

TREE BOARD MEETING AGENDA

Online via Zoom and In Person at Tumwater Fire Department Headquarters, Training Room, 311 Israel Rd. SW, Tumwater, WA 98501

Monday, October 09, 2023 7:00 PM

- 1. Call to Order
- 2. Roll Call
- 3. Changes to Agenda
- 4. Approval of Minutes
 - a. April 10, 2023 Meeting Minutes
 - b. July 10, 2023 Meeting Minutes
- 5. Tree Board Member Reports
- 6. Coordinator's Report
- 7. Public Comment
- 8. Carbon Sequestration White Paper
- 9. Tumwater Public Urban Forest Inventory
- 10. Tree Board 2023 Meeting Schedule
- 11. Next Meeting Date 11/13/2023
- 12. Adjourn

Meeting Information

The public are welcome to attend in person, by telephone or online via Zoom.

Watch Online

https://us02web.zoom.us/webinar/register/WN_Z_Pq2hvhSYCvkRi6NGrBQg

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Public Comment

The public is invited to attend the hearing and offer comment. The public may register in advance for this webinar to provide comment:

https://us02web.zoom.us/webinar/register/WN_Z_Pq2hvhSYCvkRi6NGrBQg

After registering, you will receive a confirmation email containing information about joining the webinar.

The public may also submit comments prior to the meeting by sending an email to: <u>AJonesWood@ci.tumwater.wa.us</u>. Please send the comments by 1:00 p.m. on the date of the meeting. Comments are submitted directly to the Commission/Board Members and will not be read individually into the record of the meeting.

If you have any questions, please contact Sustainability Coordinator Alyssa Jones Wood at (360) 754-4140 or AJonesWood@ci.tumwater.wa.us.

Post Meeting

Audio of the meeting will be recorded and later available by request, please email <u>CityClerk@ci.tumwater.wa.us</u>

Accommodations

The City of Tumwater takes pride in ensuring that people with disabilities are able to take part in, and benefit from, the range of public programs, services, and activities offered by the City. To request an accommodation or alternate format of communication, please contact the City Clerk by calling (360) 252-5488 or email <u>CityClerk@ci.tumwater.wa.us</u>. For vision or hearing impaired services, please contact the Washington State Relay Services at 7-1-1 or 1-(800)-833-6384. To contact the City's ADA Coordinator directly, call (360) 754-4128 or email <u>ADACoordinator@ci.tumwater.wa.us</u>.

What is the Tree Board?

The Tumwater Tree Board is a citizen advisory board that is appointed by and advisory to the City Council on urban forestry issues, including drafting and revising a comprehensive tree protection plan or ordinance, or any other tree matter. Actions by the Tree Board are not final decisions; they are Board recommendations to the City Council who must ultimately make the final decision. If you have any questions or suggestions on ways the Tree Board can serve you better, please contact the Water Resources & Sustainability Department at (360) 754-4140.

CONVENE:	7:03 p.m.
PRESENT:	Chair Trent Grantham and Boardmembers Brent Chapman, Brodrick Coval, Michael Jackson, Tanya Nozawa, Hannah Ohman, and Jim Sedore.
	Staff: Sustainability Coordinator Alyssa Jones Wood, Stormwater Program Lead David Kangiser, and Water Resources Specialist Grant Gilmore.
CHANGES TO AGENDA:	There were no changes to the agenda.
APPROVAL OF TREE BOARD MEETING MINUTES DECEMBER 12, 2022:	
MOTION:	Chair Grantham moved, seconded by Boardmember Sedore, to approve the minutes of December 12, 2022 as presented. A voice vote approved the motion.
TREE BOARD MEMBER REPORTS:	Boardmember Sedore reported he is working on a heritage tree nomination for a tree located on the Schmidt House property. The tree is a Japanese Magnolia. He is seeking approval of the nomination from Executive Director John Freedman of the Olympia Tumwater Foundation. Curator Karen Johnston is working with him on the securing approval. The draft of the nomination form was submitted to Mr. Freedman.
	A website, <i>Monumental Trees</i> , documents the tallest, oldest, and widest trees at breast height in the world. The tree located on the Schmidt House property is as large as the largest tree listed on the website.
	Boardmember Chapman inquired as to whether the consultant arborist would complete the measurements. Boardmember Sedore said the nomination has not been formally submitted pending final approval from Mr. Freedman.
	Boardmember Sedore said he is meeting with a member of the Thurston Youth Climate Coalition to discuss Garry oak trees. A list of questions was provided to him seeking answers on the likelihood of Garry oak habitat becoming extinct and the steps necessary to maintain and restore Garry oak trees.
	Coordinator Jones Wood advised that she provides updates to the Thurston Youth Climate Coalition every two months on the City's progress on climate mitigation implementation. The Thurston Youth Climate Coalition

was initially an action group as part of the Thurston Climate Action Team (TCAT). However, the group has branched out with less oversight from TCAT. A TCAT staff member attends meetings and provides support and coordination as needed. The group staged a die-in protest at local council meetings as well as the Tumwater Council meeting in January urging the cities to act on the climate crisis.

