Until recently, maintenance dredging in the Camas Slough has occurred regularly to maintain barge access and other operations at the Mill's waterfront. However, the Dock Warehouse Piers have not received recent maintenance dredging and the riverbed at the piers has filled in with river sediment. The available draft during most river stages is too shallow for demolition equipment access without dredging.

For the entire Project, dredging will be conducted in a manner to prevent impingement of fish by a dredging clamshell or hydraulic dredge. Regular observation of dredged sediment aboard the barge or at the placement areas will be conducted to ensure impingement is not occurring. If impingement should occur, clamshell equipment will be adjusted (slowed) or modified to increase the opportunity for fish to avoid or escape the bucket and/or suction head. Where hydraulic dredging is used, the dredge will be lowered deeper into the sandy sediment to reduce water entrainment.

Best management practices to minimize sediment loss and turbidity generation may include, but are not limited to, the following:

- Smooth closure of the bucket when at the riverbed;
- Minimal stockpiling of dredged material on the riverbed;
- Maintaining suction head of any hydraulic dredge in the riverbed to the extent practicable;
- Using a buffer plate or other means to reduce flow energy of the hydraulic dredge at the placement area; and
- Other conditions as specified in the Project's Water Quality Certification and other approvals.

When dredged materials are placed on a barge for transport to the placement area, no spill of sediment back to the river from the barge will be allowed. The barge will be managed such that the dredged sediment load does not exceed the capacity of the barge. The load will be placed in the barge to maintain an even keel and avoid listing.

A Dredged Materials Management Plan will be developed prior to undertaking dredging and will likely include the following best practices:

- Hay bales and/or filter fabric may be placed over the barge scuppers to help filter suspended sediment from the barge effluent, if needed based on sediment testing results.
- The contractor will be required to use a tightly sealing bucket and to monitor for spillage during transfer operations.
- Visual water quality monitoring and, if necessary, follow-up measurements will be conducted at the removal and upland transfer location to confirm no uncontrolled releases back to the river.

In-water reuse and other upland reuse is preferred for dredged materials determined to be suitable. The *Revised Tier 1 Report* provides details on the development and long-term use of this area, as well as sediment quality evaluations. A sediment sampling and analysis is planned at the time of this document, which will provide data on existing sediment quality prior to dredging and materials management. The Dredged Materials Management Program will evaluate sediment quality and determine suitability for in-water disposal. Coordination with the City and other agencies for reuse at other locations will occur prior to any reuse.

Materials not suitable for in-water reuse, but otherwise found suitable, would be disposed at the Lady Island Dredged Materials Area (LI DMA) located at the western extent of Lady Island (see **Figure 1** for location on Lady Island). Clean dredged materials from Camas Slough and the Columbia River in the vicinity have been stored at the LI DMA for many years under agreement with the Washington Department of Natural Resources.

When stockpiling dredged material at the LI DMA, best management practices will be employed to control runoff and erosion, and for example could include:

- Installing silt fences, straw bales, and/or containment berms;
- Managing runoff and elutriate water; and
- Routine inspections of the off-load and stockpile area to verify water quality protections are functioning properly.

6.2 Best Practices for Vessel Operations

Derrick barges, material barges, tugboats, along with support boats (work skiffs, survey boats) will be used on the Columbia River and in Camas Slough during demolition to provide access to the structures for removal and materials management. These vessels would be in the Project area throughout the regulatory in-water work window.

A navigation channel allows access from the Columbia River at approximately RM 119.5 to the Camas Slough and the Project area from downriver. No navigable access is available to the Camas Slough from the Columbia River at RM 122 from upriver during most river stages.

Material barges would work between the various dredge prisms and the LI DMA for off-loading dredge materials during dredging operations.

Best practices for vessel operation will include:

- The contractor will notify the U.S. Coast Guard of planned river operations prior to commencing work.
- The Contractor will prepare a Spill, Prevention, Control and Countermeasures (SPCC) Plan to be used to safeguard against unintentional release of fuel, lubricants, or hydraulic fluids.
- Drive mechanisms of equipment operated from the barge will be prevented from entering water to the extent possible.

Exhibit 22 SHOR23-01

- Turbidity and other parameters will be monitored to ensure compliance, to the greatest extent possible, with the Surface Water Quality Standards for Washington (Washington Administrative Code [WAC] 173-201A).
- Equipment operating in the water will use vegetable-based oils in hydraulic lines.
- A turbidity curtain will be used where river currents allow and moved as necessary to accommodate vessel operations.
- Floating debris will be recovered to the barge.
- Petroleum products, concrete, chemicals, or other toxic or deleterious materials will be prevented from entering surface waters to the extent possible through the use of best management practices. For example:
  - Fuel hoses, oil drums, oil or fuel transfer valves, and fittings will be checked regularly for leaks.
  - Fuels and lubricating materials will be maintained and stored properly to prevent spills.

Any barge used as a work platform to support demolition will be:

- Large enough to remain stable under foreseeable loads and adverse conditions;
- Inspected by the contractor before arrival to ensure the vessel and ballast are free of invasive species; and
- Secured, stabilized, and maintained as necessary to ensure no loss of balance, stability, anchorage, or other condition that can result in the release of demolition debris or other materials from the barge.

The contractor will time vessel operations to occur during regulatory in-water work windows, and during river stages and at locations where water depths are sufficient to avoid groundings, minimize prop-wash, and avoid creating unnecessary turbidity.

6.3 Best Practices for Piling and Dolphin Removals

In the Project area, pilings comprise the following materials:

- Carbon steel H-pile
- Reinforced concrete pile
- Concrete-filled steel pipe pile
- Steel sheet pile
- Untreated wood
- Treated wood

Methods to remove pilings and dolphins will be determined in part by the nature and locations of the pilings and dolphins. To protect water, sediment, and habitat quality, all pilings will be removed following the best management practices for removals, as published by the U.S. Environmental Protection Agency (EPA 2016) and DNR (2015). Work will be accomplished while minimizing turbidity, sediment disturbance, and debris reentry to the water column.

Exhibit 22 SHOR23-01

In general, piling removal will use a direct-pull extraction method that primarily utilizes a vibratory hammer to loosen the piling along with a crane to stabilize and help extract the loosened pile. Use of a clamshell bucket may be required for piling removal in some locations. Complete extraction of the piling is preferred to partial removal, although some pilings may need to be cut below the mudline. The contractor will make multiple attempts to remove a pile before resorting to cutting the pile. Also, pilings along the riverbank may be partially excavated to enable removal.

The following best management practices will be implemented:

- Prior to commencement of work to remove piles, a work plan will be produced by the contractor with the intent to identify appropriate detailed methods to minimize turbidity, sediment disturbance, and debris reentry.
- The contractor will assess each pile's condition, material, and location and identify if access will be from a barge or from the riverbank.
- Where river currents allow, the contractor will surround the structure to be removed with a floating surface boom to capture floating surface debris.
- Some piles in the Project area are protected by tire bumpers (e.g., the piling supporting the PECO dock). Once the piling is extracted, tires will be cut from the piling and placed on the barge or at an upland location for disposal.
- All dolphin binding materials (e.g., cables, steel straps) will be removed to the barge or upland location for disposal.
- If the pile is intractable or breaks, the contractor will cut the pile off approximately 2 feet below the mudline with consideration given to the mudline elevation, slope, and stability of the location.
- The contractor's work plan will include procedures for extracting and handling pilings that break off during removal.
- To the extent possible, the contractor will keep all equipment (e.g., bucket, steel cable, vibratory hammer) out of the water, and grip the piling above the waterline.
- The contractor will minimize overall damage to pilings during removal and will remove the piling slowly to minimize sediment disturbance and turbidity.
- A containment basin will be provided on the barge deck to contain removed materials along with sediment removed, floating debris, and splintered wood.
- Upon removal, the pile will be moved expeditiously into the containment area for processing.
- The piling shall not be shaken, hosed-off, stripped or scraped, left hanging to drip, or subjected to any other action intended to clean or remove adhering material from the piling. Sediment associated with the removed piling must not be returned to the river.

Exhibit 22 SHOR23-01

6.4 Best Management Practices for Demolition Along the Riverbank

Best management practices will be employed throughout the operation of the Project and are to include:

- Any hazardous materials present would be abated prior to the start of demolition.
- Limits of work will be clearly established prior to any demolition.
- Only established staging areas will be used for fueling, servicing, and demolition.
- Temporary equipment storage will be located in a manner that will prevent contaminants from entering aquatic areas.
- Demolition materials management areas will be identified on-site and will include appropriate sediment controls and stormwater controls.
- Materials resulting from demolition will be managed appropriately to protect the environment.
- Demolition materials will be recycled to the extent possible and if not recyclable, will be disposed at off-site approved facilities.
- Appropriate stormwater and temporary erosion and sediment control plans will be developed and will comply with the City's erosion control standards and state requirements.
- A site-specific SPCC Plan appropriate for the Project activities will be developed.

6.5 Stormwater Management During Demolition Along the Riverbank

Within the demolition area on the Camas Slough riverbank, stormwater runoff is collected currently as industrial stormwater and conveyed to the Lady Island Wastewater Treatment facility for treatment. Treated waters are discharged to the Columbia River (Outfall 001) from the Lady Island Wastewater Treatment plant under GP's Industrial NPDES Permit (No. WA0000256). Per Condition S7 of the Permit, coordination with the Washington State Department of Ecology (Ecology) would occur to secure permission for construction stormwater to be collected and treated as industrial water during demolition.

GP will also apply to be covered by the State's General Construction Stormwater Permit during demolition for areas not within the industrial treatment footprint and for coverage of off-site transportation.

Following completion of structure demolition and riverbank shaping, all industrial activities in this area will have ceased within the footprint. Impervious surfaces will have been greatly reduced over the area. Stormwater from this riverbank area, now free from all industrial activities and industrial structures, would infiltrate, or if not infiltrated, would flow naturally toward Camas Slough.

Additional details on best management practices for stormwater management are provided in the Project's *Stormwater Pollution Prevention Plan* (SWPPP).

Exhibit 22 SHOR23-01

In summary, the following practices will be followed to help ensure stormwater quality protection and protection of the adjacent aquatic areas:

- Clear staging and laydown areas away from water will be identified and designated.
- Work will be sequenced with water protection as a priority; for example, demolition activities will be timed so that low river stages allow demolition with no water present (in-the-dry).
- Riverbank demolition will be conducted in a fashion that prevents debris movement toward water, such as through use of screens or staging in a manner that barricades materials from movement toward water.
- Activities will be conducted to meet conditions as specified in the Project's Water Quality Certification and requirements of the General Construction Stormwater Permit.
- Temporary disturbance to riverbank vegetation at Camas Slough and on Lady Island will be limited to the minimum amount needed to access and remove infrastructure.
- The Contractor will prepare an SPCC Plan to be used to safeguard against unintentional release of fuel, lubricants, or hydraulic fluids.
- Drive mechanisms of equipment operated from the riverbank, but that may reach waterward of OHWM, will be prevented from entering water to the extent possible.
- Turbidity and other parameters will be monitored to ensure compliance, to the greatest extent possible, with the Surface Water Quality Standards for Washington (WAC 173-201A).
- Petroleum products, concrete, chemicals, or other toxic or deleterious materials will be prevented from entering surface waters to the extent possible through the use of best management practices. For example:
  - Fuel hoses, oil drums, oil or fuel transfer valves, and fittings will be checked regularly for leaks.
  - Fuels and lubricating materials will be maintained and stored properly to prevent spills.

7.0 REGULATORY REQUIREMENTS

The Project would require approvals from the City of Camas, Clark County, Ecology, DNR, and WDFW, as well as permits and approvals to comply with the Clean Water Act Sections 404 and 401 and Section 408 of the Rivers and Harbors Act through the USACE and Ecology (see **Table 8**).

Many of these permits and approvals require review under the Washington State Environmental Policy Act (SEPA) prior to issue. Following receipt of all permits and approvals, in-water and overwater work would be performed during the timelines outlined in the applicable permits.

Table 8. Regulatory Requirements

Permit or Approval	Agency	Attendant Approvals	Application
SEPA Determination	City of Camas	Suitability determinations	SEPA Checklist and supporting documentation
Shoreline Substantial Development Permit	City of Camas	Requires SEPA determination prior to issue	City Application and supporting documentation
FEMA Floodplain Review and Zero Rise evaluation	City of Camas and Clark County	SEPA determination	Report and Zero-rise Certification
Historic and Archaeological Review	City of Camas and DAHP	SEPA determination	Inventory of Historic Properties Archaeologic Resources Report
Grading Review	City of Camas	SEPA determination	Grading plans
Materials Reuse Approvals	Clark County Public Health and Ecology	Suitability determination	Data Report and determinations
Construction Stormwater General Permit	Ecology	SEPA determination	Notice of Intent and public notices
Approval under Existing Industrial Discharge Permit for construction stormwater discharges	Ecology	SEPA determination	Letter to Ecology addressing conditions provided in Condition S7 of the permit
Clean Water Act Section 401 Water Quality Certification	Ecology	CWA Section 404, ESA concurrence, requires anti-degradation review and review of suitability of materials for reuse	Joint Aquatic Resources Permit Application (JARPA); Suitability determination from DMMP, Preapplication meeting request form.
Clean Water Act Section 404 Permit (Individual)	USACE	Requires review and concurrence by USFWS and NOAA Fisheries under ESA. Requires Section 106 consultation with Tribes and DAHP. Requires NEPA compliance by federal agency. Requires Suitability determination for in-water disposals	JARPA along with Historic and Cultural Resources documentation, Biological Assessment, impacts assessment.
River and Harbors Act, Section 408 for use of Civil Works Projects	USACE	None	USACE provided letter to GP in 2020 indicating no Civil Works are within the Project footprint and no further action needed for compliance with this section at this time.
Hydraulic Project Approval (HPA)	WDFW	Requires SEPA determination prior to issue.	Application submitted through Aquatic Protection Permitting System (APPS) including supporting reports and JARPA

Abbreviations:
CWA = Clean Water Act
DAHP = Washington Department of Historic Preservation
Ecology Washington State Department of Ecology
ESA = Endangered Species Act
FEMA = Federal Emergency Management Agency
JARPA = Joint Aquatic Resources Permit Application
NEPA = National Environmental Policy Act
NOAA Fisheries = National Oceanic and Atmospheric Administration, National Marine Fisheries Service
SEPA = Washington State Environmental Policy Act
USACE = U.S. Army Corps of Engineers
USFWS = U.S. Fish and Wildlife Service

Exhibit 22 SHOR23-01

7.1 State Environmental Policy Act

The State Environmental Policy Act of 1971 (SEPA; Revised Code of Washington [RCW] 43.21C) established a process to identify and analyze environmental impacts associated with governmental decisions, including issuing permits for private Projects. All the City, County and State permitting and approval processes for the Project also require a SEPA review and threshold determination be made prior to issuance of a permit or approval.

The City of Camas is the lead SEPA agency for the Project. A pre-application meeting was held with the City in March 2020 based on the earlier plan. A new pre-application meeting will be scheduled to discuss the revised IWOW Structures Removal Project.

7.2 Shoreline Management Act and City of Camas Shoreline Management Program

The Shoreline Management Act (RCW 90.58) requires jurisdictions with shorelines to develop and implement a Shoreline Master Program. Such programs have been developed by the City of Camas (2015) and Clark County (2016). For this Project, the proposed structures to be removed are located within the City of Camas Shoreline Management zone with the exception of one dolphin removal within the Clark County Shoreline Management zone.

A *Shoreline Report* has been completed for the Project in compliance with requirements and addresses how Project activities potentially impact shoreline and meet compliance requirements for the City's Shoreline Master Program. This includes the requirements found in Section 5.7.2 (i.e., Clearing, Grading, Fill, Excavation), Section 6.4.2.1 (i.e., Dredging), Section 6.4.2.2 (i.e., Dredge Material Disposal), and Section 6.4.5 (i.e., Shoreline Stabilization – General) of the City's Shoreline Master Program. Note that most of the requirements of Section 6.4.5 would not apply to this Project as the Project does not involve the establishment of "new or enlarged structural shoreline stabilization measures".

The Project area is primarily designated as a "High Intensity" shoreline, which provides for industrial uses while protecting existing ecological functions. Critical Areas are protected under the Shoreline Master Program, including wetlands and fish and wildlife habitat conservation areas. See the *Shoreline Report* for details.

Given that the Camas Shoreline Master Program does not list all of the Project's proposed activities as permitted uses, some of the activities would be considered an "unlisted use," which would require a Shoreline Conditional Use approval by the City of Camas. Other activities are recognized in the Master Program. Structural shoreline modification and fill placement waterward of the OHWM require a Conditional Use Approval. Dredging is permitted where it will not result in significant adverse impacts. To be eligible for a Conditional Use approval, the Project must be consistent with the requirements of WAC 173-27-160.

Exhibit 22 SHOR23-01

7.3 Critical Areas Ordinances from the Camas Shoreline Master Program

Appendix C of the Camas Shoreline Master Program (City of Camas 2021), as adopted by Ordinance No. 21-003, defines critical areas. These include Wetlands; Critical Aquifer Recharge Areas; Frequently Flooded Areas; Geologically Hazardous Areas; and Fish and Wildlife Habitat Conservation Areas. The following provides the description of these critical areas, as defined by the City of Camas (also see Chapter 16.51.070 of the Camas Shoreline Master Program):

- **Wetland critical areas** are defined as important natural resources which provide significant environmental functions including: the control of floodwaters, maintenance of summer stream flows, filtration of pollutants, recharge of ground water, and provision of significant habitat areas for fish and wildlife.
- **Critical aquifer recharge areas (CARA)** are defined as those areas with a critical recharging effect on aquifers used for potable water as defined by WAC 365-190-030(2). CARA have prevailing geologic conditions associated with infiltration rates that create a high potential for contamination of ground water resources or contribute significantly to the replenishment of ground water. These areas include the following:
    - Wellhead Protection Areas;
    - Sole Source Aquifers;
    - Susceptible Ground Water Management Areas;
    - Special Protection Areas (as defined WAC 173-200-090);
    - Moderately or Highly Vulnerable Aquifer Recharge Areas; or
    - Moderately or Highly Susceptible Aquifer Recharge Areas.
- **Frequently Flooded Areas** include areas of special flood hazard which are commonly identified as critical areas in local government development regulations.
- **Geologically Hazardous Areas** include areas susceptible to one or more of the following types of hazards:
    - Erosion hazard;
    - Landslide hazard;
    - Seismic hazard; or
    - Other geological events including, mass wasting, debris flows, rock falls and differential settlement.
- **Fish and wildlife habitat conservation areas** include the following areas:
    - Areas with which state or federally designated endangered, threatened, and sensitive species have a primary association;
    - State priority habitats and areas associated with state priority species;

Exhibit 22 SHOR23-01

- Habitats of local importance as identified by the city's park, recreation and Open space comprehensive plan as natural open space;
- Naturally occurring ponds under twenty acres;
- Waters of the state;
- Bodies of water planted with game fish by a governmental or tribal entity; or
- State natural area preserves and natural resource conservation areas.