Boardmember Sedore reported the heritage tree nomination for a Garry oak located on the Walmart property has been submitted to the City. The remaining Garry oaks are located within residential areas. He plans to contact property owners of the Garry oak trees.

Boardmember Chapman invited the Board and staff to attend the Wednesday, April 12, 2023 10 a.m. Washington State Arbor Day celebration on Capitol Campus. The Governor will be speaking in addition to Hillary Franz, Commissioner of Public Lands. Forty children will sing and assist in planting a tree in an area across from the old General Administration Building.

COORDINATOR'SCoordinator Jones Wood welcomed new Boardmembers Hannah Ohman
and Brodrick Coval.

Staff with Thurston Regional Planning Council (TRPC) is tentatively scheduled to present the Carbon Sequestration White Paper to the Board at its October 9, 2023 meeting. All Board meetings until September will be a joint meeting with the Planning Commission. The City Council is also scheduled to receive the same presentation during its May 23, 2023 worksession.

Coordinator Jones Wood reported she submitted a grant proposal to the Department of Natural Resources (DNR) for \$40,000 for a City property tree inventory. Included within the proposal is a maintenance plan. The plan will identify priority maintenance areas for scheduling during a fouryear cycle as dictated by the Urban Forestry Management Plan, as well as producing cost estimates for the work.

Coordinator Jones Wood responded to suggestions to review the tree inventory and explained that the only inventory the City currently has is the street tree inventory. The City lacks a tree inventory of other City-owned properties. The proposal establishes a baseline of a tree inventory for all City properties to include all parks. The proposal implements several actions in the Urban Forestry Management Plan. She plans to request the hiring an urban forester or urban ecologist position in the next City's budget cycle.

At the next joint Board and Commission meeting, members will receive a draft of the Tree Preservation and Vegetation Protection Ordinance. The

draft will be published on the City's website on Wednesday prior to the joint meeting. The document is in a tracked changes format for comparison of existing language and proposed changes.

Coordinator Jones Wood mentioned three compost projects in progress by the City.

Boardmembers are scheduled to receive Tree Board business cards to identify each member as a Tree Board member. She asked for feedback on information to include on the business card. Boardmember Sedore recommended adding "Tumwater Tree Boardmember" as an identifier. Chair Grantham suggested ordering nametags for each member. Coordinator Jones Wood said she followed up with staff and learned that business cards are the least expensive option. The line item for the Tree Board in the budget was not funded in 2023. Funds from the Sustainability budget are being utilized for the Board.

Coordinator Jones Wood advised that she is attending a Thurston County Food Bank event at Mountain View Church and will hand out information during the distribution to promote the tree giveaway during the Arbor Day celebration and distribute Stream Team newsletters. During those types of events, she typically interacts with several hundred people from Tumwater or from the south county area. She also prepared seed packets and added a handout from the National Wildlife Federation on how to provide water for Monarch butterflies. She prepared 50 packs of seeds of milkweed and an additional 50 packets of Pacific Northwest pollinator wildflowers. The packets and the tree seedlings will be distributed during the Arbor Day Bags containing various an assortment of materials have been event. prepared for distribution during the event. Some materials include the old heritage tree map and last year's plant list replaced with this year's plant list. She also developed a postcard with a QR code to promote the new story map for heritage trees in the City. Additionally, a tree care pledge was developed to give to recipients of free trees. The pledge includes address information for possible follow-up later on the condition of the tree the person received.

Coordinator Jones Wood advised that staff drafted a property owner consent form for the heritage tree program. Staff also is reviewing ways the City can track heritage trees when the property changes ownership. One option would include a provision in TMC 16.08 by making it the responsibility of the property owner to share the information with the buyer about a heritage tree designation.

There were no public comments.

COMMENT:

DISCUSSION -

PUBLIC

Coordinator Jones Wood indicated the Tree Board expressed an interest in

STORMWATER-	utilizing stormwater sites as potential planting areas. She introduced
TREE BOARD	stormwater staff members to share information on opportunities and
SYMBIOSIS:	limitations for utilizing stormwater sites for tree plantings.

Dave Kangiser reported he serves as the Stormwater Program Lead and is responsible for coordinating the City's NPDES permit requirements and spill response, as well as working on habitat restoration projects with a nexus to stormwater.