The Project's potential effects on these critical areas, as well as how the Project has been designed and would be implemented in compliance with the city and county's critical areas ordinances is addressed in various Project related documents, as listed in Section 9. These include:

- The "*Shoreline and Critical Areas Review and Impacts Assessment*[2]*,"* which addresses wetlands critical areas as well as fish and wildlife habitat conservation areas.
- The "*Geologically Hazardous Area and Critical Aquifer Recharge Review - Addendum to the Shoreline and Critical Areas Review and Impacts Assessment,"* which addresses geologically hazardous areas and critical aquifer recharge areas.
- The "*Frequently Flooded Areas Report and Flood Hazard Assessment for Demolition of Encroachments*," the "*Certification of No-Rise and Description of Flood Hazard for Demolition of One Dolphin*," and the "*No-Rise Report for Removal of Structures along Camas Slough*," which addresses frequently flooded areas.
- The "*Biological Assessment*," which further addresses fish and wildlife habitat conservation areas (in addition to the information provided in the "*Shoreline and Critical Areas Review and Impacts Assessment"*)

As discussed in these documents, the Project has been designed to avoid and minimize impacts to critical areas to the extent possible, and measures have been proposed to minimize impacts when complete avoidance is not possible. In addition, the assessments and measure proposed to address the critical areas ordinances for the City of Camas would also address critical areas as defined by Clark County.

7.4 Clean Water Act

The Clean Water Act of 1972 (CWA; 33 United States Code [U.S.C.] §1251 et seq.) along with implementation rules, including the Navigable Waters Protection Rule (85 *Federal Register* [FR] 22250), establishes the structure for regulating discharges of pollutants into Waters of the U.S. and regulating quality standards for surface waters. Section 404 of the CWA establishes a program to regulate the discharge of dredged or fill material into Waters of the U.S., including wetlands, and requires a permit before dredged or fill material may be discharged into waters of the U.S. The USACE

[2] This document has been prepared to meet the requirements of the City of Camas and Clark County Shoreline Master Programs and requirements for critical areas reports (Camas Municipal Code [CMC] 16.51.140 and Clark County Code [CCC] 40.440, 40.450, and 40.460). It has also been developed to provide information relevant to the SEPA process.

Exhibit 22 SHOR23-01

Seattle District Regulatory Branch administers individual permit decision, conducts, or verifies jurisdictional determinations, and enforces Section 404 permit provisions. The Columbia River and Camas Slough are Waters of the U.S. because they are traditional navigable waters (85 FR 22250). The USACE's jurisdictional boundary for fresh waters under the CWA is the ordinary high water along with the upland boundary of any adjacent wetlands.

Wetlands are present below OHWM in the Project area and are unavoidably impacted by Project activities. Descriptions of wetlands in the Project area, potential effects to those wetlands, and mitigating actions are provided in the *Shoreline Report*. All the wetlands in the Project area are also subject to state and local regulations, as well as the federal CWA.

As part of the Section 404 permitting process, the USACE consults with the U.S. Fish and Wildlife Service and NOAA Fisheries to evaluate impacts on fish and wildlife protected under the Endangered Species Act. To facilitate the USACE consultation process, a *Biological Assessment* has been prepared to document the biological resources and evaluate potential effects to species listed on the Endangered Species Act that may be present in the Project area.

Further, federal agencies are mandated to consider the effects of their undertakings on historic properties under Section 106 of the National Historic Preservation Act of 1966 [16 U.S.C. §470(f)]. Thus, as part of their review, the USACE consults with Washington State Department of Archaeology and Historic Preservation. The Project has developed an *Inventory of Historic Properties and Historic Context*, which summarizes the presence of historic structures and provides evaluation regarding eligibility for listing as an Historic Resource. The Project's *Archaeological Cultural Resources Report* provides information on resources and an analysis of potential effects.

Delegation of CWA Section 401 and its implementing rules authorizes Washington State to certify that a discharge would not violate state water quality standards prior to the issuance of a Section 404 CWA permit. For the Project area, Ecology is the designated state water pollution control agency for issuing a Section 401 water quality certification. Ecology requires a SEPA determination to be completed for the Project prior to issuing a certification.

7.5 Rivers and Harbors Act

As stated, the Columbia River and Camas Slough are navigable waters. The Rivers and Harbors Act of 1899 (R&HA; 33 U.S.C. §401 et seq.) regulates all work affecting the condition of navigable waters. Section 10 of the R&HA requires authorization from the USACE for the construction of any structure in or over any navigable waters of the U.S., the excavation and dredging or deposition of material, or any obstruction or alteration to a navigable water. Under the R&HA, the jurisdictional boundary for fresh navigable waters is the ordinary high water (OHW) (33 Code of Federal Regulations 329.11).

As mentioned earlier, Section 408 of the R&HA addresses securing federal permission for making alterations to federal Civil Works Projects. USACE has made a determination that the Project would not alter, occupy, or use a USACE federally authorized Project (Letter to J. Dambrun, GP, March 20, 2020). There are no river levees in the Project reach.

7.6 Hydraulic Project Approvals

Projects that occur below the OHW require a Hydraulic Project Approval (HPA) from the WDFW (RCW 77.55).

All demolition work or other work below the OHWM or directly over the waters of Camas Slough or the Columbia River would be covered by the HPA. Other in-water work, such as sediment sampling, also requires an HPA.

7.7 Activities on State-Owned Aquatic Lands

State-owned aquatic lands are defined as all tidelands, shorelands, harbor areas, the beds of navigable waters, and waterways owned by the state. These areas are administered by the DNR. This Project includes activities on state aquatic lands leased by GP in the 2016 State Aquatic Lands Lease and also within various Aquatic Land Easements issued by DNR.

The lease terms require coordination and approval by DNR prior to undertaking the Project. Coordination with DNR to meet the terms of the lease has been initiated with the objective for the Project to identify and meet various lease terms for work occurring within the footprint. DNR coordination will continue throughout the Project.

8.0 ENVIRONMENTAL REVIEW SUMMARY

Environmental resources and uses within the Project area with the potential to be affected by the proposed Project were identified. A *SEPA Checklist* has been prepared to document in more detail the potential effects of Project activities. **Table 9** lists the resources considered and summarizes the potential effects that could result from implementation of the Project.

Table 9. Project Effects Summary

Resource or Use	Present and May be Impacted	Present and Not Impacted or Not Present	Summary of Anticipated Effects and Associated Documentation
Air Quality	X		Temporary emissions generation associated with demolition equipment and activities. Best management practices will be implemented to reduce vehicle and equipment emissions and provide dust control. The Contractor is required to secure approvals from the Southwest Clean Air Agency prior to handling regulated materials and performing structure demolition.
Historic Resources	X		Six historic resources were documented within the study area. Three were determined to not be eligible for listing on the National Register of Historic Places (NRHP). Three other resources individually fail to meet NRHP criteria, however, as a group, they were determined to be potentially eligible for NRHP listing as a contributing resource to a potential historic district. As such, demolition is considered an adverse effect. Additional information is provided in the report, *Inventory of Historic Properties and Historic Context Study*.

Resource or Use	Present and May be Impacted	Present and Not Impacted or Not Present	Summary of Anticipated Effects and Associated Documentation
Archaeological Resources	X		An archaeological pedestrian survey of the proposed work areas on the mainland identified the Berger Crane foundation footings as a recorded archaeological site (45-CL-1380). The site is considered not eligible for listing on the NRHP. Work on and adjacent to the mainland is highly unlikely to encounter intact archaeological material because most of the area has been disturbed repeatedly by shoreline construction and is mostly covered by fill material. An inadvertent discovery plan is recommended for work between the low waterline and the OHW along the main Mill parcel.
Fish and Wildlife Habitat, including Threatened and Endangered Species	X		The proposed activities include placement of fill within a water of the U.S. that is known to provide habitat to fish species listed under the Endangered Species Act. Additional information on fish species within the Project area and potential impacts are provided in the Biological Assessment. Native vegetation would be installed following riverbank grading activities near the Berger Crane foundation to provide riparian restoration. Additional information on impacts to vegetation and Fish and Wildlife Habitat Conservation Areas, as protected under City and County Critical Areas codes, is provided in the *Shoreline Report* and *Critical Areas Review*.
Floodplains	X		The Project would occur in the special flood hazard area of the Columbia River, including portions of the floodway as mapped by the Federal Emergency Management Agency. The Project would remove existing encroachments to flow, and no new construction would be involved. Changes in ground elevation would be minor given small areas of net fill, and other areas of net cut within the floodway. Additional information is provided in the Frequently Flooded Areas Reports and Flood Hazard Assessments prepared for the City of Camas and Clark County.
Hazardous Materials	X		Regulated materials present would be abated prior to demolition activities to the extent possible. Some roofing materials will be abated at the time of demolition. Regulated materials will be managed and disposed of in compliance with rules and regulations.
Land Use	X	X	Project activities would occur on lands under DNR Aquatic Lands Lease agreement and easements. A potential goal of the Project is to terminate this lease. Waterfront operations would no longer be possible from the river. However industrial land uses on the main mill parcel and Lady Island would not change as a result of the Project.
Navigation	X		The USACE currently maintains the federal navigation channel in the Columbia River adjacent to the south side of Lady Island (USACE 2008). The USACE has determined the Project will not occupy a federal Project (Section 408 letter, USACE 2020). Barge operations in the Camas Slough and on the Columbia River would result in temporary use of these areas. The contractor is required to inform the U.S. Coast Guard prior to operations on the river.
Noise	X		Temporary noise generation associated with demolition equipment and activities would be consistent with existing noise levels associated with the Industrial zoning. In-water noise impacts are evaluated in the *Biological Assessment*.
Migratory Birds	X		Temporary vegetation disturbance will occur during the Project. Impacts to birds protected under the Migratory Bird Treaty Act is very limited. Best management measures include confining activities related to clearing, grubbing, and trimming of trees/shrubs to the non-nesting season (August 1 to January 31). See the *Shoreline Report.*
Recreational Use		X	Project activities would not preclude recreational users or the public from accessing the Camas Slough or Columbia River.

Resource or Use	Present and May be Impacted	Present and Not Impacted or Not Present	Summary of Anticipated Effects and Associated Documentation
Soils and Sediments, including Dredged Materials	X		Sediments would be disturbed by dredging. Dredged materials management is required, and dredged materials would be disposed of at approved locations. The *Tier 1 Evaluation for Dredged Materials Management* report provides additional information on dredge activities.
Solid Wastes	X		In additional to debris generated by the Project, many of the existing dolphins and pilings include rubber tires. All solid waste generated by the Project would be removed and recycled when feasible or properly disposed of.
Vegetation	X		Limited temporary vegetation removal would be required for the Project activities. Native vegetation would be installed following riverbank grading. Additional information on impacts to vegetation is provided in the *Shoreline Report*.
Visual Resources	X		Removal of structures within the riverbed and riverbanks would reduce the visual clutter as experienced by users on the waterways and traveling on SR 14. Due to natural slopes and existing development, the area is not visible from downtown Camas.
Water Resources and Water Quality	X		The Project includes activities within Camas Slough, the Columbia River, and the Shoreline Zone of the City of Camas and Clark County. The Columbia River and Camas Slough are listed under Section 303(d) of the Clean Water Act for water quality impairment. The proposed activities include dredging and/or placement of fill within waters of the U.S. and would require permitting under Section 404 of the Clean Water Act. Additional information is provided in the Shoreline Report and Critical Areas Review. A Preliminary Stormwater Management Plan has been prepared to describe temporary erosion and sedimentation control measures, pollution prevention measures, inspection/monitoring activities, and record keeping that would be implemented during construction. A Stormwater Pollution Prevention Plan would be prepared by the construction contractor prior to initiating work activities.
Wetlands	X		The proposed activities include dredging and/or placement of fill within wetlands, resulting in temporary impacts, and would require permitting under Section 404 of the Clean Water Act. Additional information on wetland conditions and impacts assessment are provided in the Shoreline Report and Critical Areas Review.

Abbreviations:
DNR = Washington State Department of Natural Resources
NRHP = National Register of Historic Places
USACE = U.S. Army Corps of Engineers

9.0 DOCUMENTS PRODUCED FOR THIS PROJECT

The following documents and applications have been previously prepared and will be updated as necessary to support the permitting process and agency reviews:

- City of Camas Pre-Application Meeting, Presentation (December 1, 2022)
- City of Camas Development Application (February 2023)
- *Inventory of Historic Properties and Historic Context Study* (August 2020)
- *Archaeological Resources Cultural Survey and Literature Review* (July 2020)
- *Tier 1 Evaluation for Dredged Materials Management* (February 2023)
- *Sediment Sampling and Analysis Plan* (February 2023)

Exhibit 22 SHOR23-01

- Washington State Department of Ecology, Section 401 Water Quality Certification, Pre-Filing Meeting Request Form (November 2022)
- *Biological Assessment* (February January 2023)
- *SEPA Checklist* (February 2023)
- *Shoreline and Critical Areas Review and Impacts Assessment* (January 2023)
- *Geologically Hazardous Area and Critical Aquifer Recharge Review - Addendum to the Shoreline and Critical Areas Review and Impacts Assessment* (May 2023)
- *Frequently Flooded Areas Report and Flood Hazard Assessment for Demolition of Encroachments* (Memorandum for City of Camas, January 2023)
- *Certification of No-Rise and Description of Flood Hazard for Demolition of One Dolphin* (Floodplain Memorandum for Clark County, February 2023)
- *No-Rise Report for Removal of Structures along Camas Slough* (February 2023)
- Joint Aquatic Resource Permit Application Form (JARPA, To be submitted after SEPA is completed or decision is imminent)
- *Preliminary Stormwater Management Plan* (March 2023)

10.0 REFERENCES

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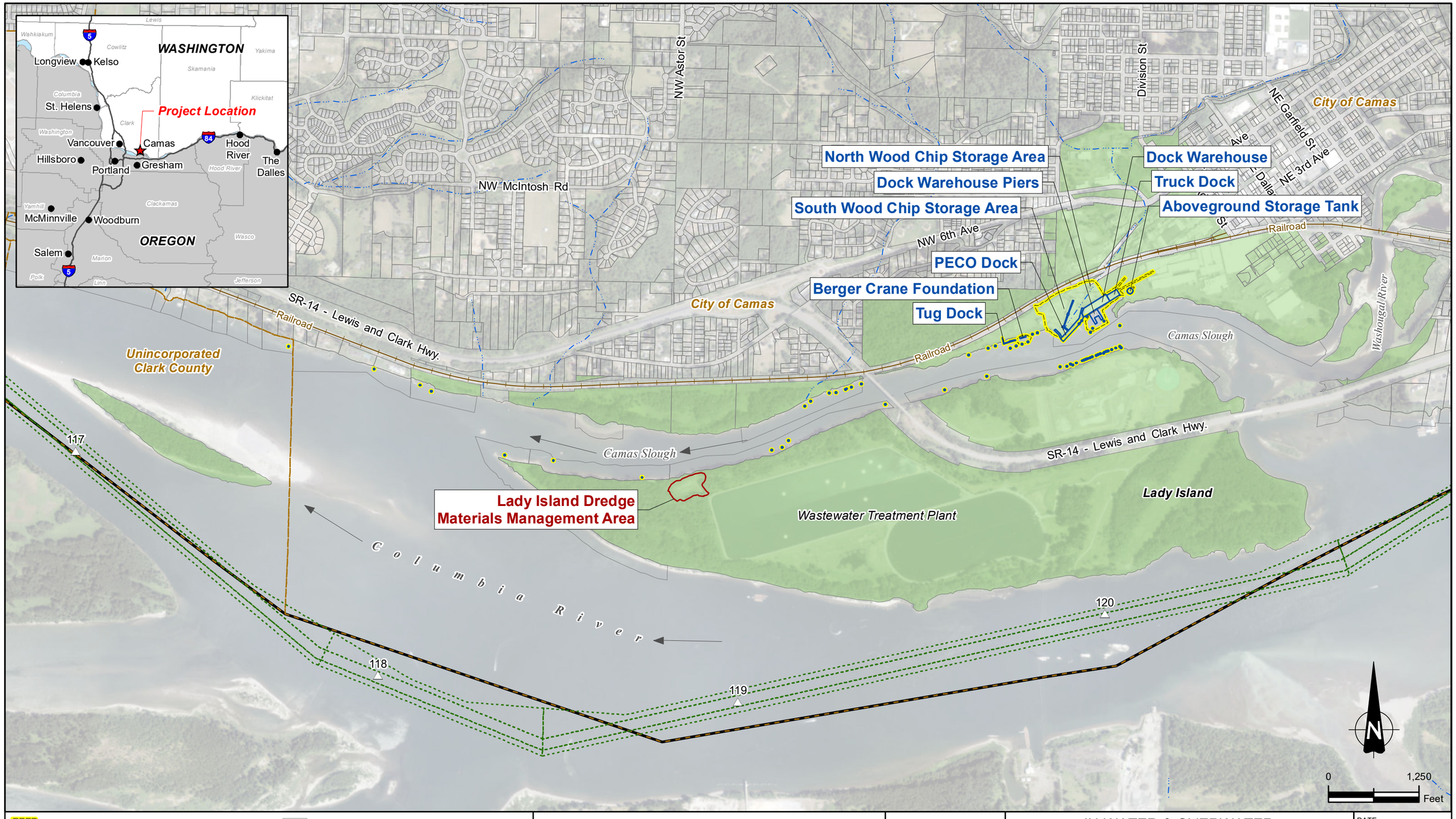
FIGURES



- Project Limits
- Columbia River Mile Marker
- Stream/River
- Structure To Be Removed
- Dolphin To Be Removed
- Lady Island Dredge Materials Management Area
- Tax Lot
- Tax Lot Owned by Georgia-Pacific
- City Boundary
- County Boundary
- Federal Navigation Channel