Grant Gilmore, Water Resources Specialist, said he works with Coordinator Jones Wood and Program Lead Kangiser in the Water Resources and Sustainability Department focusing on conservation, habitat restoration, and education and outreach. He is one of the founding members of the Washington Stormwater Center. Trees were mentioned as a focus for many efforts associated with stormwater and restoration.

Program Lead Kangiser said many stormwater features in the City may appear to be good locations for planting trees; however, stormwater facilities are engineered for specific infiltration rates with specific soils. Any planting within a stormwater facility would alter the infiltration rate. Some limited opportunities exist for tree plantings at stormwater facilities. One example of a stormwater facility that could accommodate tree plantings is located west of I-5 off Israel Road. Two stormwater facilities include both wet and dry ponds. The slope of the facilities could provide an opportunity to plant some trees. Infiltration rates are also very site-specific. For example, a pond with plantings could slow infiltration because of plant roots. Sometimes the types of trees create root runners that can compromise pond liners. Engineered structures are maintained by staff. Trees planted in stormwater facilities can create leaf litter that can alter the water quality. Deciduous trees tend to drop more leaf litter. Evergreen trees can alter the pH of water by dropped needles.

Boardmember Sedore pointed out that an increase in the trees planted within a subdivision will reduce stormwater flow to retaining ponds. Program Lead Kangiser said the City's NPDES permit is issued by the Department of Ecology to regulate stormwater and surface waters. The permit has many rules governing how the City operates its stormwater facilities. A new permit is due for release in 2024. One of the proposed changes to the new permit is tree retention. The proposal speaks to a specific date the City is required to document existing landscape canopy cover and riparian tree canopy for the permit coverage area. That information is required to be documented over time. New requirements speak to no later than a specific date, permitees shall adopt and implement tree canopy retention and restoration objectives to support stormwater management and water quality improvements in receiving water. The work of the Board has enabled some progress by the City to meet the new requirements. Although, the language is a draft, once the new permit is

issued, the requirements will be more specific. The updated tree inventory will be a major component.

Boardmember Sedore asked whether more trees planted near the perimeter of a stormwater facility could reduce the size of a retention pond. Chair Grantham replied that retention ponds are designed to handle water runoff from streets and other impervious surfaces.

Specialist Gilmore added that stormwater ponds are designed to retain a specific amount of impervious runoff from development. Stormwater ponds are designed and sized to receive a specific amount of water from all impervious surfaces. Not all stormwater ponds are equal as they are designed and engineered differently to accommodate the needs of the developer, the code, and water quality regulations, etc.

Boardmember Sedore spoke to a tour of the Kirsop Landing development last fall. Members noticed the hardscape roof downspouts fed into some type of stormwater system or stormwater was dissipated by the lawns. Program Lead Kangiser said the system is designed based on the soil type. Typically, a roof drain system does not require treatment prior to infiltration. Some sites include a collected system draining to a stormwater facility. Boardmember Sedore commented that in newer high-density development, it appears because of the number of roads and driveways development requires a stormwater pond. Program Lead Kangiser noted that Boardmember Sedore's subdivision, Foster Place, was constructed in 1975 when newer stormwater facilities were not in existence. Today, more stormwater treatment is required to accommodate increased density.

Boardmember Chapman expressed interest in learning more about best practices for vegetation surrounding stormwater ponds. For example, if trees were planted along the perimeter of a pond, his interest is in the type of species that would provide the greatest benefits.

Boardmember Sedore said he was approached by several residents last year questioning why the City was not planting more evergreen trees to reduce the impact of rainfall. He asked how deciduous trees versus evergreen trees handle stormwater runoff. Program Lead Kangiser said an approved planting list is included in the drainage manual outlining allowed species and planting locations. He offered to forward the information to the Board.

Boardmember Sedore commented that historically, he has witnessed the evolution of stormwater management in the City where today stormwater management is incorporated within the City's code and included in development plans. He questioned the use of incentives for developers and homeowners to manage stormwater versus the imposition of rules. With climate change, temperatures are increasing and it is important to motivate actions to promote an increase in canopy to help control temperatures rather

than imposing rules. Program Lead Kangiser said language within the City's drainage manual is somewhat lax in terms of tree retention. Rather than requiring specific actions, the language speaks to "should," enabling more latitude to the property owner or the developer. Language within the stormwater permit does not speak to replacement of trees or a specific number of trees to retain. The Community Development Department imposes tree retention requirements. However, he agreed the language should be specific and definite.