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

PROJECT LOCATION

DATE: OCTOBER 2022
SCALE: 1 " = 1,250 '
PROJECT NO.
FIGURE: 1261

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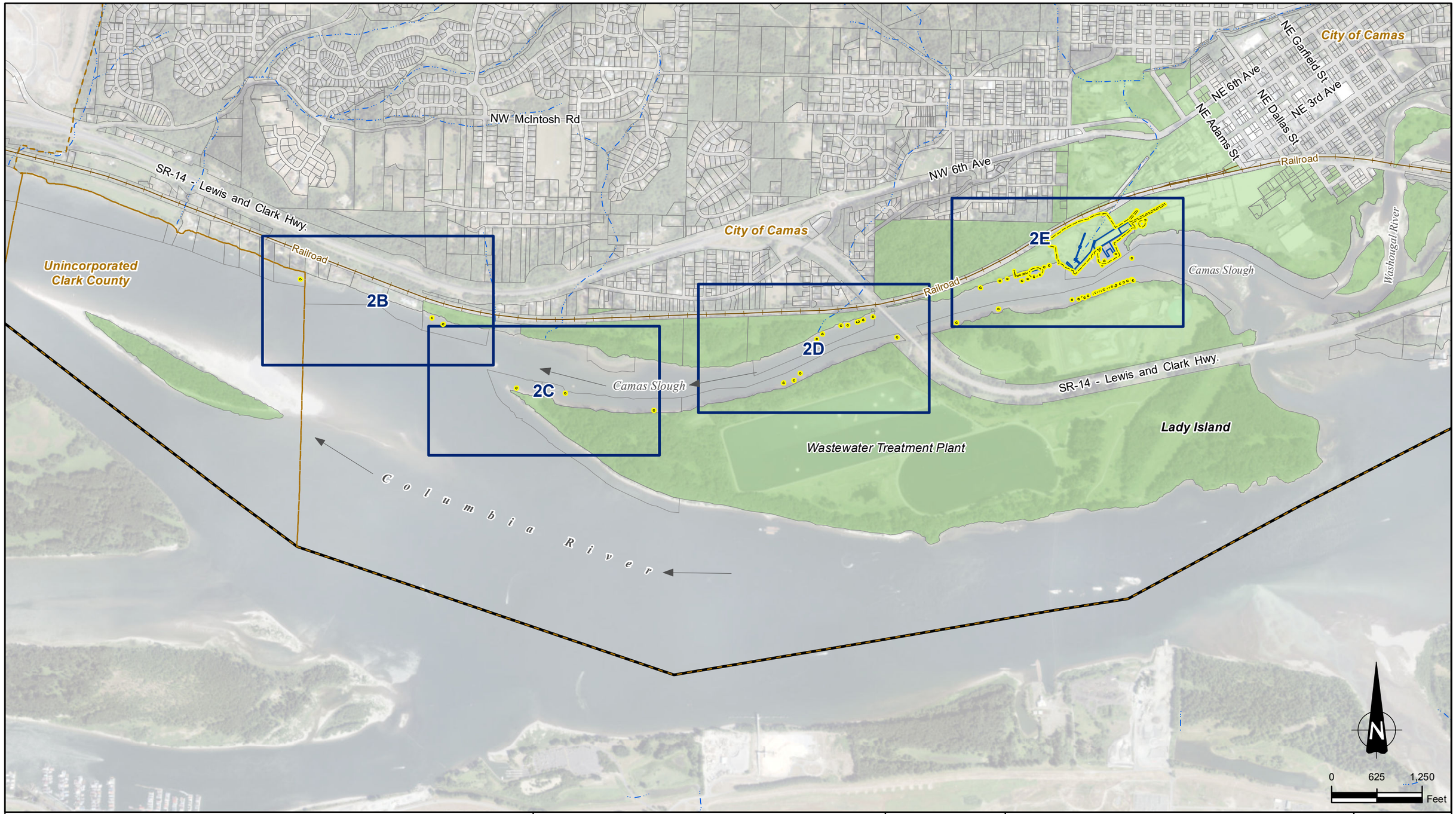

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Stream/River
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary
County Boundary

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP
OVERVIEW

DATE
OCTOBER 2022

SCALE
1 " = 1,250 '

PROJECT NO.

FIGURE
1262

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2A - Study Area Map - Overview.mxd - sierra.marrs - 10/19/2022 - 3:36:05 PM

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific
City Boundary
Action Area:
Vibratory Pile Removal Underwater Action Area
Dredging Water Quality Action Area

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED AND STUDY AREA MAP

DATE: APRIL 2023
SCALE: 1 " = 200 '
PROJECT NO.
FIGURE: 1263

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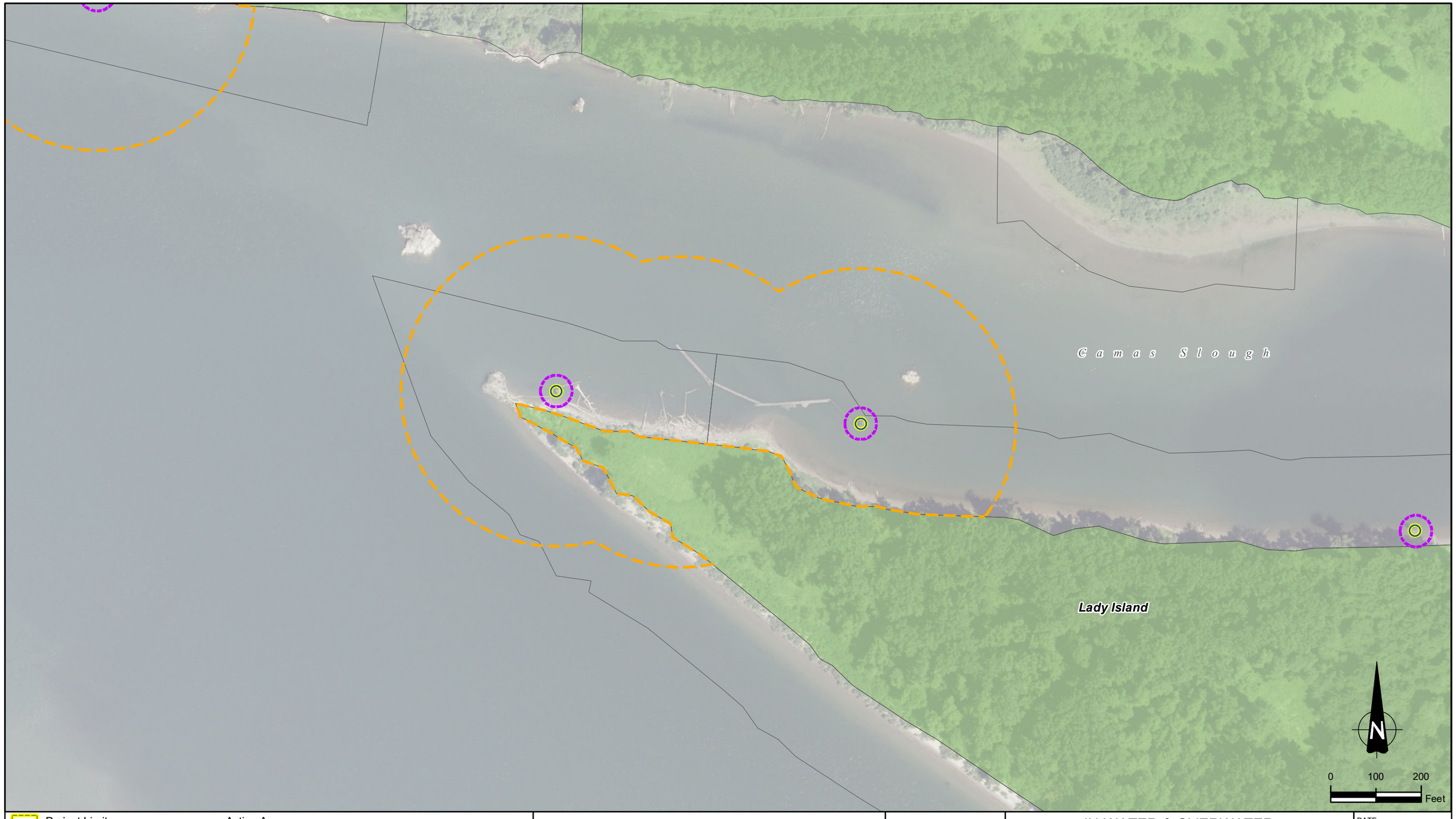

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific

Action Area:
Vibratory Pile Removal Underwater Action Area
Dredging Water Quality Action Area

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED AND STUDY AREA MAP

DATE: APRIL 2023
SCALE: 1 " = 200 '
PROJECT NO.
FIGURE: 1264

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2B-2E - Study Area Map - Mapbook.mxd - sierra.marrs - 4/19/2023 - 2:34:48 PM

Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific
OHWM (elevation: 16.05 ft., CRD)
Action Area:
Dredging Water Quality Action Area

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE: APRIL 2023
SCALE: 1 " = 200 '
PROJECT NO.
FIGURE: 1265

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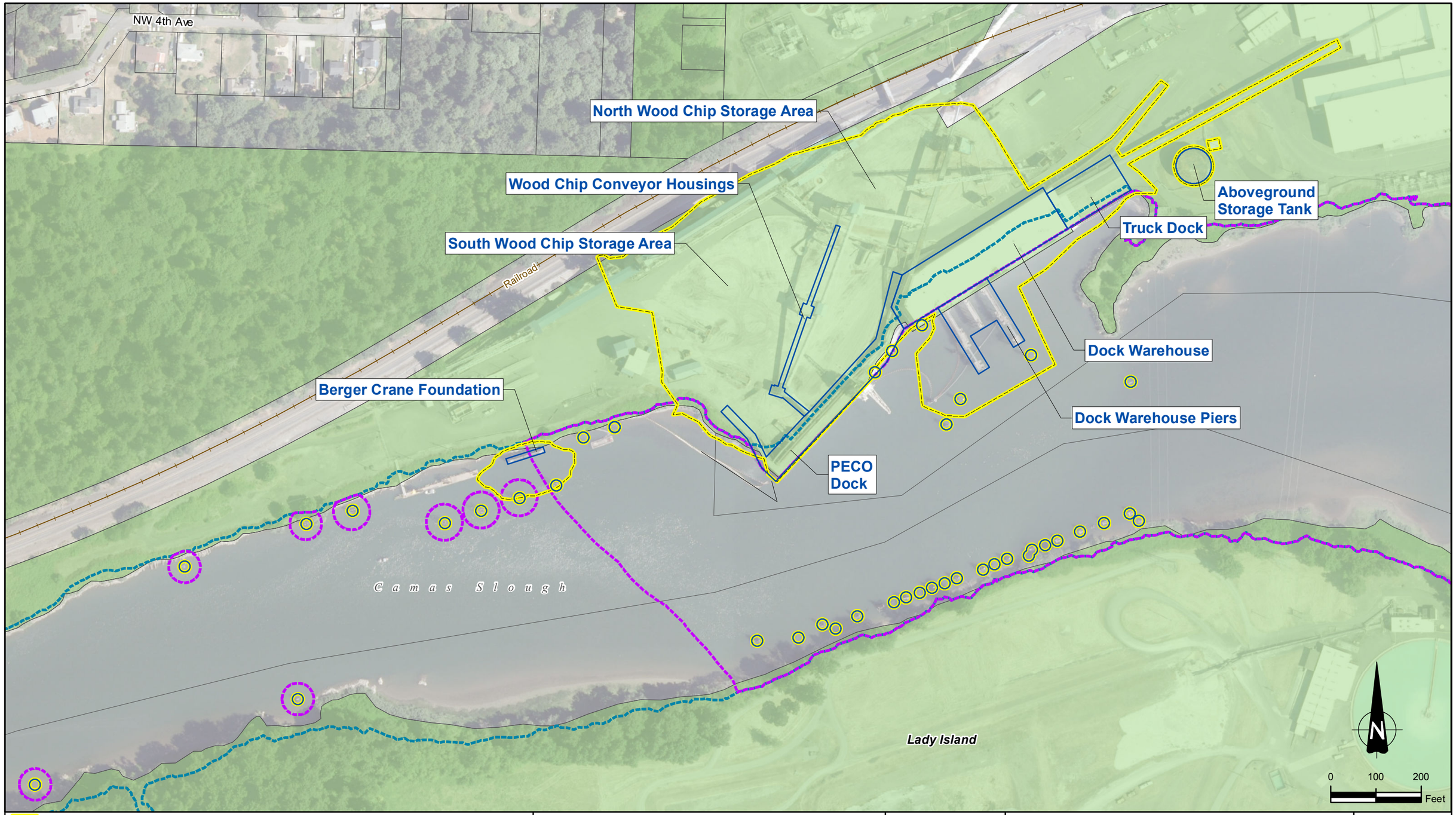


Project Limits
Structure To Be Removed
Dolphin To Be Removed
Tax Lot
Tax Lot Owned by Georgia-Pacific
OHWM (elevation: 16.05 ft., CRD)
Action Area:
Dredging Water Quality Action Area

GEORGIA-PACIFIC
CONSUMER OPERATIONS LLC

Tetra Tech

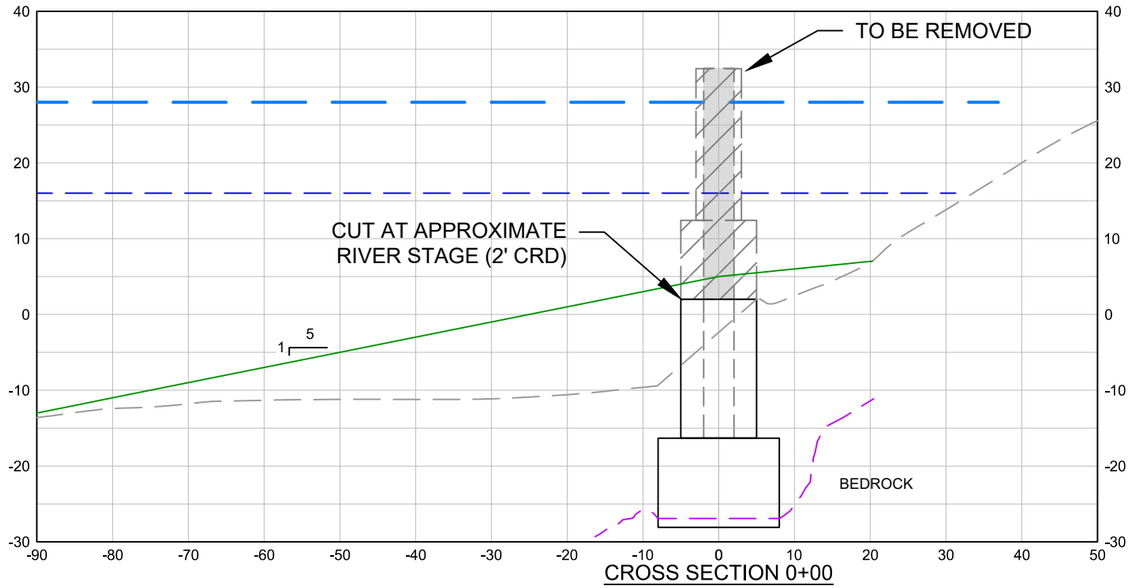
TETRA TECH

IN-WATER & OVERWATER
STRUCTURES REMOVAL PROJECT
CAMAS MILL, CAMAS, WASHINGTON

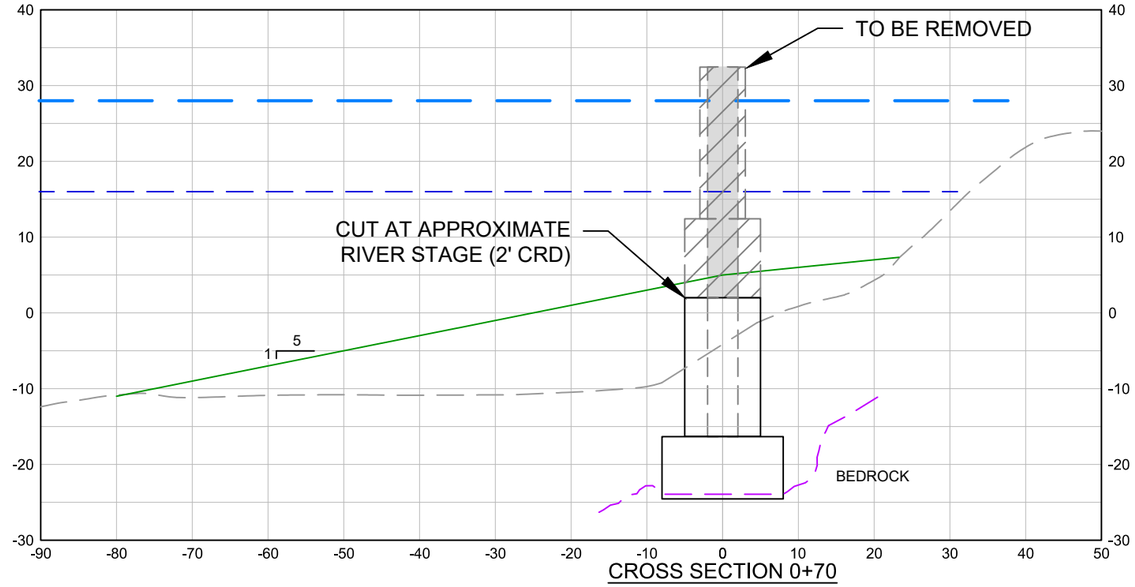
STRUCTURES TO BE REMOVED
AND STUDY AREA MAP

DATE: APRIL 2023
SCALE: 1 " = 200 '
PROJECT NO.
FIGURE: 1266

R:\PROJECTS\CAMAS_0117-0064\FIGURES_UPDATE\MAPS\Figure 2B-2E - Study Area Map - Mapbook.mxd - sierra.marrs - 4/19/2023 - 2:34:53 PM