Boardmember Jackson spoke to the importance of prompting actions early within the development process. He cited the retention of three large maple trees near a local retention pond. During the development process, the developer had intended to remove the trees because of the required size of the retention pond. Although the maple trees provide a good canopy, they also drop too many leaves into the pond. However, he is not aware of any issues with the effectiveness of the retention pond. The trees were retained because City staff worked with the property owner from the start of the process and throughout the project.

Discussion ensued on proper maintenance of retention ponds and the quality of water in a mixed native forest versus a stormwater pond. Specialist Gilmore added that retention ponds are not designed to receive precipitation from one area because they are designed to receive water from a larger area. Natural forests receive waters and distribute more evenly with trees absorbing the water. Ponds treat water that was never treated. Engineered ponds are designed to treat water to an acceptable degree. The City does not test all retention ponds as water is infiltrating and traveling through the system.

Program Lead Kangiser cited a pond near the church off Israel Road. Water from the parking area infiltrates in the small pond, which is designed to treat that specific area. The soil mix within the pond is designed to treat water and contaminants from the parking area.

Boardmember Sedore commented on the complexity of creating more retention ponds without the benefit of trees with canopies to accommodate the increase in density with yards too small to infiltrate water.

Boardmember Chapman noted that the City also practices zero impact development where hardscaping is much less. Staff advised of recent research on other bio-filtration methods providing ways to combine both density and adequate stormwater treatment.

Specialist Gilmore advised the Board of ways of addressing the challenges by considering all wetlands, critical areas, streams, and riparian areas and considering opportunities for inventorying areas to plant. All those areas need restoration. Following an assessment of opportunity sites it might be

possible to work with private property owners to invite efforts to enhance sites that could result in creating wildlife corridors, enhancing trails, or improving conditions between systems. Staff is working to update ordinances to address development and how mature trees are considered on sites and potential opportunities retain those trees. He noted that each site is unique and has its own set of criteria. The goal is always to retain and plant Northwest native species. Planting opportunities should be considered as phase 1 of the process by planting trees of a specific size with an understanding of its rate of growth and water needs within the first several years and following up later by planting the understory. There are many opportunities around the City to increase tree canopy. Water Resources and Sustainability Department staff have expanded substantially in the last year and efforts by the team have been focused on the environment and increasing trees and tree canopy in the City. He urged the Board to identify any locations that could benefit from additional trees.

Boardmember Chapman questioned whether staffing resources would be available to map opportunity sites across the City. Planting all opportunity sites across the City could increase the tree canopy. Tree canopy is one of the major metrics for habitat, stormwater treatment, and ecosystem services.

Coordinator Jones Wood advised that the GIS position could provide some support after quantifying the volume of information.

Boardmember Chapman noted that most of the roundabouts along Littlerock Road do not contain any trees. Most of the roundabouts in the cities of Olympia and Lacey contain trees. Not all trees need to be Douglas firs or big leaf maples.

Coordinator Jones Wood shared an aerial photograph of an area of top priority by the City. The area is located at the golf course along a fence line of 700 feet and eight feet wide. The area is top priority. Stormwater crews recently removed willow plants.

Program Lead Kangiser reported the site is a stormwater facility that was not functioning because of the amount of willow plants. The facility treats water before discharging to the Deschutes River. Stormwater entering the facility is from Cleveland Avenue. The facility was hydroseeded with proper grass. However, an opportunity exists between the fence and swale to plant trees.

Specialist Gilmore added that he is working on developing a plan to identify the number and type of trees for the site. The multi-phased approach is preferred because of the availability of trees. Staff is considering several hundred trees of different species. The site will likely be overplanted to account for any loss of trees. The site will be planted with understory plants later in the process. The site could serve as a model for implementing a

project. His focus is working with the Parks and Recreation Department and the golf course to widen the buffer along the golf course of at least 10 to 20 feet to convert the perimeter to a riparian buffer with various plantings. Because of his representation on the Stream Team he has the capacity to increase volunteer events in partnership with the Parks and Recreation Department. Stream Team is cooperatively sponsored and funded by the storm and surface water utilities of the cities of Lacey, Olympia and Tumwater and Thurston County. Stream Team fills a niche in the South Sound providing free quality environmental education programs and activities and hands-on action projects. Following the lessening of the pandemic, volunteer efforts are ramping upwards as well as education outreach, hands-on science experiences, and tree planting activities.

Program Lead Kangiser queried the Board on any interest in replanting other sites similar to recent plantings at the Palermo Wellfield site. There are many opportunities to replant developed sites around the City.

DISCUSSION – TUMWATER SCHOOL DISTRICT SUMMER PROGRAM:

Specialist Gilmore reported Tumwater School District has been a priority to build connections and relationships. A joint effort is underway to create a summer program with the Pacific Education Institute (PEI), Tumwater School District, and the City with possible engagement by South Sound Green. The program is a forestry and stream management program offered during the first week in August for five weeks of instruction and hands-on science activities totaling 180 hours. The program is open to grades 9 through 12 for 16 students. The subject matter includes forest practice law with a focus on wetland delineation, watershed management from the headwaters to the Sound, a mapping component, and opportunities to plant trees and implement an independent restoration project at Sapp Road Park. The program is under development and sponsors are seeking individuals who would like to offer their expertise in forest management and other related fields that would benefit the students. He invited the Board to consider contributing their time to educate students. The program will likely be competitive because many students have expressed interest in the program. If the program is successful, the program will be expanded regionally as there is an existing deficit in workforce development in forestry and environmental fields.

Boardmember Coval expressed interest in participating as his profession has a strong nexus with the program. PEI also works closely with South Puget Sound Salmon Enhancement Group. Additionally, the Department of Natural Resources created a new position of an Outdoor Education and Training Program Manager. The manager would likely be interested in the program. She is working on the agency's youth education and outreach program strategy and is collaborating with other programs across the state.

Boardmember Chapman asked whether participating students would receive environmental science credits. Specialist Gilmore said he believes credits

would be provided, as the course will be advanced. The school district will determine the credits. The group is developing and piloting the program. Information has been shared with school districts in Olympia and Thurston County. All Water Resources and Sustainability staff will be engaging with the students. Many science teachers are focused on forests, tree canopy, and how plants process water and chemicals.

Boardmember Jackson asked whether any fieldwork is anticipated. Specialist Gilmore said the curriculum includes a mix of classroom and fieldwork. Facilitating the program is the easy part as the school district has the available equipment and facilities; however, organizing and seeking volunteers to mentor and teach the students is much more difficult.

Boardmember Jackson said his company manages a tree farm near Millersylvania Park of approximately 1,000 acres with 364 acres of wetlands that abut Beaver Creek. The Board should continue to receive updates on the status of the program because it presents a good opportunity to become involved in forestry as the field lacks young people who are interested in forestry jobs. Specialist Gilmore suggested the company consider hosting a day of learning for the students in how the property is managed. He offered to follow up to coordinate efforts.

DISCUSSION – **HERITAGE TREE NOMINATION AT 5800 LITTLEROCK ROAD:** Boardmember Sedore reported on a Garry oak tree located along the edge of the Walmart parking lot. Mary McQueen was the previous owner of the property. For years, roads and parking lots have been constructed around the tree. He understands the tree is located on City right-of-way. Tree experts examined the tree and recommended removing soil from the roots and the trunk of the tree added during the development of the Walmart parking lot. He has nominated the tree as a Heritage Tree to protect and retain the tree.

MOTION: Boardmember Sedore moved, seconded by Boardmember Chapman, to recommend the City Council approve designating the Garry Oak at 5800 Littlerock Road as a Heritage Tree in the City of Tumwater. Motion carried unanimously.

Boardmember Chapman asked about the remediation work suggested by the consulting arborist. Coordinator Jones Wood reported she has discussed the issue with the Transportation and Engineering Department responsible for street trees. The department plans to hire a contractor to trim the tree and remove the material as recommended. Boardmember Chapman recommended the consulting arborist should be at the site during the pruning and material removal process to ensure the safety of the tree. Coordinator Jones Wood said she was unsure as to the status of the work but would coordinate the request with staff.

Boardmember Chapman inquired about the potential nomination of another

Garry oak north of the site. Boardmember Sedore said he is aware of three more Garry oak trees in the City.

Coordinator Jones Wood addressed questions concerning the heritage tree nomination process. Trees can be nominated by Tumwater residents, City staff, or the Tree Board. Two other trees have been nominated by residents but action was tabled until more information is available about the trees. Several trees were designated as heritage tree prior to creation of the program in the City's code.

Boardmember Sedore asked about the status of several Sycamore trees on the Department of Transportation property located off Capitol Boulevard. Chair Grantham replied that the City plans to widen the road and the trees would likely be removed. Boardmember Sedore expressed interest in learning how the designation of a heritage tree affects the construction project. Coordinator Jones Wood shared that recently, the City approved the method the Community Development Department receives data on heritage trees. A process was subsequently created to develop a point of interest map, which did not include current data on the new heritage tree program. Better data have been provided to cross-reference when the department reviews development plans.

- **OTHER BUSINESS:** Boardmembers introduced themselves and shared information about their profession, length of service on the Board, and their respective interest in forestry.
- **NEXT MEETING** The next meeting is a joint meeting with the Planning Commission on May 9, 2023.