CROSS SECTION 0+00



CROSS SECTION 0+70

Depth Thickness Table in Ft		
MIN	MAX	Color
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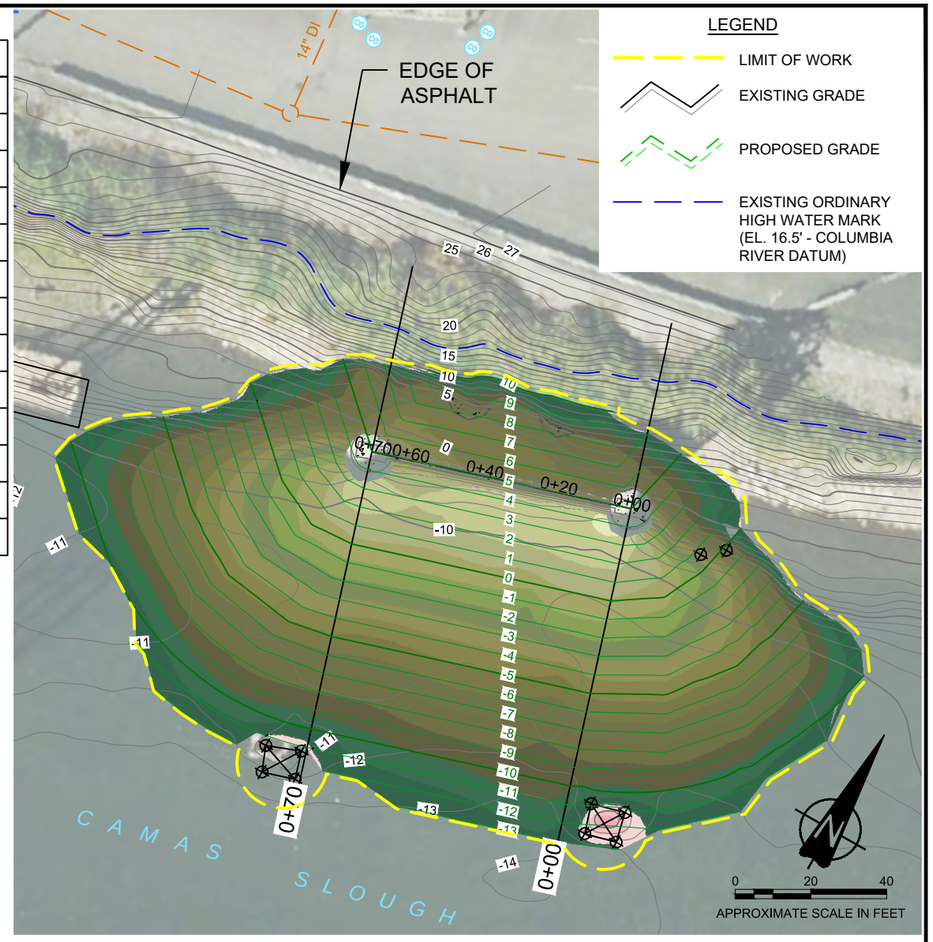
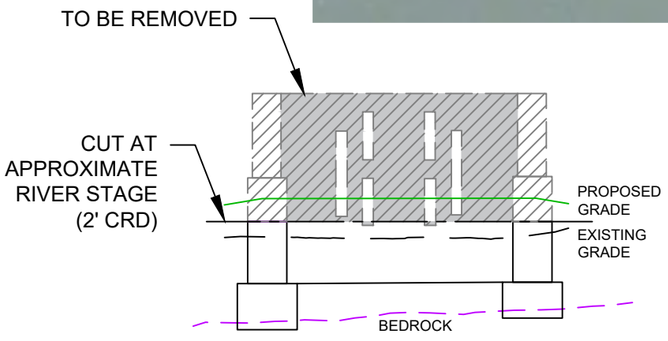
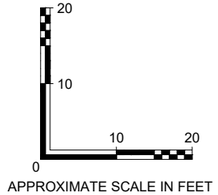
+1	+2	
+2	+3	
+3	+4	
+4	+5	
+5	+6	
+6	+7	
+7	+8	
+8	+9	
+9	+10	
+10	+11	
+11	+12	

3,500 c□ FILL





BERGER CRANE FOUNDATION PHOTO

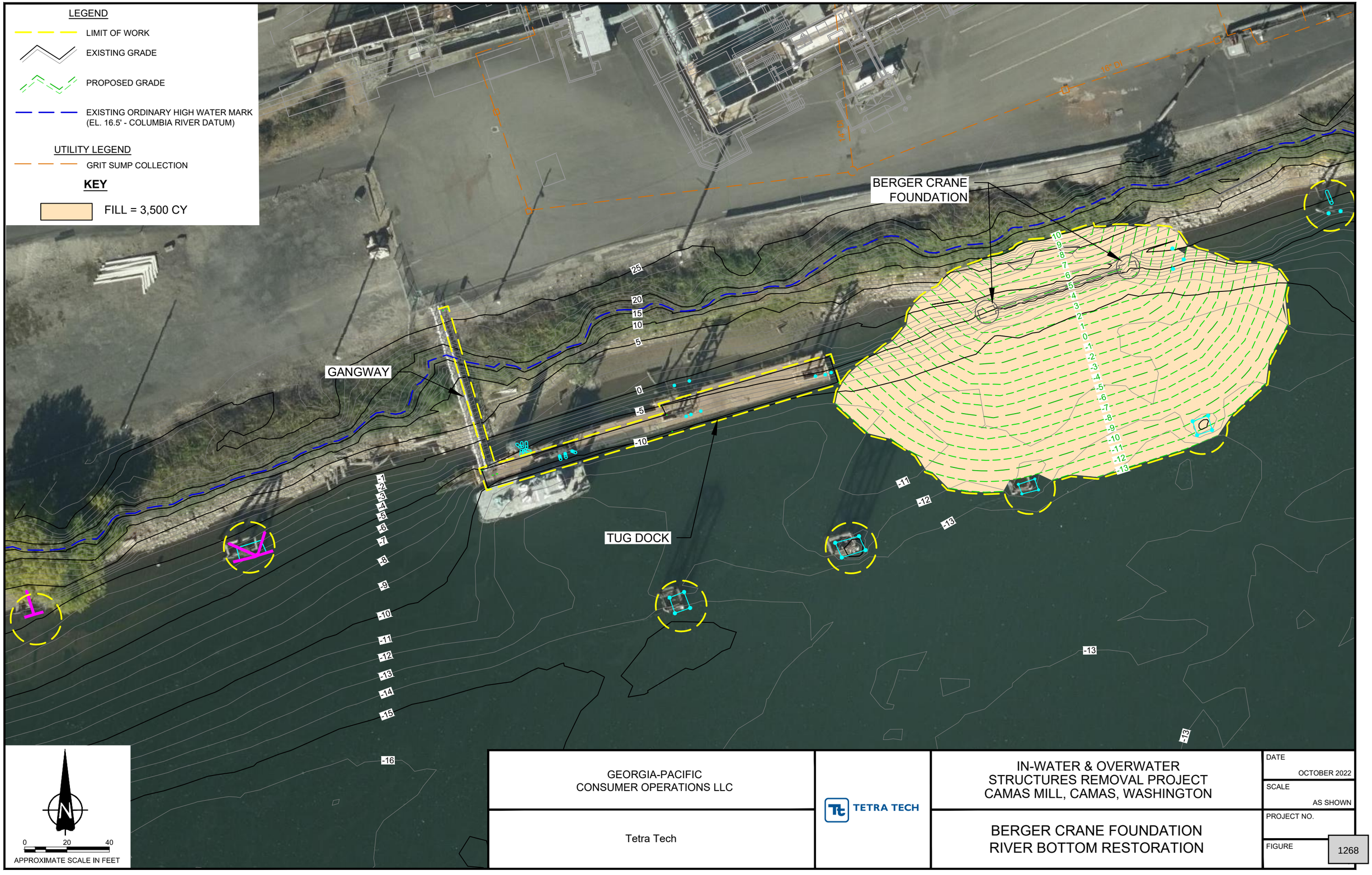


APPROXIMATE SCALE IN FEET

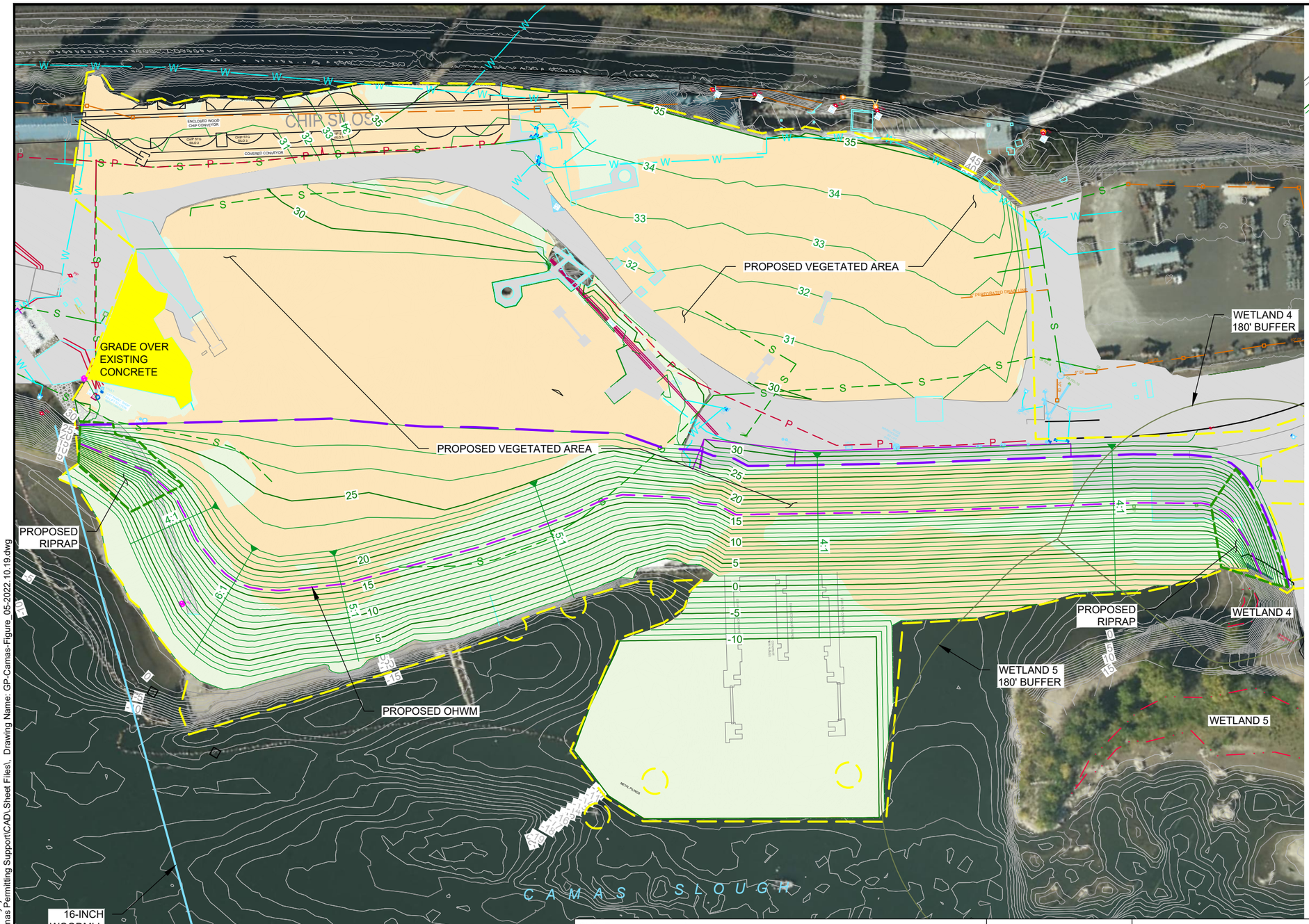
CROSS SECTION LEGEND

- ORDINARY HIGH WATER MARK (EL. 16.5' - COLUMBIA RIVER DATUM)
- 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING GRADE
- PROPOSED FINAL GRADE

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE: OCTOBER 2022
			SCALE: AS SHOWN
Tetra Tech		GRADING PLAN BERGER CRANE FOUNDATION	PROJECT NO.
			FIGURE: 1267



GEORGIA-PACIFIC CONSUMER OPERATIONS LLC	TETRA TECH	IN-WATER & OVERWATER STRUCTURES REMOVAL PROJECT CAMAS MILL, CAMAS, WASHINGTON	DATE OCTOBER 2022
Tetra Tech		BERGER CRANE FOUNDATION RIVER BOTTOM RESTORATION	SCALE AS SHOWN PROJECT NO. FIGURE 1268



LEGEND

- LIMIT OF WORK
- EXISTING GRADE CONTOURS (SITEWIDE LAND SURVEYING 7/07/20)
- PROPOSED FINAL GRADE CONTOURS
- PROPOSED ORDINARY HIGH WATER MARK (OHWM) (EL. 16.5' - COLUMBIA RIVER DATUM)
- PROPOSED 100-YEAR FLOOD PLAIN (EL. 28' - COLUMBIA RIVER DATUM)
- EXISTING WETLAND

UTILITY LEGEND

- FIRE MAIN
- W — WATER
- S — PROCESS SEWER
- GRIT SUMP COLLECTION
- OL — OVERHEAD POWER LINE
- P — UNDERGROUND POWER LINE
- NATURAL GAS

EARTHWORK QUANTITIES

NORTH WOOD CHIP AREA:
130,730 SF (3.00 ACRE)
CUT = 5,678 CY
FILL = 32,943 CY

SOUTH WOOD CHIP AREA, PECO DOCK, WAREHOUSE, AND PIERS:
340,088 SF (7.81 ACRE)
CUT = 32,676 CY
FILL = 20,788 CY

DRAFT

0 50 100
APPROXIMATE SCALE IN FEET

CLIENT
Georgia-Pacific
CAMAS MILL
Camas, Washington 98607

TETRA TECH
www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

GEORGIA-PACIFIC CONSUMER OPERATIONS LLC
CAMAS MILL
CAMAS, WASHINGTON

GRADING PLAN - PECO DOCK, DOCK WAREHOUSE, AND DOCK WAREHOUSE PIERS

DATE 10/19/22
SCALE AS SHOWN
PROJECT No. 194-0117
FIGURE 1269

Plot Date: 10/19/22 - 5:03pm, Plotted by: joel.cameron
Drawing Path: P:\194-0117-0064 Camas Permitting Support\CAD\ Sheet Files\, Drawing Name: GP-Camas-Figure_05-2022-10.19.dwg

APPENDIX A: SITE AND STRUCTURE PHOTOGRAPHS

Appendix A

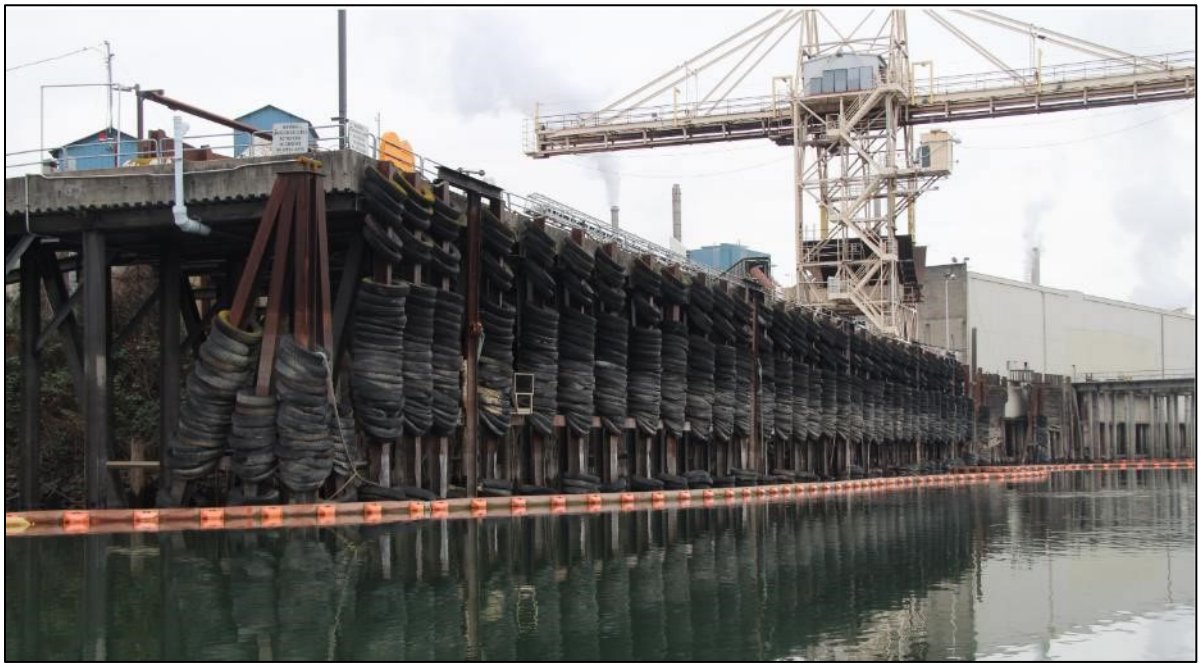
Site and Structure Photographs

Photograph 1. Truck Dock which is supported by approximately 220 pilings constructed from wood and pipe.

Photograph 2. Conveyer housing in the vicinity of the Truck Dock, PECO Dock, and Dock Warehouse

Photograph 3. Dock Warehouse situated between the Truck Dock and PECO Dock and supported by approximately 800 piles, with foundations on the riverbank side.

Photograph 4. Three piers extend from the Dock Warehouse that are supported by 54 concrete piles along with 21 carbon steel pipe piles. Three guidance dolphins are arranged at the end of the piers.



Photograph 5. The PECO Dock, supported by approximately 400 wood piles.

Photograph 6. Concrete footing from the Berger Crane gantry.

Photograph 7. Typical HP pile dolphin with tire bumpers attached.

Photograph 8. Typical timber head dolphin.

Photograph 9. Aboveground storage tank, a 40,000-gallon steel oil tank that has been previously cleaned and disconnected.

STATE ENVIRONMENTAL POLICY ACT CHECKLIST

A. Background

1. Name of proposed project, if applicable:

In-water and Overwater Structures Removal Project

2. Name of applicant:

Georgia-Pacific Consumer Operations LLC (GP)

3. Address and phone number of applicant and contact person:

Georgia-Pacific Consumer Operations LLC
401 NE Adams Street
Camas, Washington 98607

Applicant:
Shawn Wood
Vice President
(Phone No.: 360-834-8162)

Technical Contact:
Caleigh Belkoff
Environmental Manager
Phone No.: 360-834-8485

4. Date checklist prepared:

March 10, 2023

5. Agency requesting checklist:

City of Camas

6. Proposed timing or schedule (including phasing, if applicable):

Work in-water and overwater would occur during approved in-water work windows and following receipt of all approvals. Work would span approximately three years, with the final schedule dependent on the in-water work windows. At the time of this document development, demolition is expected to begin in 2023 following receipt of all Project permits and approvals. However, the project schedule will be influenced by work-window timing, weather, river stage, and contractor and equipment availability. The project work hours are expected to be Monday through Friday from 7 AM to 5 PM and Saturday 7 AM to 3:30 PM.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

No additions, expansion, or further activity related or connected to this proposal are planned.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

- Appendix 1: *Project Description Narrative*: Prepared by Tetra Tech; Bothell, WA, February 2023.
- Appendix 2: *Shoreline Report and Critical Areas Review and Impact Assessment*: Prepared by Tetra Tech; Bothell, WA, February 2023.
- Appendix 3: *Biological Assessment*: Prepared by Tetra Tech; Bothell, WA, February 2023.
- Appendix 4: *Inventory of Historic Properties and Historic Context Study*: Prepared by WSP USA Environment & Infrastructure Inc.; Portland, OR, February 2023.
- Appendix 5: *Archaeological Resources Survey and Literature Review*: Prepared by WSP USA Environment & Infrastructure Inc.; Portland, OR, March 2023.
- Appendix 6: *Inadvertent Discovery Plan*: Prepared by Erik Anderson; Kirkland, WA, February 2023.
- Appendix 7: *Frequently Flooded Areas Report and Flood Hazard Assessment for Demolition of Encroachments*: Prepared by WSP USA Environment & Infrastructure Inc.; Portland, OR, February 2023.
- Appendix 8: *Certification of No-Rise Report for Removal of Structures along Camas Slough*: Prepared by WSP USA Environment & Infrastructure Inc.; Portland, OR, February 2023.
- Appendix 9: *Certification of No-Rise and Description of Flood Hazard for Demolition of One Dolphin*: Prepared by WSP USA Environment & Infrastructure Inc.; Portland, OR, February 2023
- Appendix 10: *Revised (Version 3) Tier 1 Evaluation for Dredged Materials Management*: Prepared by Tetra Tech; Bothell, WA, February 2023
- Appendix 11: *Sampling and Analysis Plan for the Characterization of Sediments in the Camas Slough, Washington*: Prepared by Tetra Tech; Bothell, WA, February 2023.
- Appendix 12: *Preliminary Stormwater Management Plan*. Prepared by Tetra Tech; Bothell, WA, March 2023
- *Joint Aquatic Resources Permit Application*: To be submitted at a later date
- *WDFW Hydraulic Permit Application (HPA)*: To be submitted at a later date
- *Stormwater Pollution Prevention Plan (SWPPP)*: To be submitted Prior to construction

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

Prior to the start of this project, abatement of regulated materials will take place for any structures that have been demonstrated to have regulated hazardous materials, including asbestos containing materials. A *Notification of Demolition and Notification of Intent to Remove Asbestos* will be submitted to the Southwest Clean Air Agency by the contractor no later than 10 days prior to the start of any abatement. All asbestos containing materials along with any other regulated hazardous material determined to be present will be abated prior to structure demolition activity.