ADJOURNMENT: With there being no further business, Chair Grantham adjourned the meeting at 9:00 p.m.

Prepared by Valerie L. Gow, Recording Secretary/President Puget Sound Meeting Services, psmsoly@earthlink.net

CONVENE:	7:00 p.m.
PRESENT:	Chair Trent Grantham and Boardmembers Brent Chapman, Brodrick Coval, Michael Jackson, Tanya Nozawa, Hannah Ohman, and Jim Sedore.
	Staff: Sustainability Coordinator Alyssa Jones Wood.
CHANGES TO AGENDA:	There were no changes to the agenda.
APPROVAL OF TREE BOARD MEETING MINUTES - MARCH 13, 2023:	
MOTION:	Boardmember Sedore moved, seconded by Boardmember Coval, to approve the minutes of March 13, 2023 as presented. A voice vote approved the motion.
TREE BOARD MEMBER REPORTS:	Boardmember Chapman asked that the City follow-up on the status of newly planted tree along Littlerock Rock and 77 th Way that appear to be dying from the lack of irrigation.
	Coordinator Jones Wood said she would review the street tree list to determine if the trees are City-owned. If the trees are privately owned, the property owner has a three-year bond and must replace the trees. She will follow up with the Community Development Department on the status of ownership, location, and the health of the trees.
	Boardmember Sedore reported he is working on potential nominations for heritage trees. His recent efforts have centered on the Fred Meyer Garry oak trees. The store's legal department claims the strip of land is not owned by Fred Meyer. It appears the land is owned by the Panda Express restaurant. He spoke to the facilities manager of the restaurant. Additionally, a local citizen who advocates for Garry oak trees sent a list of several Garry oak trees located on public right-of-way including trees on the Trosper Lake Park property. The park is undeveloped land located behind Tumwater Middle School off Littlerock Road. He spoke to Director Denney about retaining the Garry oaks when the property is developed in 2027.
	Boardmembers Michael Jackson and Tanya Nozawa joined the meeting.
COORDINATOR'S REPORT:	Coordinator Jones Wood referred to a memorandum from Manager Medrud regarding the pause on the updates of the urban forestry codes until staff reviews new requirements of the Washington Wildland-Urban Interface Code enacted by the state to address wildfire hazards and the interface between rural

and urban areas that could pose wildfire hazards. Community Development is reviewing the Code and is working with other cities, Thurston County, and the Department of Ecology, as critical areas appear not to be exempt from the Code. Following the review, the update process will be reinitiated on the amendments.

Boardmember Chapman asked whether the requirements are from the state or the federal government. Coordinator Jones Wood said the International Building Code was adopted as a Washington Administrative Code (WAC) and requires a larger amount of defensive space between buildings and vegetation. The Code also requires a certain distance between canopies in certain areas, which speaks to uncertainties associated with both groves and wildlife corridors.

Boardmember Sedore said the Code requires all residential, industrial, and commercial uses to provide 10 feet of space between buildings and trees with trees spaced 10 feet apart.

Coordinator Jones Wood shared information on additional uncertainties surrounding the new requirements, especially as it pertains to wildlife corridors.

Boardmember Sedore commented that the new requirements would eliminate most trees on most properties in the City.

Coordinator Jones Wood referred to a map included with the memorandum identifying areas in the City subject to the new code. The urban core of the City is not subject to the Code; this raises equity concerns and possibly more requirements for an area not subject to risk. The City is required to adopt the Code by October 2023.

Boardmember Sedore asked whether the Code is retroactive. Coordinator Jones Wood said the City's Building Official has interpreted the Code as retroactive, which speaks to removal of trees/vegetable not meeting the standards to maintain defensible space.

Chair Grantham asked whether irrigated property would be exempt. Coordinator Jones Wood said defensible space on properties with trees/vegetation must be irrigated. The approach for any amendments to the landscaping code to reduce mandatory irrigation was planting drought-tolerant native species may not be possible under the new Code. The Community Development Department is leading the review of the Code to identify any leeway/flexibility within the new requirements.

Boardmember Sedore asked whether the new code affects current proposed developments in the City. Coordinator Jones Wood said the requirements would not be effective until adopted by the City.

Boardmember Sedore asked whether the City has placed a moratorium on development until staff can resolve the issues surrounding the new Code. Coordinator Jones Wood indicated she was not aware of any moratorium.

Coordinator Jones Wood reported the Parks and Recreation Department has indicated interest in continuing to combine Arbor Day/Earth Day events each year.