A proposal to restore topographic grades and for stormwater collection facilities installation at the North Wood Chip Yard has been provided to the City of Camas by GP. That project would occur on the main Mill parcel, but outside the footprint of the *In-water and Overwater Structures Removal Project* described here.

10. List any government approvals or permits that will be needed for your proposal, if known.

Federal

- Clean Water Act (CWA) Section 404 Permit – US Army Corps of Engineers (USACE)
- River and Harbors Act, Section 10, Navigable water protection, USACE
- Endangered Species Act – Section 7 compliance, US Fish and Wildlife Service (U.S. FWS), National Oceanic and Atmospheric Administration (NOAA Fisheries Service)
- National Historic Preservation Act, Section 106 consultation, USACE
- Suitability Determination for in-water disposal of sediments, Dredged Materials Management Program (DMMP)

State

- Clean Water Act, Section 401 Water Quality Certification – Washington Department of Ecology (Ecology)
- Written approval for Non-routine Discharges under existing National Pollution Discharge Elimination System (NPDES), Permit No. WA000256 for waste discharge, per Permit Condition S7, Ecology
- Notice of Intent (NOI) for coverage under the Washington State Construction Stormwater General Permit, Ecology
- Hydraulic Project Approval (HPA) - Washington Department of Fish and Wildlife (WDFW)
- Archaeology and Historic Properties review, Washington Department of Archaeology and Historic Preservation (DAHP)

City of Camas

- SEPA Process and Determination
- Shoreline Substantial Development Permit/Conditional Use Approval
- Floodplain Review and Zero Rise Evaluation
- Historic Properties and Archaeological Resources Review
- Clearing and Grading Approval City of Camas

Clark County

- Floodplain Review and Zero Rise Evaluation
- Potentially - Materials Reuse Approvals – Clark County Public Health

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

GP is planning to remove and/or demolish several structures associated with prior operations at the Camas Mill. The structures to be removed are located in-water and/or overwater on the Columbia River and Camas Slough and are located within the Shoreline Management Zone of the City of Camas or are in-water within unincorporated Clark County.

The structures to be removed include:

- A warehouse;
- Five docks/piers;

- Conveyor housings;
- An aboveground oil storage tank;
- Crane foundation; and
- Approximately 3,000 pilings that are associated with the above structures, serve as mooring dolphins, or are abandoned.

Photographs of the structures to be removed are presented in *Project Description Narrative* (**Appendix 1**). The proposed project will require work within the ordinary high-water mark (OHWM) of the Columbia River and Camas Slough. Some of the structures to be removed are located on State-owned land currently leased by GP through the Washington Department of Natural Resources (WDNR).

Table 1 summarizes structures to be demolished, indicates where the structures are located, and provides an estimate of the disturbance area.

Table 1: Summary of Structures to be Removed.

Structure to be Demolished	Location of Structure	Area of removal with disturbance area for dredging (SF)
Dolphins and pilings	Lease Areas (LA): 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19, in Camas Slough and Columbia River	890[2]
Downriver dolphin in Clark County	LA 1, Columbia River	30
Dock Warehouse piers and access dredging	LA 17, Camas Slough	58,710 (includes dredge prism)
Berger Crane foundation	LA 17, Camas Slough	19,370 (includes fill prism)
Tug Dock	LA 17, Camas Slough	-0-
Riverbank Structures[1]: Truck Dock, Dock Warehouse & PECO Dock	North Bank of Camas Slough, Main Mill Parcel	40,450
Aboveground Oil Storage Tank	Main Mill Parcel	-0-[5]
South Wood Chip Storage Area	Main Mill Parcel	155,580
Product Conveyor Housing[3]	Main Mill Parcel	-0-
Wood Chip Conveyor Housings[3]	Main Mill Parcel	-0-

Note:
1. Together, the Truck Dock, Dock Warehouse, and PECO Dock cover approximately 1,055 lineal feet along the riverbank. Given the contiguous nature of the structures, removal activities are summarized for all three structures together.
2. Assumes a 30 square foot footprint for each dolphin to be removed.
3. Conveyor housings are elevated, crossing over either the South Wood Chip Storage Area or the Truck Dock area.
4. No area of ground disturbance is expected as removal and riverbank restoration would be within the existing structure's footprint.
5. No area of ground disturbance is expected as removal is planned only to existing slab level.

Abbreviations:
LA = Lease Area, per GP 2014 lease with WDNR
SF = square feet

Table 2 summarizes piling removal by location. Dolphins are groups of 3, 5, 7, or 9 piles individually installed at an angle and bound together to create a sturdy structure to serve for mooring or for protection of an adjacent structure from potential impacts. A complete impacts analysis including methods and results discussion is provided in the *Shoreline Report and Critical Areas Review and Impact Assessment* (**Appendix 2**).

Table 2: Pilings to be Removed.

Location	In-water or Overwater	Approximate Number of Pilings [1]
Open-water dolphins and pilings	In-water	250
One downriver dolphin in Clark County	In-water	9
Pilings at riverbank that are associated with in-water structures[2]	In-water	200
Piling associated with overwater structure foundations [3]	Overwater	2,500
Estimated Total numbers of piling		**Approximately 3,000**

Note:

1. Numbers of pilings were estimated, and the total estimated number has been rounded up.
2. In-water pilings include pilings associated with mooring dolphins, remnant riverbank pilings, sheet pilings, pilings supporting the Dock Warehouse Piers, and pilings at the Tug Dock.
3. Overwater pilings include pilings associated with the foundations supporting the Dock Warehouse, PECO Dock, and Truck Dock along the riverbank.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The proposed project lies within the City of Camas, Washington, except for one dolphin to be removed on the Columbia River that is located outside the city limits within unincorporated Clark County, Washington. (**Table 3**). The Project location, overview, and site plan figures, along with site photos are provided in the *Project Description Narrative* (**Appendix 1**).

The Project area consists of a portion of the Camas Slough, which runs between Lady Island and the city of Camas, Washington, on the north bank of the main channel of the lower Columbia. The project area lies within Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16, Willamette Meridian. The project lies between RM 117 and 121, with much of the proposed activity at approximately RM 119 to 120 located in the Camas Slough.

As stated, the structures to be removed are located adjacent to the riverbank, or entirely or partly below the OHWM of the Camas Slough or Columbia River main stem and are located within either the City of Camas Shoreline Management Zone or Clark County Shoreline Management Zone. One dolphin located downriver of the main Mill parcel at Columbia River RM 117 and is on State Aquatic bedlands within unincorporated Clark County.

The project office is located at the Camas Mill main office at 401 NE Adams Street, Camas, WA 98607.

Table 3: Parcels in the Project Area.

Assessor Parcel Number	Owner[1]	Tax Parcel Type Description/Zoning/location
08370-0000	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/ **Lady Island**
09104-4013	Georgia-Pacific Corporation	Manufacturing—lumber and wood products/Heavy Industrial
09104-4015	Fort James Camas, LLC (GP)	Manufacturing—paper products/Heavy Industrial/ **Main Mill Parcel**
09104-4027	Specialty Minerals Inc. [2](GP)	Storage warehouse/Heavy Industrial
50090-1000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-2000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-3000	Fort James Camas, LLC (GP)	Tidelands/Water
50090-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-4001	Fort James Camas, LLC (GP)	Tidelands/Water
50081-7000	Fort James Camas, LLC (GP)	Tidelands/Water
50081-8000	Fort James Camas, LLC (GP)	Tidelands/Water

1. The previous corporate name, Fort James Camas LLC, is shown on County's tax parcel information.
2. Specialty Minerals was a part of Fort James Camas, LLC.

B. Environmental Elements

1. *Earth*

a. General description of the site:

(circle one) (Flat,) rolling, hilly, steep slopes, mountainous, other _____

Structures to be removed are located in-water and over-water. Structures to be demolished occur in the Camas Slough, along the banks of the Camas Slough at the Camas Mill property, and along the Columbia River.

b. What is the steepest slope on the site (approximate percent slope)?

Areas of the Camas Slough riverbank have the steepest slopes with some slopes at approximately 30%.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

No areas within the project are used for agricultural purposes. No areas of long-term agricultural significance occur within the project vicinity. Soils on the main Mill parcel are comprised of fill materials. Sediments at river locations are generally comprised of sandy and gravelly materials.

Where natural riverbanks exist in the project area they are mapped as either Newburg silt loam or Sauvie silt loam series. In the project area, the north side of Lady Island riverbank were mapped as Newburg silt loam series, while the western extent of Lady Island were mapped as Sauvie silt loam series. These natural soils are silty loams derived from alluvium.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No surface indications of historic or currently active landslides or unstable soils are indicated or mapped in the project area, on the parcel, or in the immediate vicinity.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Table 4 provides a summary of the fill and excavation quantities above and below OHWM.

All fill materials will be comprised of materials approved for the location. Some fill materials will be available from the Lady Island Dredge Materials Management Area where clean dredged fill material has been stored (**Appendix 1-Figure 1**). Riprap and larger material retrieved from the riverbanks during excavation would be stockpiled and reused where appropriate.

Table 4: Summary of Fill or Excavation Quantities

Structure to be Demolished	Filling or excavation/dredging	Fill (+)/Excavate (-) Quantity (Cubic Yard)	
		Below OHWM	Above OHWM
Dock Warehouse piers access dredging	Dredging	-10,500	-0-
Berger Crane foundation	Filling	+3,500	-0-
Riverbank Structures[1]: Truck Dock, Dock Warehouse & PECO Dock	Excavation/dredging and filling	+1,230 / -2,990	+18,300 / -17,100
South Wood Chip Storage Area	Excavate remaining wood chips and backfill to previous grade	-0-	+11,100 CY

Note:

1. Together, the Truck Dock, Dock Warehouse, and PECO Dock cover approximately 1,055 lineal feet along the riverbank. Given the contiguous nature of the structures, removal activities are summarized for all three structures together.

Abbreviation:
CY = cubic yard
OHWM = ordinary high water mark

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.
Vegetation clearing for the project is very limited as the project removes existing structures. Erosion is not anticipated from structure demolition. Following demolition of structures on the main Mill parcel, the riverbank will be reshaped to allow natural drainage and revegetated. Best management practices will be utilized to eliminate erosion and contain sediment during removal of structures from the riverbank and reshaping.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

In-water structure removals will result in no change of impervious surfaces. Along the riverbank on the main Mill parcel where overwater structures will be removed, impervious surface is currently 100 percent. At the completion of the project, when structures have been removed, less than 10 percent of the project footprint will have retained impervious surfaces. No new impervious surfaces are anticipated.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Best management practices (BMPs) for reduction and control of erosion will be implemented throughout the project to reduce potential for erosion and provide sediment containment and control. Example BMPs include perimeter silt fencing where appropriate, and straw waddles and other BMPs would be installed as needed. A list of additional BMPs to be implemented are available in the *Project Description Narrative* (**Appendix 1, Section 6.0**), as well as the Preliminary Stormwater Management Plan (**Appendix 12**).

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

During Demolition Activities: The project includes demolition of structures, which may result in temporary and transient increase in fugitive dust emissions during work activities. Prior to demolition occurring, GP will work with its contractor to ensure all air quality approvals needed from Washington's Southwest Clean Air Agency are in place.

Other emissions during demolition are anticipated to include primarily vehicle and equipment emissions from worker trucks, machinery, and equipment to disassemble and remove materials from buildings and facilities, and from haul trucks to transport items for disposal and recycling. Emissions of particulate matter (PM), carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), volatile organic compounds (VOCs), and various greenhouse gases (GHGs) are expected from the use of gasoline and diesel fuels.

Post-Demolition Activities: No air emissions would occur following the project. No long-term maintenance of any area of the project would be required. No new operations area planned in the project area.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No off-site sources of emissions or odor are associated with this proposal or may affect the project are anticipated.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Demolition will incorporate best management practices to reduce the risk of fugitive dust emissions. Best management practices include, removing dust prior to demolition where needed, watering areas during building felling to minimize fugitive dust, routine site sweeping, as well as minimizing the extent of dust disturbance and other dust containment measures. Machinery used for demolition will incorporate standard air emission reduction technologies, and a no-idle policy will be used during loading and unloading vehicles to reduce emissions.

3. Water

a. Surface Water:

1) **Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**

The project includes in-water and over-water structures to be removed in the Camas Slough and Columbia River. Riverine wetlands are present in the project area or adjacent to the project area within 200 feet.

- Columbia River: The Columbia River is one of the largest rivers in North America, extending approximately 1,240 miles, draining approximately 258,000 square miles, and emptying into the Pacific Ocean. The project area is within the Lower Columbia Reach, and located approximately 120 river miles from the Pacific Ocean. The Columbia River experiences low river stages (low water levels) generally in October with high stages in June most years. The change in water depth between June and October in the project area is approximately 10 feet.
- Camas Slough: Camas Slough is an approximately 2.4-mile-long side channel of the Columbia River. The confluence with the Washougal River occurs at the far upriver end of the Camas Slough and no portion of the project is on the Washougal River. The Camas Slough has similar river stages as the Columbia River.
- Riverine Wetlands: Riverine emergent wetlands occur along the Camas Slough riverbanks at the main Mill parcel and Lady Island. Located at the base of the riverbank, the riverine wetlands extend from land waterward to the point where deep water prevents persistent rooted vegetation, usually at about 6 feet of depth. The wetland areas are seasonally inundated for long durations, from November through June in most years. Additional details regarding the wetland areas and their locations can be found in the *Shoreline Report and Critical Areas Review and Impact Assessment* (**Appendix 2**).

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

As stated, all proposed structures removal require work to occur over, in, or adjacent to the described waters. Figures are included in *Project Description Narrative* (**Appendix 1)** and show locations of the structures to be removed relative to the waters. Removal of the in-water and overwater structures would occur in a manner that is not disruptive to ongoing operations at the Mill and in a manner that is protective of the environment.

Work in-water and overwater to remove structures includes:

1. Remove in-water pilings and dolphin,
2. Dredging for access to, and demolition of, the three Dock Warehouse piers,
3. Berger Crane Foundation demolition to river stage and fill to create shallow nearshore habitat and cover the remnant foundation,
4. Demolish Dock Warehouse,
5. Demolish PECO Dock,
6. Remove floating Tug Dock,
7. Demolish Truck Dock, and
8. Riverbank shaping to decrease slope and create final riverbank topography.

The *Project Description Narrative* **(Appendix 1**) provides details regarding proposed removal methods for structures, photos of the structures, and additional relevant figures.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

Table 5 provides a summary by location of sediment quantities to be dredged in the Columbia River and Camas Slough. Dredged materials will be placed at the Lady Island Dredge Materials Management Area (see **Figure 1** for location).

Table 5: Summary of In-water Dredge and Fill Below OHWM of Camas Slough and Columbia River

Project Activity	Waterbody	Impact location	Duration of impact	Amount of material to be placed in or removed from River (cubic yards)	Area of River directly affected. (sq. ft.)
Fill at Berger Crane Foundation, new shallow riverbed contours	Camas Slough	Below OHWM	Permanent	+3,500	19,018 sq. ft
Fill and Excavation at riverbank structures (Wood Chip area, Truck Dock, Dock Warehouse, PECO Dock), reshape riverbank	Camas Slough	Below OHWM	Permanent	+1,230 / -2,990	67,356 sq. ft.
Dredge at Dock Warehouse Piers, channel deepening for access for demolition	Camas Slough	Below OHWM	Temporary, short-term, <90 days	-10,500	59,153 sq. ft.
Total Project; net amount of material to be placed or removed; below OHWM and from Floodway:				-8,760 cubic yards	
The following Excavation and Fill quantities occur above OHWM, within the 100-year floodplain and in the regulatory Shoreline Buffer.					
	Associated Waterbody	**Location**	**Duration**	**Fill or Excavate Quantity (CY)**	**Area of Shoreland directly affected (sq. ft.)**
Excavate & Fill at Truck Dock, Dock Warehouse, PECO Dock; reshape slopes to 5:1 and 4:1; match existing grades.	Camas Slough	Above OHWM; Main Mill Parcel	Permanent Fill placement	+18,300 / -17,100	168,312 sq. ft.
Excavate & Fill at South Wood Chip Storage Area; excavate remaining wood chips and backfill to previous grade.	Camas Slough	Above OHWM; Main Mill Parcel	Permanent Fill placement	+11,100	155,580
Total Project; Net Amount of material to be placed or removed; above OHWM:				+12,300 cubic yards	

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No surface water withdrawals or diversions will be needed. During demolition, all water for dust control or other activities will be acquired from the Mill's existing water supply, City of Camas potable water supply, and/or City of Camas fire water supply, as appropriate.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

The area of proposed activity lies in the Special Flood Hazard Area (SFHA) and floodway on the north bank of the Columbia River (including the Camas Slough, which is treated as part of the Columbia River in the FEMA Flood Insurance Study [FIS]). The proposed demolitions would be in an area that lies in FIRM Panels 529 (downstream of Lady Island), 533 (most of Lady Island and the Camas Slough), and 534 (the eastern portion of Lady Island and areas upstream) published by FEMA dated effective September 5, 2012 (panels 529 and 533), and January 19, 2018 (panel 534).

An evaluation of the effect of the project activities on flood hazard, certification of no-rise, and figures are presented in the following:

- **Appendix 7:** Frequently Flooded Areas Report and Flood Hazard Assessment for Demolition of Encroachments. WSP USA Environment & Infrastructure Inc., February 2023.

- **Appendix 8**: Certification of No-Rise Report for Removal of Structures along Camas Slough. WSP USA Environment & Infrastructure Inc., February 2023.

- **Appendix 9**: Certification of No-Rise and Description of Flood Hazard for Demolition of One Dolphin. WSP USA Environment & Infrastructure Inc., January 2023.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No waste materials will be discharged to surface waters. Any demolition debris materials that inadvertently reach water will be removed.

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No groundwater will be used for this project that is beyond the current groundwater rights associated with the Mill. Water for the project will be supplied from the Mill's existing wells. Water may be used for dust suppression and other demolition BMPs. The small amounts of water to be used intermittently during demolition would be *de minimis* compared to the amount of water consumed daily by the Mill. No water used during demolition will be actively discharged to groundwater. Water utilized during the demolition of upland structures will be collected, to the extent possible, and conveyed for treatment at the Lady Island Wastewater Treatment Facility.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No discharge of waste material into the ground from septic tanks or other sources will occur. No septic system occurs within the project area.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Potential runoff sources would include stormwater from precipitation events and any waters used for demolition dust control or other demolition activities.

Existing Site Conditions: The main Mill parcel has an extensive area of industrial stormwater collection and treatment. On-site stormwater is collected in catchments and conveyed to the Lady Island Wastewater Treatment Facility. Following treatment, the water is released to the Columbia River under the Mill's Industrial NPDES permit. The system collects stormwater from the Dock Warehouse, Truck Dock, conveyors, oil tank, and as infiltrated stormwater from underdrains at the South Wood Chip Yard lying adjacent to the PECO Dock and Dock Warehouse.

The PECO dock is outside the industrial stormwater collection footprint. This area has a natural stormwater runoff that flows into the adjacent Camas Slough or Columbia River.

During Demolition: During demolition, stormwater runoff and other wastewater would be conveyed to the existing industrial stormwater collection system for the Dock Warehouse, Truck Dock, conveyors, oil tank, and at the South Wood Chip Yard. Treatment at Lady Island Wastewater Treatment facility would occur prior to release of treated water to the Columbia River.

Floating silt curtains would be used during demolition of the PECO dock to retain any sediment and reduce the risk of turbidity. Demolition of these sites are currently proposed to be timed to occur during for low river stages, and thus much of the work would be completed in-the-dry further reducing the risk of sedimentation. The ground surface will be stabilized with appropriate materials, such as crushed gravel, to prevent erosion following demolition.

Post-demolition Conditions: Following completion of the project, the area that currently includes the Dock Warehouse and Truck Dock will be regraded (**See Appendix 1, Figure 5**) and stormwater from the remaining project footprint will naturally discharge, including areas at the former PECO Dock. Additional details on best management practices for stormwater management are provided in the project's Preliminary Stormwater Management Plan (See **Appendix 12**).

2) Could waste materials enter ground or surface waters? If so, generally describe.

No waste is anticipated to enter groundwater because of this proposed project.

The proposed project includes in-water work for removal of dolphins and piers as well as over-water structure removals. Inadvertent introduction of debris to surface waters could occur during activities. All demolition would be planned to reduce the risk of introduction of debris to surface waters.

For overwater structures, several approaches will be employed to reduce the risk of a materials entering surface waters. To the extent that agencies allow, all overwater structure demolition will be timed to occur when river stages are low so that the riverbank is not covered by water. Riverbank structures would be demolished with upper stories removed first and working from the upland side, so that ground floors and riverside walls serve to contain debris. Other management practices to contain debris and potential sedimentation include floating silt curtains in-water and silt curtains on the riverbank. Debris nets and utilizing barges to protect surface waters would also be implemented.

Best management practices for the removal of pilings will be implemented following WDNR (2017[1]) and EPA (2016[2]) guidance. Following the guidelines reduces the risk of waste materials entering the water. The guidance has been developed to ensure water quality protection protect habitat quality. Guidelines include methods to minimize turbidity by avoiding sediment disturbance, avoiding debris entering the water, and providing habitat protection, including noise reduction where possible. Guidelines for vibratory extraction, direct pull, clamshell removal, or cutting removals, as well as guidelines for barge work operations, containment, debris capture, and disposal of pilings, sediment, and other residues would be followed.

Stormwater from construction barges generally runoff to the river, except for areas on the barges that with contain sediment materials or areas of removed materials. These containment areas would incorporate BMPs to control the risk of sediment or other materials reaching the river during storms. BMP commonly employed to contain incidental river sediments and other materials could include coir logs or silt curtains, or other materials (**Appendix 12**).

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

For in-water removals, no change in drainage would occur because of the removals. As stated above, a change in stormwater collection would occur because of removals where the industrial stormwater footprint area is reduced and areas along the riverbank are returned to natural drainage.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

During demolition of riverbank structures, BMPs will be used to control stormwater runoff and measures to reduce or control surface runoff include:

- Minimized disturbance to existing vegetation.
- Areas that would be bare earth following structure removal will receive a stabilizing layer of crushed gravel.
- All demolition will occur on existing impervious surfaces to the extent possible, including staging and materials management.
- Collection points and water bars will be implemented on-site during demolition activities to direct stormwater to receiving inlets to be conveyed to the Lady Island Wastewater Treatment facility.

Additionally, debris material management will include the following BMPs:

- Debris piles will be minimized, and when present will be managed to not generate stormwater runoff that could reach the surface water.
- Demolition materials management areas will be identified and maintained on-site and will include appropriate sediment controls and stormwater controls.
- Installing silt fences, straw bales, straw wattle and/or containment berms around major demolition areas to control possible flow of loose debris.
- Managing runoff and elutriate water.

[1] Washington Department of Natural Resources (WDNR). 2017. Derelict Creosote Piling Removal Best Management Practices for Pile Removal and Disposal. Last update 1/25/2017. Accessed 11/11/2020. https://www.dnr.wa.gov/publications/aqr_rest_pileremoval_bmp_2017.pdf?zynetrzfr

[2] U.S. Environmental Protection Agency (EPA). 2016. Best Management Practices for Pilling Removal and Placement in Washington State. February 18, 2016. Region 10, EPA. Accessed 11/11/2020. https://www.nws.usace.army.mil/Portals/27/docs/regulatory/RGPs/RGP6/EPA%20BMPs%20for%20Piling%20Removal%202-18-16.pdf?ver=2017-02-07-230329-363

- Routine inspections of any temporary piles to verify water quality protections are functioning properly.
- Demolition debris will be removed from the site and disposed at approved locations.

For dredging, an Evaluation for Dredged Materials Management Plan and SAP has been developed (**Appendix 10 and 11**, respectively, and include the following best practices:

- Hay bales and/or filter fabric may be placed over the barge scuppers to help filter suspended sediment from the barge effluent, if needed based on sediment testing results.
- The contractor will be required to use a tightly sealing bucket and to monitor for spillage during transfer operations.
- Visual water quality monitoring will be implemented and, if necessary, follow-up measurements will be conducted at the removal and upland transfer location to confirm no uncontrolled releases back to the river.

Additional BMPs are outlined within the *Project Description Narrative* (**Appendix 1, Section 6.0**) as well as in the Preliminary Stormwater Management Plan (**Appendix 12**).

4. Plants [help]

a. Check the types of vegetation found on the site:

___ deciduous tree: alder, maple, aspen, other
___ evergreen tree: fir, cedar, pine, other
_X__shrubs (including blackberry)
_X__grass, weeds and other cleared-land vegetation
____ pasture
____ crop or grain
____ Orchards, vineyards or other permanent crops.
_X__Wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
_X__water plants: water lily, eelgrass, milfoil, other
___ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

No permanent changes in vegetation would result from the project. No trees would be removed by the project. BMPs would be implemented to control the project footprint and minimize any temporary impacts to vegetation. Upland areas will be recontoured and revegetated with an approved seed mix.

b. List threatened and endangered species known to be on or near the site.

According to USFWS IPaC online tool the following species were identified on or near the site:

- Bradshaw's Desert-parsley (*Lomatium bradshawii*),
- Golden Paintbrush (*Castilleja levisecta*),
- Kincaid's Lupine (*Lupinus sulphureus spp. Kincaidii*),
- Nelson's Checker-mallow (*Sidalcea nelsoniana*),
- Water Howellia (*Howellia aquatilis*), and
- Willamette Daisy (*Erigeron decumbens*).

As further explained in the *Biological Assessment* (**Appendix 3)** these species are not known to be present on the site and were deemed to be unlikely to occur within the project site due to the lack of preferred or suitable habitat for these species.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Wetland areas that are temporarily impacted by dredging/excavation will be allowed to re-vegetate following placement of clean fill materials to re-establish grades.

e. List all noxious weeds and invasive species known to be on or near the site.

Common Name	Scientific Name	Noxious Weed Class
Indigo bush	*Amorpha fruticosa*	B
Canada thistle	*Cirsium arvense*	C
Field bindweed	*Convolvulus arvense*	C
Teasel	*Dipsacus fullonum*	C
English ivy	*Hedera helix*	C
Garlic mustard [1/]	*Allaria petiolata*	A
Himalayan blackberry	*Rubus armeniacus*	C
Reed canarygrass	*Phalaris arundinacea*	C
Tansy ragwort	*Tanacetum vulgare*	C
Common St Johnswort	*Hypericum perforatum*	C
Hairy cat's ear	*Hypochaeris radicata*	C

[1/] Species has not been documented within the Project boundary associated with the IWOW Structures Removal Project, but is being treated in a small area on the mill site.

5. Animals

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Birds: Birds known to be present in the project area include American Robin (*Turdus migrotorius*), mallard (*Anas platyrhynchos*), American black swift (*Cypseloides niger*) least sandpiper (*Calidris minutilla*), Canada goose (*Brant canadensis*) red-tailed hawk, (*Buteo jamaicensis*), great blue heron (*Ardea herodias*), bald eagle (*Haliaeetus leucocephalus*), barn swallow (*Hirundo rustica*), Steller's Jay (*Cyanocitta stelleri*), American crow (*Corvus brachyrhynchos*), Brandt's cormorant (*Phalacrocorax penicillatus*), osprey (*Pandion haliaetus*).

Mammals: Deer, beaver, river otter, racoon, coyote, mice, rabbits, and other small mammals.

Fish: Bass, salmon, trout, steelhead, eulachon, sturgeon, and others are likely to present in the river.

b. List any threatened and endangered species known to be on or near the site.

The likelihood of listed species occurring in the project area as well as the projects potential effects on these species is provided in the *Biological Assessment Report* (**Appendix 3**). Of the federally protected species identified by the USFWS and NOAA Fisheries, the following species and their critical habitat may occur in the action area:

- Lower Columbia River fall Chinook (*Oncorhynchus tshawytscha*),

- Columbia River Chum (*O. keta*),
- Lower Columbia River Coho (*O. kisutch*),
- Lower Columbia River Steelhead (winter and summer) (*O. mykiss*),
- Pacific eulachon (*Thaleichthys pacificus*), and
- Bull trout (*Salvelinus confluentus*).

All fish species on the list have designated Critical Habitat within the project area.

Other species that are threatened or endangered that may occur near project area as indicated by the PHS mapper included gray wolf, northern spotted owl, streaked horn lark, and yellow-billed cuckoo. As further explained in the *Biological Assessment* (**Appendix 3**), these species are all deemed to be unlikely to occur within the project site due to the lack of recent observations or lack of suitable habitat within the project area.

c. Is the site part of a migration route? If so, explain.

The project site is within the Pacific Flyway for waterfowl. Migration of salmonids also occurs in the project area. The Lower Columbia River is utilized by anadromous salmonids as adults migrating upstream to spawn and as juveniles to migrate downstream to enter the ocean.

d. Proposed measures to preserve or enhance wildlife, if any:

The project would enhance wildlife habitats by the removal of numerous in-water and overwater structures which would result in a net increase in wildlife habitat by removing overwater shade, and removal of refugia for aquatic predators, reducing avian predator perches, and increasing shallow nearshore habitat. Other long-term beneficial effects that would enhance wildlife include the removal of creosote treated pilings. Following the structures removal activities, areas of disturbed riverbanks and uplands, such as the Berger Crane foundation, would be graded to slopes similar to adjacent natural riverbank areas. Shallow nearshore area will be created in a former area dredged for navigation purposes. Benefits to wildlife are detailed in the *Biological Assessment* (**Appendix 3**).

e. List any invasive animal species known to be on or near the site.

No known invasive animal species are present on or near the site.

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

After demolition associated with the In-water and Overwater Structures Removal Project is completed, the project will not use any energy.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

The project will not affect the potential use of solar energy by adjacent properties.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

As the project is a demolition project, energy conservation features include efforts/practices to use electrical and fuel-derived power during the work as efficiently as possible. A no-idle policy per Washington standards will be enforced during the project.

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

There are very limited risks for toxic chemical exposure, fire, explosion, spill, or hazardous waste as a result of the demolition. No industrial chemicals are within the project footprint as industrial activities have ceased at these locations and any residuals were removed previously.

During demolition, BMPs will be used to mitigate risks of fire or explosion. Any hazardous materials generated from abatement of regulated materials prior to demolition will be handled by certified personnel according to regulations and contained and disposed of in appropriate approved landfills. Following demolition, all regulated materials will have been removed from the project area.

1) Describe any known or possible contamination at the site from present or past uses.

In 2020, Ecology assigned the main Mill parcel as Site No. 15156 under the State cleanup program. At the time of this checklist, planning for site investigations has not started and site investigations have not occurred. No information on possible contamination of the main Mill parcel is available. Sediments slated for dredging would be evaluated by chemical and physical testing and results reviewed by agencies prior to receiving approvals for disposal or reuse of sediments. No other portions of the project have known or suspected contamination.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

An underground regional gas transmission pipeline located outside the project area crosses the main Mill parcel, Camas Slough and Lady Island. All work for this project would be performed in compliance with safety operations at Camas Mill.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Within the project area, no toxic or hazardous chemicals will be stored, or used during the demolition project. Regulated materials will be removed from the site during the project and contained and disposed of at approved landfill locations. Following demolition and completion of the project the area will have no operations to result in toxic or hazardous chemicals being stored, used, or produced within the project area. The Mill will continue to be in operation on the main Mill parcel following mill safe operations requirements.

4) Describe special emergency services that might be required.

The Mill is staffed at all times and can respond in cases where emergency services may be required. This project is not anticipated to place an additional burden on public emergency resources.

5) Proposed measures to reduce or control environmental health hazards, if any:

Abatement of known locations of regulated materials in structures to be demolished and removed will be performed by certified abatement contractors, and waste materials will be disposed of off-site at an authorized and licensed location.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Existing noise in the project area includes highway traffic noise, heavy industrial activities, and railroad noise. Traffic noise originating along State Route 14 on crossing to and from and on Lady Island is prevalent throughout the project area. Industrial noise associated with the mill operations are present. Noise from passing trains on the BNSF rail line also is present intermittently. Background noise for the project area is estimated at 50 to 60 decibels (dBA) during weekday daylight hours, exclusive of train noise. These noises do not affect the project.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

- Short-term noise during demolition: Noise from demolition activities would be expected to occur during the standard project work hours of Monday through Friday from 7:30 AM to 5 PM and Saturdays from 7:30 AM to 3:30 PM. No work is anticipated at night.

  Noise during demolition on the main Mill parcel would include vehicle traffic accessing the site, as well as noise generated by gas and diesel motors typical of mobile construction/demolition equipment, such as dump trucks, excavators, front-end loaders, and cranes. Demolition activities may also result in short-term bursts of vibration and pounding along with combustion engine noise from piling removal and break-up and/or collapse of concrete structures. Gas-powered electrical generators may be used to provide support for lighting, air compression, water pumps, or other support during abatement and demolition. Noise may result from demolition debris and material management in preparation for loading and transport from the site, such as saw cutting, drilling, and pounding. Minor amounts of jack hammering may be required to remove some concrete.

  It is estimated that during demolition, intermittent peak sound levels could reach from 90 to 110 dBA L_{max} at the noise source, depending on the type and location of the activity. Sound levels of 110 dBA L_{max} are perceived as very loud and equivalent to concerts, car horns, and sporting events. At these levels, exposure may be harmful after 30 minutes, and hearing protection would be required for construction workers and contractors who would be exposed to these levels.

  Additionally, the project would also result in hydroacoustic noise due to piling removal using a vibratory hammer and concrete removal using a hoe-ram operation and/or saw cutting. Other potential sources of underwater noise that could occur as a part of this project include dredging activities and barge and other vessel use. It is estimated that during demolition, intermittent peak hydroacoustic sound levels could reach from 140 to 206 dB at peak from the noise source, depending on the type and location of the activity. Sound levels that reach 206 dB have the potential to cause fish injury and sounds levels that reach 150 dB have the potential to cause fish disturbance regardless of fish size. Additional calculations regarding hydroacoustic noise effects are detailed in the *Biological Assessment* for the In-water and Overwater Structures Removals Project (**Appendix 3**).

  Note that no blasting is planned for this demolition project.

- Long-term noise: No long-term noise would be created or associated with the project as no new activities are planned for the project area following demolition.

3) Proposed measures to reduce or control noise impacts, if any:

Demolition operations will occur during normal working hours. A variety of routine and conventional noise best management practices will be put in place during demolition to reduce noise impacts. Quieting will be accomplished using conventional engineering controls, such as machine mufflers, substituting quieter equipment where possible, and equipment maintenance actions that reduce machine and engine noise. Best management practices include a no-idle policy while on-site and shutting down noisy equipment when not being used. Given the location within an operational industrial site, demolition noise will not result in unusual noise generation.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

The project area was first developed as a paper manufacturing site and has been operational since 1883. However, the structures slated for demolition and removals are currently idle. The project will result in waterfront operations to no longer be possible from the main Mill parcel as there will be no access to the river. Overall current land uses on the main Mill parcel, and nearby or adjacent properties will remain unchanged.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

The project site has not been used for working farmland or working forest lands. No agricultural lands or forest lands will be converted as a result of the proposal.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

The project will not affect or be affected by surrounding working farm or forest land.

c. Describe any structures on the site.

Multiple structures occur on the main Mill parcel, such as processing facilities, material storage, and product warehousing. These are currently still in operation for manufacturing. Idle structures to be removed by this project within the project footprint are described above.

d. Will any structures be demolished? If so, what?
Structures to be removed include:

- A warehouse;
- Five docks/piers;
- Conveyor housings;

- An aboveground oil storage tank;
- Crane foundation; and
- Approximately 3,000 pilings that are associated with the above structures, serve as mooring dolphins, or are abandoned.

e. What is the current zoning classification of the site?

The main Mill parcel and Lady Island are zoned as Heavy Industrial land use. Areas of the project that are located in-water are zoned as Tidelands/Water.

f. What is the current comprehensive plan designation of the site?

The Camas 2035 comprehensive plan designation for the site is Heavy Industrial (City of Camas, 2016)[3].

g. If applicable, what is the current shoreline master program designation of the site?

The project site is within the following Shorelines Master Program designations:

- *High Intensity* along the main Mill parcel and central portion of Lady Island along the Camas Slough.
- *Medium Intensity* in the along the Columbia River and southeast corner of Lady Island.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

Critical areas in the project include the Columbia River and the Camas Slough along with limited areas riverine wetland areas along the riverbanks. Portions of the project are within the Columbia River floodplain.

i. Approximately how many people would reside or work in the completed project?