Coordinator Jones Wood reported that four interns from The Evergreen State College have been working in the Water Resources and Sustainability department to support efforts on urban trees and vegetation. One intern crossreferenced the City's approved street tree list with resources and research on heat and hardiness vulnerability for climate change. Another intern is working on a demonstration garden design on the City Hall campus. Funding is provided for the garden for water conservation and bioremediation. Last quarter, four interns have worked in the department. This quarter, another intern will interview the top 10 residential water consumers to investigate the reason for such high water usage. The interview will be a qualitative openended interview conducted remotely. The results will assist the City in producing a more tailored water conservation messaging campaign. The homeowner interviews are voluntary.

Boardmember Sedore inquired about the status of the annual review of the street tree list. Coordinator Jones Wood advised that the pause in the urban forestry updates also applies to the street tree list.

Coordinator Jones Wood responded to requests for information on the research the intern utilized for heat and hardiness vulnerabilities of trees. She offered to forward the information to the Board. The intern was able to locate a study on urban trees in Puget Sound recently completed by a non-profit organization in the Seattle area.

Boardmember Sedore asked whether the intern included National Wildlife Foundation's recommended plants listed on its website. Coordinator Jones Wood explained that the intern cross-referenced the City's existing list as proposed recently by the consultant. Boardmember Sedore noted that entering the zip code in the Foundation's website produces a list of recommended plants for an area. It is an easy to use reference that the City should consider when the Board reviews the street tree list. Coordinator Jones Wood said the current version is an updated proposed street tree list that includes native trees.

Boardmember Coval asked about the value of inviting the interns to attend the Board's next meeting to present information on their current work. Coordinator Jones Wood said only one intern is working with her at this time and she could extend an invitation to attend the next meeting. The intern is completing their summer internship remotely from Texas. Item 4b.

TUMWATER TREE BOARD MINUTES OF VIRTUAL MEETING July 10, 2023 Page 4

Boardmember Chapman asked about the maintenance responsibility for the demonstration garden. Coordinator Jones Wood said the Parks and Recreation Department may maintain the garden. The department has been involved throughout the process.

Coordinator Jones Wood updated the Board on the Thurston Climate Mitigation Plan. The plan includes a section on agriculture, prairies, and forests. Four actions are related to those areas as well as some agriculturerelated actions. Actions include reforestation programs, native municipal canopy, tree preservation, tree canopy preservation, and prairie preservation. The three entities responsible for implementing the plan include an elected official entity comprised of one elected official from the four jurisdictions (Lacey, Olympia, Tumwater, and Thurston County), a community advisory workgroup comprised of 15 community members from various organizations, and a staff team comprised of one staff member from each jurisdiction. Staff identified one regional priority with suggested priorities related to trees and forest. Staff identified a major priority of focus for each jurisdiction and two tree-related actions for the elected officials to champion and move forward. One action is rural tree canopy targets with target outcomes. Thurston County is completing a tree canopy assessment that will be analyzed to help identify forested areas of high risk of conversion and opportunities for conservation and restoration. Data will be applied to establish targets for tree canopy at the regional level focusing on rural Thurston County where the majority of carbon sequestration occurs. The action will be led by the county. Other actions advanced for regional focus in 2024 include state forestlands management advocacy with two proposed outcomes of legacy forest protection and a dedicated funding source for purchasing, protection of legacy stands, or DNR enrolling more of its land in its carbon project. Elected officials will work with DNR and other agencies to advance the actions regionally.

Boardmember Sedore asked whether the timber industry is represented on the community advisory workgroup. Coordinator Jones Wood identified members serving on the workgroup. Members include Thurston Conservation District, Puget Sound Energy, Intercity Transit, a tribal representative, different stakeholder groups identified by the elected official committee, such as representatives from the building industry, realtors, transportation, rural lands/agriculture, and others. At this time, no forestry or timber-related interests are represented on the workgroup. The Thurston Climate Action Team tree group has requested adding a position representing forestry. At this time there is no dedicated position for forestry.

Boardmember Coval said his business was contacted about serving as a representative; however, the business declined because of time constraints.

Coordinator Jones Wood said the committee currently has two vacant positions. The staff team is developing a recruitment strategy. Members of

the workgroup serve a one-year term. She described ongoing recruitment efforts and the intent to advocate for a forestry representative.

Coordinator Jones Wood reported on the loss of a large limb from the Meeker Garry oak tree located off Old Highway 99. The tree is located within City right-of-way and staff is working with Kevin McFarland to investigate why the limb fell and assess the overall health of the tree. Mr. McFarland is completing a Level 3 assessment using sonic tomography to detect decay and cavities in the tree. Some decay was identified by Mr. McFarland with efforts ongoing by the City to ensure the health of the tree.