No people will work in the project footprint following completion. Ongoing Mill operations would continue on the main Mill parcel and Lady Island. The Mill currently employs approximately 150 people, and this number of employees would remain unaffected by the completion of the project.

j. Approximately how many people would the completed project displace?

No one will be displaced by this project.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not applicable as no displacements would occur.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The project area would remain as an operational mill and zoned as heavy industrial following demolition, which would retain the available employment lands that are essential to a healthy city (Camas City-wide Land Use Goal LU-1.1).

[3]. Reference: City of Camas. Camas 2035; a Comprehensive Plan to Guide Growth and Development for the City of Camas. Ordinance 16-010. June 2016.

Demolition of unused structures is compatible with existing City requirements for maintenance of buildings and structures. Safe and timely demolition of unused structures provides environmental protection and public safety and is compatible with the City of Camas 2035 comprehensive plan's vision for vital, stable, and livable neighborhoods (City of Camas 2016).

The project, in part, fronts on the Camas Slough, which is a designated as an important shoreline for public recreation. Thus, the demolition project will help maintain attractive and welcome corridors to the City (Economic Development goal ED-6).

As a result of the demolition project, a portion of the riverbank shoreline will be regraded to preserve the natural contours and aquatic habitats will be restored due to the removal of obstructions (Natural Environment Goal NE-1.8, NE-2.2).

Additionally, the project plans to restore a portion of the shoreline that has been impaired or degraded, which align with the Camas Shoreline Master Program (Natural Environment Goal SMP-3.3).

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

No measures are proposed as there are no agricultural or forest lands of long-term commercial significance present.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Not applicable. No housing is on-site or planned for this site.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Not applicable. No housing units would be eliminated.

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable. No impacts to housing would occur.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

No new structures are proposed. The tallest structure to be removed is the 80 foot high crane on the PECO Dock. No new structures are proposed for the parcel, so no exterior building materials are proposed.

b. What views in the immediate vicinity would be altered or obstructed?

No views will be obstructed by the removal of structures.

Alterations in the view of the riverbank on the main Mill parcel will result from the removal of structures. When viewed from the Camas Slough, Lady Island, and from viewable sections along SR 14, the riverbank would no longer contain the existing infrastructure and would be less cluttered. However, this is

a minor change as the remaining operational portions of the Mill, with the balance of infrastructure would continue to comprise the view.

Views from the Project Site: The main Mill parcel is on the southern shoreline of the City of Camas and Local views from the main Mill parcel riverbank currently include the nearby Mill infrastructure and Lady Island's wastewater treatment plant, the Camas Slough, and State Route 14. The regional visual character from the parcel will remain largely the same following the project.

Views towards the main Mill parcel: Few public locations are available to view the main Mill parcel's riverbank. Current views from adjacent public space are limited to those from on the Camas Slough and Columbia River. Following demolition, this view will no longer include the obstructions of the piers/docks, pilings, warehouse, crane foundation, oil tank, dolphins, or pilings. However, most of the mill's infrastructure would remain, so the industrial characteristics of the viewshed would be retained following completion of the project. The overall degree of visual change would be low, although the riverbank will be visually less cluttered.

Views along the River and Camas Slough: Viewers in this area include recreational boaters and from three residential properties. Viewers from residential properties would be considered highly sensitive to deterioration of any visual character. The visual character is strongly defined by the open view corridor along the river and its generally forested riverbanks. The removal of dolphins from multiple locations along the Camas Slough and the River in most cases would completely remove the visible industrial elements from the viewshed. For most viewers, the removal of the dolphins would be considered positive as it restores harmony to the natural scenic character.

c. Proposed measures to reduce or control aesthetic impacts, if any:

Vegetation will be retained where possible throughout the project area.

11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

No new permanent source of light or glare would be produced as a result of this project. The project will be conducted during daylight hours. No nighttime work is planned.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No light or glare would result from the completed demolition project. No new light sources are planned.

c. What existing off-site sources of light or glare may affect your proposal?

No existing off-site sources of light or glare could affect this proposal.

d. Proposed measures to reduce or control light and glare impacts, if any:

If artificial lighting is necessary during demolition, it will be temporary and localized for the crew during demolition. Lights will be directed away from the nearby water sources to minimize temporary impacts on aquatic wildlife. No permanent impacts from light or glare would result from the project.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

Informal recreational opportunities in the immediate vicinity include recreational boating, fishing and other river-focused activities. No recreational opportunities exist on the main Mill parcel or Lady Island. Walking and biking on the nearby City streets and the adjacent City neighborhoods is also available.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No permanent changes to recreation activities will result from the project. There could be some temporary displacement of existing water-related recreational opportunities primarily within Camas Slough during the removal of numerous structures. Work is not proposed to impact water-related recreational opportunities on the mainstem channel of the Columbia River.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

No changes to recreation activities result from this demolition project.

13. Historic and cultural preservation

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.

Three structures to be demolished were determined to be older than 50 years (**Table 6**). The three resources were assessed for their eligibility for National Register of Historic Places listing, both individually and as contributing resources to a potential historic district. These resources, while more than 50 years of age, individually fail to meet any NRHP criteria due to a lack of architectural significance and material integrity; however, the three historic resources, as a group, represent a significant association with broad patterns of local history under Criterion A of the NRHP, related to the development of the Camas Mill and its close relationship with the development of the City of Camas. Under NRHP Criterion C, these resources, as a group, demonstrate the physical design of a pulp and paper industry as it developed throughout the 20th century, reflected in their architecture, landscape, and engineering aspects. For most of the City of Camas's existence, the production of pulp and paper has dominated the local economy and facilitated the development of supporting industries within the region. Therefore, these resources warrant consideration for eligibility as contributing resources to a proposed historic district.

Table 6: NRHP Recommendations and Determinations of Effect for Historic Resources

Building/ Facility Number	Construction Date	Building/Facility Name	NRHP Recommendation	Determination of Effect
1201-1202	1932	Dock Warehouse	Not individually eligible; eligible as contributing resource to a potential historic district	Adverse Effect
- -	c. 1932	Dock Warehouse Truck Dock	Not individually eligible; eligible as contributing resource to a potential historic district	Adverse Effect
6108	1934	Loading Ramp (to the Dock Warehouse)	Not individually eligible; eligible as contributing resource to a potential historic district	Adverse Effect

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No previously recorded sites were identified within the Mill parcel. Studies to determine this and which were completed for this project include:

- **Appendix 4***: Inventory of Historic Properties and Historic Context Study:* Prepared by WSP USA Environment & Infrastructure Inc.; Portland, OR, February 2023.
- **Appendix 5***: Archaeological Resources Survey and Literature Review:* Prepared by WSP USA Environment & Infrastructure Inc.; Portland, OR, March 2023.
- **Appendix 6***: Inadvertent Discovery Plan:* Prepared by Erik Anderson; Kirkland, WA, February 2023.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

- Inventory of Historic Resources: The study methodology followed NRHP recommendations including those in Bulletin number 15, *How to Apply the National Register Criteria for Evaluation* (United States Department of the Interior 1997) in assessing buildings over 50 years of age for NRHP significance and eligibility. To construct an understanding of the historic land use, research was conducted at several archival repositories to review historic maps, aerial photographs, property records, city atlases, census and manufacturing records, GIS databases, and other pertinent information. Research included Washington Department of Archaeology and Historic Preservation (DAHP) and University of Washington archives, as well as historical records held by GP and various local Historic Societies. Impacts were assessed according to the NRHP, where demolition of potentially eligible resources is considered an Adverse Effect. Considering that together the three structures identified are recommended to have eligibility as contributing resources to a potential historic district, the demolition of these three resources will have an Adverse Effect (**Appendix 4**).

- Archaeological Resources Cultural Survey and Literature Review: The study methodology followed standards established by the DAHP and provided in *Washington State Standards for Cultural Resources Reporting* (DAHP 2018). Work included field investigations, as well as review of ethnographic and historical literature on Native American and early Euro-American occupation of the Project Area and its vicinity, map regression analysis, and a literature review including historic maps, and records on file with the DAHP. Based on archaeologic survey results, it was determined that it would be unlikely that intact archaeological material would be disturbed by the project **Appendix 5**).

An Inadvertent Discovery Plan has been developed and will be implemented during demolition (**Appendix 6**).

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Adverse effects are unavoidable to the three historic structures slated for demolition. Mitigation efforts include digital and written documentation of the structures prior to demolition and development of a detailed Historic Context for the properties. Also, the Camas Mill actively maintains a historic archive in Camas with arranged public access.

Mitigation for archaeological resources requires contractors and other personnel be briefed on the provisions of the Monitoring and Inadvertent Discovery Plan to clarify their responsibilities prior to any demolition activities, and the requirements of the plan be implemented during demolition.

14. Transportation

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

Access to the project area located along the south shore of the Camas Slough is provided by NE Adams Street and NE 3rd Street in the City of Camas. If needed, access to areas of the project located on Lady Island is accessed with coordination with GP from the Lewis and Clark Highway (also known as State Route 14). There is no public access to Lady Island. City streets and State Route 14 will be used to transport workers, equipment, supplies, and waste materials. Nearest access to the Columbia River is at the Port of Camas/Washougal, 1.5 miles upriver from the project area.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

All project activities will occur on GP property or adjacent, and in-water of the Columbia River or the Camas Slough. The river is not currently served by public transit. Clark County provides public transit (C-Tran) along NW 6th Avenue in the vicinity of the main Mill parcel. The nearest bus stop (C-Tran, Clark County) is along NW 6th Avenue, approximately 0.15 mile north of the main Mill parcel.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

The project would neither create nor eliminate any parking spaces.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

No new streets or roads are required because of this project.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

The project will occur in the immediate vicinity of rail transportation that lies on the main Mill parcel and along the Columbia River. The project would not use rail transportation. The project will not use air transportation.

The project activities will utilize vessels on the Columbia River and Camas Slough for piling, dolphin, and pier/dock removals. Additionally, vessels will be used for dredging, support, and for transport to offloading areas. Vessels would include tugboats, barges, and support vessels.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

The project will not generate any daily vehicular trips once completed.

During demolition, approximately three to five truckloads of debris are expected to occur each day during demolition activities to remove the debris from the project site. Additionally, prior to the start and at the end of demolition, demolition equipment would be hauled to the site and then removed from the site. It is unknown what percentage of the volume would be trucks, we estimate that the majority would be trucks

and demolition equipment. Daily vehicular trips would be timed to occur outside of peak traffic times in this area. Note that infrastructure, both within the mill and the surrounding community, was designed to accommodate a much larger volume of truck traffic, therefore, there will be limited impacts during demolition activities.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

The project will not interfere, affect, or be affected by movement of agricultural and forest products on roads or streets.

h. Proposed measures to reduce or control transportation impacts, if any:

Traffic Control: To reduce risk of any potential traffic and safety impacts, traffic control will be used to control access to and from the project site during the demolition. Traffic control would include flaggers where required, as well as safety signage for traffic and pedestrians, and will follow all City requirements.

15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

No change in public services results from the project.

b. Proposed measures to reduce or control direct impacts on public services, if any.

None required, as no change in public services is anticipated from the project.

16. Utilities

a. Circle utilities currently available at the site:

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other _____

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

No new utilities are proposed for this project and all required utilities during removals will be provided from existing facilities.

C. Signature

Under the penalty of perjury, the above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: Shawn J Wood

Name of signee SHAWN T. WOOD

Position and Agency/Organization V.P.

Date Submitted: 7/26/2023

State Environmental Policy Act
Determination of Non-Significance

CASE NO: SEPA23-04 Georgia Pacific In-Water Over-Water Removal Project

APPLICANT: Sam McDowell
Georgia Pacific
401 NE Adams Street
Camas, WA 98607

REQUEST: Remove and/or demolish several structures associated with the prior operations at the Camas Mill that are located in-water and/or overwater on the Columbia River and Camas Slough.

LOCATION: Tax parcels: 08370-000, 09104-4013, 09104-4015, 09104-4027, 50090-1000, 50090-2000, 50090-3000, 50090-4000, 50081-4000, 50081-4001, 50081-7000, 50081-8000 between river mile 117 and 121.

LEGAL DESCRIPTION: The Project area lies within the City of Camas in Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16, Willamette Meridian

SEPA DETERMINATION: Determination of Non-Significance (DNS)

COMMENT DEADLINE: **August 17, 2023, at 5:00pm**

As lead agency under the State Environmental Policy Act (SEPA) Rules [Chapter 197-11, Washington Administrative Code (WAC)], the City of Camas must determine if there are possible significant adverse environmental impacts associated with this proposal. The options include the following:

- DS = Determination of Significance (The impacts cannot be mitigated through conditions of approval and, therefore, requiring the preparation of an Environmental Impact Statement (EIS).
- MDNS = Mitigated Determination of Non-Significance (The impacts can be addressed through conditions of approval), or;
- DNS = Determination of Non-Significance (The impacts can be addressed by applying the Camas Municipal Code).

Published in the Post Record on August 3, 2023 Legal Publication #825040
Posted at Camas City Hall, Camas Library, City of Camas website at: http://www.cityofcamas.us
Mailed to property owners within 300-feet of the property on August 2, 2023

State Environmental Policy Act
Determination of Non-Significance

Determination:

Determination of Non-Significance (DNS). The City of Camas, as lead agency for review of this proposal, has determined that this proposal does not have a probable significant adverse impact on the environment. An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(e). This decision was made after review of a completed environmental checklist, and other information on file with the City of Camas.

Date of Publication & Comment Period:

Publication date of this DNS is **August 3, 2023,** and is issued under WAC 197-11-340. The lead agency will not act on this proposal until the close of the 14-day comment period, which ends on **August 17, 2023**. Comments may be sent by email to communitydevelopment@cityofcamas.us or regular mail to:

City of Camas SEPA Official
Community Development Department
616 NE Fourth Avenue
Camas, Washington 98607

Responsible Official: Robert Maul (360) 817-1568

Robert Maul, Interim Community Development Director and SEPA official

August 3, 2023
Date of publication

Published in the Post Record on August 3, 2023 Legal Publication #
Posted at Camas City Hall, Camas Library, City of Camas website at: http://www.cityofcamas.us
Mailed to property owners within 300-feet of the property on August 2, 2023

COMMUNITY DEVELOPMENT DEPARTMENT
616 NE 4th Avenue
Camas, WA 98607
www.ci.camas.wa.us

Date Published: August 3, 2023

To Whom It May Concern:

Please find enclosed a Determination of Non-Significance (DNS) for the **Georgia Pacific In-Water Over-Water Project (SEPA23-04)** that was issued pursuant to the State Environmental Policy Act (SEPA) Rules, Chapter 197-11, Washington Administrative Code. The enclosed review comments reflect evaluation of the environmental checklist by the lead agency as required by WAC 197-11-330(1)(a)(i).

The following materials were submitted with the initial application:

- Project Narratives
- SEPA Checklist
- Critical Areas Reports
- Preliminary Stormwater Management Plan
- Archeological Study
- Mailing labels

All application materials are available for review upon request from the Community Development Department.

Written comments may be submitted on this determination within fourteen (14) days of its issuance, after which the DNS will be reconsidered in light of the comments received.

Please address all correspondence to:

City of Camas, SEPA Official
Community Development Department
616 NE Fourth Avenue
Camas, Washington 98607
communitydevelopment@cityofcamas.us

Distribution:

Applicant
C-Tran
Camas School District
Camas Building Official, Brian Smith
Camas Communications Director, Bryan Rachal
Camas Engineering Department Managers and Staff
Camas Fire Department, Randy Miller
Camas Finance Director, Cathy Huber Nickerson
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Clark County Natural Resources Council
Clark Public Utilities
Department of Ecology
Department of Fish and Wildlife, Region 5
Department of Natural Resources, SEPA Center
Port of Camas Washougal
Southwest Clean Air Agency
US Army Corps of Engineers
Vancouver - Clark Parks & Recreation
Washington Office of Archaeology & Historic Preservation
Washington State Department of Transportation
Washington State Parks and Recreation Commission, Environmental Program
Property Owners within 300 feet *(mailed the SEPA Determination & map)*

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Southwest Region Office
PO Box 47775, Olympia, WA 98504-7775 • 360-407-6300

August 16, 2023

Robert Maul, Planning Manager
City of Camas
Community Development Department
616 Northeast Fourth Avenue
Camas, WA 98607

Dear Robert Maul:

Thank you for the opportunity to comment on the determination of nonsignificance for the Georgia Pacific In-Water Over-Water Removal Project Project (SEPA23-04). The Department of Ecology (Ecology) reviewed the environmental checklist and has the following comment(s):

SOLID WASTE MANAGEMENT: Derek Rockett (360) 407-6287

The applicant proposes to demolish an existing structure(s). In addition to any required asbestos abatement procedures, the applicant should ensure that any other potentially dangerous or hazardous materials present are removed prior to demolition. It is important that these materials and wastes are removed and appropriately managed prior to demolition. It is equally important that demolition debris is also safely managed, especially if it contains painted wood or concrete, treated wood, or other possibly dangerous materials. Please review the "Dangerous Waste Rules for Demolition, Construction, and Renovation Wastes," on Ecology's website at: Construction & Demolition Guidance. All removed debris resulting from this project must be disposed of at an approved site. All grading and filling of land must utilize only clean fill. All other materials may be considered solid waste and permit approval may be required from your local jurisdictional health department prior to filling. Contact the local jurisdictional health department for proper management of these materials.

SOLID WASTE MANAGEMENT, Industrial Section: Tara Roberts (360) 280-4325

Any cleanup work at the Georgia-Pacific Camas Mill (GP Camas) must be done in accordance with Agreed Order 18201. This includes cleanup and characterization of sediments. A full sediment Remedial Investigation is scheduled to begin in late 2023, early 2024. The conclusion of work with this project does not exclude these areas from cleanup processes in the future. Further, Ecology needs to be involved in the decision to determine if there is any potential exposure of contaminants to the post-demolition stormwater before it is discharged to the waterways.

Ecology's comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various authorizations that must be obtained or legal requirements that must be fulfilled in order to carry out the proposed action.

If you have any questions or would like to respond to these comments, please contact the appropriate reviewing staff listed above.

Department of Ecology
Southwest Regional Office

(JKT:202303728)

cc: Derek Rockett, SWM
Tara Roberts, SWM

SHOR23-01 Exhibit

NOTICE OF APPLICATION FOR
SHORELINE SUBSTANTUAL DEVELOPMENT PERMIT AND SHORELINE
CONDITIONAL USE APPROVAL
Camas Mill's In-Water and Overwater Structures Removal Project

(File # **SHOR23**-01) NOTICE
IS HEREBY GIVEN

that an application was filed with the City of Camas on March 31, 2023 for the approval of a Shoreline Substantial Development Permit and Shoreline Conditional Use Permit for in-water and overwater removal of aquatic structures along the Columbia River. The project is located within the shoreline designation of "High and Medium Intensity" Georgia-Pacific Consumer Operations LLC (GP) is planning to abate, remove, and demolish several structures associated with prior operations at the Camas Mill located in the city of Camas and in unincorporated areas of Clark County, Washington. The structures that GP is proposing to be removed are located in-water and/or overwater on the Columbia River and Camas Slough, and are located within the Shoreline Management Zone of the City of Camas, or are in-water within unincorporated Clark County.

Approvals and Permits Sought from City of Camas: 1) SEPA Determination, 2) Shoreline Substantial Development Permit/Conditional Use Approval, 3) Clearing and Grading Approval City of Camas 4) Critical Areas Review and 5) Historic Properties and Archaeological Resources Review.

Location: The site is located lands owned by Georgia-Pacific Consumer Operations LLC at 401 NE Adams Street in Camas, WA in Township 1 North, Range 3 East, Sections 8, 9, 10, 11, 15, and 16 of the Willamette Meridian in Camas, Washington, on the Columbia River (Between River Miles 117 and 121, with much of the proposed activity at approximately RM 119 to 120 located in the Camas Slough). Parcel Number s 08370-0000, 09104-4013, 09104-4015, 09104-4027, 50090-1000, 50090-2000, 50090-3000, 50090-4000, 50081-4001, 50081-7000 and 50081-8000.

Application Materials: The application was deemed technically complete on **July 27, 2023**, and included the following documents, which are available for review from the Community Development Department (616 NE 4th Avenue): SEPA checklist, and the the following supporting documents: Appendix 1: Project Description Narrative, Appendix 2: Shoreline Report and Critical Areas Review and Impact Assessment, Appendix 3: Biological Assessment, Appendix 4: Inventory of Historic Properties and Historic Context Study, Appendix 7: Frequently Flooded Areas Report and Flood Hazard Assessment for Demolition of Encroachments, Appendix 8: Certification of No-Rise Report for Removal of Structures along Camas Slough, Appendix 9: Certification of No-Rise and Description of Flood Hazard for Demolition of One Dolphin, Appendix 10: Revised (Version 3) Tier 1 Evaluation for Dredged Materials Management, Appendix 11: Sampling and Analysis Plan for the Characterization of Sediments in the Camas Slough, Washington, Appendix 12: Preliminary Stormwater Management Plan, A Joint Aquatic Resources Permit Application, WDFW Hydraulic Permit Application (HPA), and Stormwater Pollution Prevention Plan (SWPPP) will be submitted at a later date and prior to demolition activities.

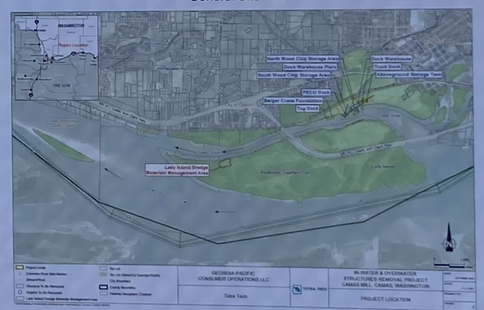
Application materials are available for review during regular business hours from the Community Development Department hours Monday-Friday 8am-5pm.

Comment Deadline: Written public comments must be received in the next 30 days by **September 4, 2023**, before 5:00 p.m.

Mailed public comments may be directed to the Community Development Department, c/o Shoreline Administrator, 616 NE Fourth Avenue, Camas, WA 98607, or emailed to communitydevelopment@cityofcamas.us. A public hearing is required: (date and time)_____. The public hearing will be held _(location)_____.

For questions related to this application, please contact Lauren Hollenbeck, Senior Planner , (360) 817-7253 or lhollenbeck@cityofcamas.us

General Site Plan



NOTICE OF APPLICATION FOR
SHORELINE SUBSTANTIAL DEVELOPMENT PERMIT AND SHORELINE
CONDITIONAL USE PERMIT (SDP/SCUP)
Camas SCI's In-Water and Overwater Structures Removal Project
File #: SHOR23-01 NOTICE
IS HEREBY GIVEN

SHOR23-01 Exhibit

General Site Plan

NOTICE OF PUBLIC HEARING

Georgia Pacific In-Water and Over-Water Structures Removal Project

Shoreline Substantial Development Permit and Shoreline Conditional Use Permit

(File #SHOR23-01)

[consolidated files: Critical Areas Review (CA23-04), State Environmental Policy Act (SEPA 23-04); and Archaeological Review* (ARCH23-03)]

A public hearing for the "Georgia Pacific In-Water and Over-Water Structures Removal Project" will be held remotely via Zoom and in-person at City Hall, 616 NE 4th Avenue, Camas, WA, 98607, on **Wednesday, October 25, 2023, at 5:00 p.m**. The application was submitted by Georgia Pacific on March 30, 2023, and resubmitted June 1 and 20, 2023, and deemed technically complete on July 27, 2023. The applicant requests approval to removal certain unused in-water and over-water structures associated with the previous operations of the pulp and paper mill along the Camas Slough and Columbia River near the Camas Mill property. The project area is within the shoreline designations of "Aquatic", "Medium Intensity", and "High Intensity".

Questions/Comments: The public hearing will follow the quasi-judicial process described within Camas Municipal Code §18.55.180. Public comments and questions are encouraged, and there are several opportunities available to interested citizens. Comments related to this proposal may be submitted as follows: (1) In person by testifying at the public hearing held remotely via Zoom or at City Hall; (2) by regular mail to Planning Division staff, Lauren Hollenbeck, Senior Planner, at the Camas City Hall, 616 NE 4th Avenue, Camas, WA 98607; (3) by phone (360) 817-7253 or by email to: communitydevelopment@cityofcamas.us.

It is preferable that written comments be received at least five (5) working days prior to the public hearing, to be available with the online agenda and materials. After the agenda has been posted online, all other written comments must be received no later than noon (12:00pm) the day of the hearing to be included in deliberations. During the hearing, oral comments may also be submitted as well as written comments via email to communitydevelopment@cityofcamas.us.

Application Materials: The project application materials included the following: Project Narrative; Shoreline Report, SEPA checklist; Stormwater Management Plan; Critical Area Reports; Archaeological Report*; and other submittal documents. These documents are available upon request to the City by phone (360) 817-7253 or by email communitydevelopment@cityofcamas.us.

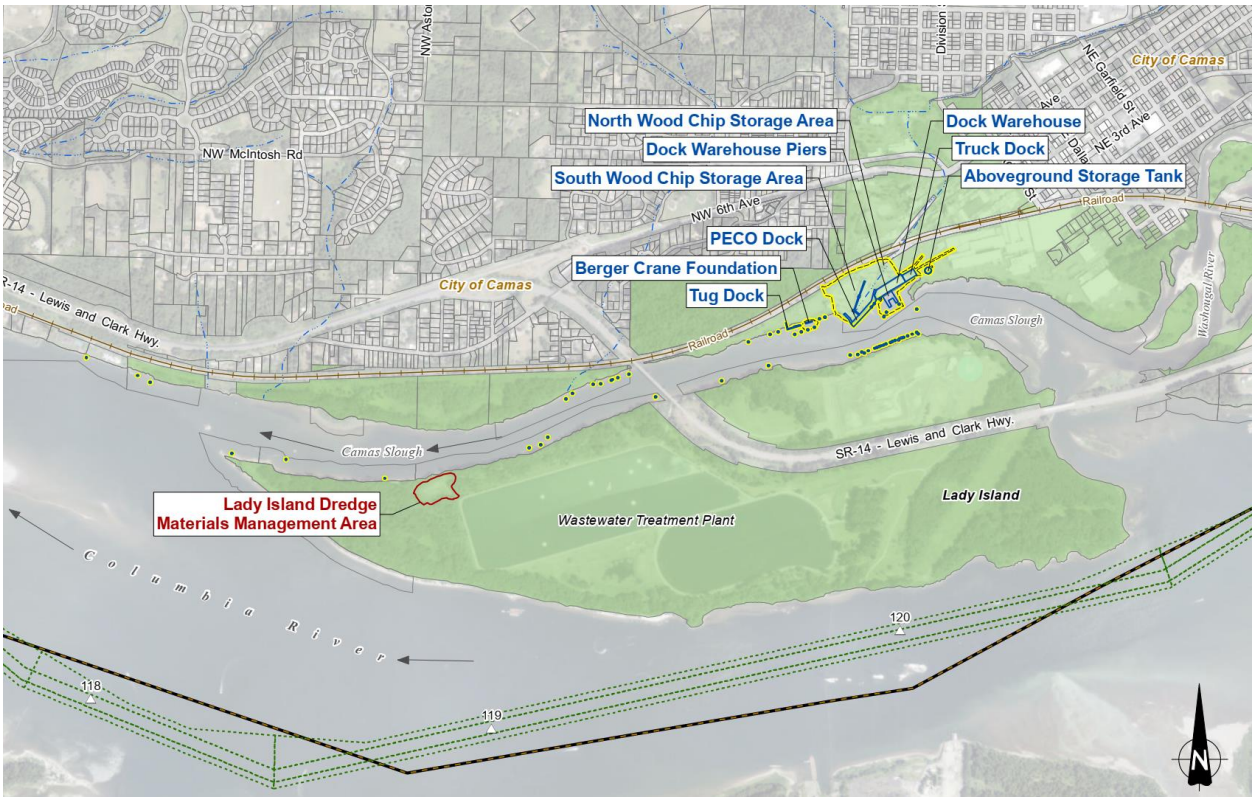
Participate: The public hearing will be held in-person and remotely via Zoom. All citizens are entitled to have equal access to the services, benefits, and programs of the City of Camas. Please contact the City Clerk at (360) 817-1591 for special accommodations if needed. The city will provide translators for non-English speaking persons who request assistance at least three working days prior to a public meeting or hearing.

More Information: The public hearing agenda and supporting documents will be available for review on the City's website at the Public Meeting Portal "Agenda, Minutes & Videos" link within the drop-down menu that is labeled "Community" or follow this link: www.cityofcamas.us/meetings

*Consistent with RCW 42.56.300, Archaeological information is exempt from public disclosure.

Published in the Post Record on October 5, 2023 Legal Publication #840210
Posted at Camas City Hall, Camas Library, City of Camas website at: http://www.cityofcamas.us
Mailed to property owners within 300-feet on October 4, 2023

VICINITY MAP



In re: Georgia Pacific In-water & Overwater Structures Removal

) NO. SHOR23-01
)
) AFFIDAVIT OF MAILING
)
)
)
)
)
Respondent.)

STATE OF WASHINGTON)
) ss.
CLARK COUNTY)

I, Carey Certo, on oath says:

I, Carey Certo, on October 4, 2023, I directed a true and correct copy of the Notice of Public Hearing be served upon the parties herein, in the above-entitled action, by depositing with the U.S. Post Office, Camas, Washington, a postage-prepaid envelope containing same addressed as follows: See attached list.

Carey Certo
SIGNATURE

SUBSCRIBED and SWORN to before me this 5th day of October, 2023.

AIREANNA BALDWIN NOTARY PUBLIC STATE OF WASHINGTON My Comm. Expires October 01, 2024 No. 183848

Aireanna Baldwin
Notary Public in and for the State of Washington, residing at Clark County
My appointment expires: 10/1/24

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NOTICE OF PUBLIC HEARING

Georgia Pacific In-Water and Over-Water Structures Removal Project

Shoreline Substantial Development Permit and Shoreline Conditional Use Permit

(File #SHOR23-01)

[consolidated files: Critical Areas Review (CA23-04), State Environmental Policy Act (SEPA 23-04); and Archaeological Review* (ARCH23-03)]

A public hearing for the "Georgia Pacific In-Water and Over-Water Structures Removal Project" will be held remotely via Zoom and in-person at City Hall, 616 NE 4th Avenue, Camas, WA, 98607, on **Wednesday, October 25, 2023, at 5:00 p.m**. The application was submitted by Georgia Pacific on March 30, 2023, and resubmitted June 1 and 20, 2023, and deemed technically complete on July 27, 2023. The applicant requests approval to removal certain unused in-water and over-water structures associated with the previous operations of the pulp and paper mill along the Camas Slough and Columbia River near the Camas Mill property. The project area is within the shoreline designations of "Aquatic", "Medium Intensity", and "High Intensity".

Questions/Comments: The public hearing will follow the quasi-judicial process described within Camas Municipal Code §18.55.180. Public comments and questions are encouraged, and there are several opportunities available to interested citizens. Comments related to this proposal may be submitted as follows: (1) In person by testifying at the public hearing held remotely via Zoom or at City Hall; (2) by regular mail to Planning Division staff, Lauren Hollenbeck, Senior Planner, at the Camas City Hall, 616 NE 4th Avenue, Camas, WA 98607; (3) by phone (360) 817-7253 or by email to: communitydevelopment@cityofcamas.us.

It is preferable that written comments be received at least five (5) working days prior to the public hearing, to be available with the online agenda and materials. After the agenda has been posted online, all other written comments must be received no later than noon (12:00pm) the day of the hearing to be included in deliberations. During the hearing, oral comments may also be submitted as well as written comments via email to communitydevelopment@cityofcamas.us.

Application Materials: The project application materials included the following: Project Narrative; Shoreline Report, SEPA checklist; Stormwater Management Plan; Critical Area Reports; Archaeological Report*; and other submittal documents. These documents are available upon request to the City by phone (360) 817-7253 or by email communitydevelopment@cityofcamas.us.

Participate: The public hearing will be held in-person and remotely via Zoom. All citizens are entitled to have equal access to the services, benefits, and programs of the City of Camas. Please contact the City Clerk at (360) 817-1591 for special accommodations if needed. The city will provide translators for non-English speaking persons who request assistance at least three working days prior to a public meeting or hearing.

More Information: The public hearing agenda and supporting documents will be available for review on the City's website at the Public Meeting Portal "Agenda, Minutes & Videos" link within the drop-down menu that is labeled "Community" or follow this link: www.cityofcamas.us/meetings

*Consistent with RCW 42.56.300, Archaeological information is exempt from public disclosure.

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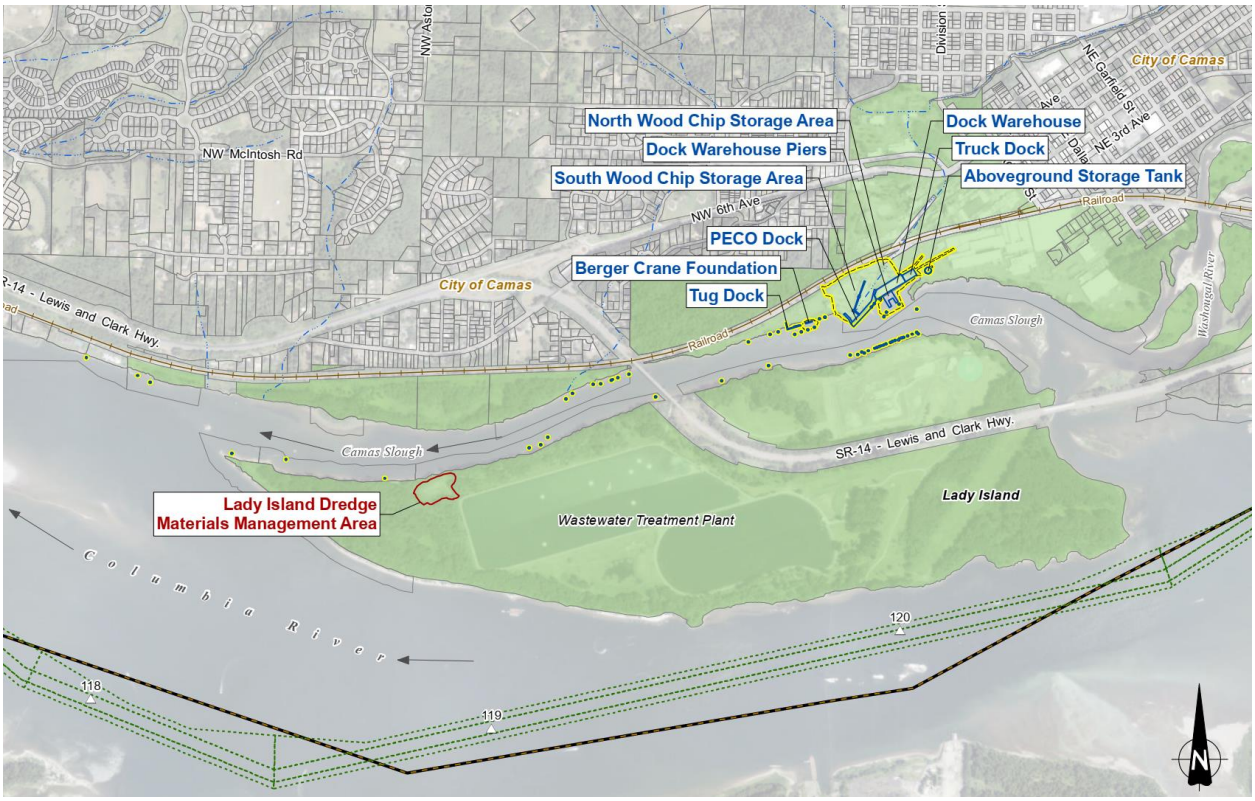
Mailed to property owners within 300-feet on October 4, 2023

VICINITY MAP



Georgia In-Water Over Water Structures Removal (SHOR23-01)
Index of Exhibits

Exhibit No.	Title/Description	Date Submitted
1	Application Form	3/28/23
2	Pre-Application Meeting Notes	
3	Biological Assessment	1/2023
4	Certification of No-Rise & Description of Flood Hazard for Demolition of One Dolphin	1/24/23
5	Shoreline Report	2/2023
6	Frequently Flooded Areas Report and Flood Hazard Assessment for Demolition of Encroachments	2/14/23
7	No Rise Report for Removal of Structures Along Camas Slough	2/23/23
8	Revised Tier 1 Evaluation for Dredged Materials Management	3/10/23
9	Sampling & Analysis Plan for the Characterization of Sediments in the Camas Slough	3/10/23
10	Preliminary Stormwater Management Plan	
11	Action Area Parcels	4/2023
12	Incomplete Application Review Letter #1	4/18/23
13	Georgia Pacific Response to Incompleteness Letter #1	6/28/23
14	Incomplete Application Review Letter #2	6/12/23
15	Georgia Pacific Response to Incompleteness Letter #2	
16	Technically Complete Application Review Letter	7/27/23
17	Notice of Application	8/3/23
18	Affidavit of Mailing Notice of Application & SEPA Determination of Non-Significance	8/2/23
19	Floodplain Permit	5/26/23
20	Geological Hazardous Area & Critical Aquifer Recharge Review	5/2023
21	Certified Mailing List & Labels	6/14/23
22	Project Narrative	6/20/23
23	SEPA Checklist	7/26/23
24	SEPA Determination of Non-Significance	8/3/23
25	SEPA Distribution Cover Letter	8/3/23
26	Ecology SEPA Comment	8/16/23
27	Development Sign Posting	8/3/23
28	Notice of Public Hearing	10/5/23
29	Affidavit of Mailing Notice of Public Hearing	10/4/23