Boardmember Jackson mentioned the car that crashed into the retaining wall and hit the tree approximately 10 years ago. The accident left a large gap in the tree, which has nearly closed over the last 10 years.

PUBLIC COMMENT:

BRIEFING: URBAN FORESTRY MANAGEMENT PLAN – CITY-OWNED TREE INVENTORY AND MAINTENANCE PLAN SCOPE OF WORK: Coordinator Jones Wood reported on the receipt of a grant award from the Department of Natural Resources (DNR) of \$40,000 with a City match of \$20,000 from the Tree Fund to complete six actions in the Urban Forestry Management Plan. The grant scope of work includes updating the existing street tree inventory dataset. She encouraged the Board to assist in the work or identify any volunteers that might be interested. The City released a solicitation for a consultant. One company responded to the solicitation. The

There were no public comments.

solicitation for a consultant. One company responded to the solicitation. The tasks include updating the street tree inventory, completing a point-based inventory of other City properties not heavily forested, and completing a sample-based approach inventory of other heavily forested areas (excluding the golf course), developing a four year maintenance schedule, and budget estimates for maintenance.

Boardmember Sedore asked about any mechanism that the City uses to maintain the inventory. Coordinator Jones Wood said the inventory would be updated based on new development applications; however, the inventory is not connected to the City's work order system or the GIS system at this time. The City is phasing to a new system over the next several years that will include those abilities. During the update to the Arbor Day Foundation on the number of trees removed to maintain the City's USA Tree City designation, staff could be contacted about documenting the number of trees removed, the species, and the locations.

Boardmember Sedore shared that he spoke to a staff member during the Arbor Day event who indicated records of trees removed are available. Coordinator Jones Wood said she does not have access to the records but would follow up with staff.

Boardmember Sedore questioned the City's process of confirming the

plantings of new development based on the submittal of landscape plans. Coordinator Jones Wood explained that the inventory only pertains to trees located on City property. Developers are responsible for maintaining plantings within the first three years for private development.

Discussion ensued on the lack of inventory for private properties. Coordinator Jones Wood explained that the City has plans on file for all new development but lacks the resources for inputting the information.

Coordinator Jones Wood added that the scope of work for the grant also includes development of a Community and Urban Forest Maintenance Report. Associated tasks include providing a summary of methodology and inventory results, reporting on results of iTree analysis, development of a maintenance prioritization and strategy, a cost estimate for maintenance work, and a planting strategy for improving tree canopy equity.

The City applied for an Inflation Reduction Act Urban Forestry grant of approximately \$400,000 with a required 50% match by the City. The funding would be used to hire an urban forester as well as fund some incentive programs geared towards low and moderate income homesholds to include tree assessment assistance, small grants for low and moderate-income households with non-City-owned street trees requiring maintenance, a tree giveaway program for low and moderate income households and other areas of the City in need of plantings, and placement of heat sensors at locations throughout the City to measure the increase in tree canopy. Announcement of the federal grant award is not anticipated until November.

Boardmember Sedore asked for a description of the analysis for the new inventory. Coordinator Jones Wood said the analysis uses a sample-based approach documenting the method of sampling to determine the number of trees within a specific space. Boardmember Sedore questioned whether the City will complete an analysis on the inventory. Coordinator Jones Wood explained that the inventory will identify potential planting areas and needed maintenance. At this time the inventory is not intended for any further analysis. The data will be in an excel format. Boardmember Sedore commented that the effort might be conducive for an intern who is interested in biostatistics. Coordinator Jones Wood advised that her department is moving to the campus of South Puget Sound Community College and the intent is to create an internship program with the college and continue the internship program with The Evergreen State College.

DISCUSSION: HERITAGE TREE NOMINATION AT 330 SCHMIDT PLACE: Coordinator Jones Wood reviewed the process for nominating a heritage tree. The nomination of the Japanese Bigleaf Magnolia tree located at 330 Schmidt Place was submitted by Boardmember Sedore.

Boardmember Sedore reported the City contracted with an urban forester who assessed the tree on June 29, 2023 and estimated the tree is 83 years old. He

and the urban forester disagree on the species of the tree and he plans to follow up with the urban forester as to why he believes it is a saucer magnolia tree, which should be clarified before forwarding a recommendation to the Council. The tree may be the largest of its species in the world based on the Monumental Tree database. If there is agreement on the species of the tree, he plans to submit data to the Monumental Tree database to document that the tree is the largest Japanese Bigleaf Magnolia tree in the world.

MOTION: Boardmember Sedore moved, seconded by Chair Grantham, to recommend the City Council approve designating the Japanese Bigleaf Magnolia tree located at 330 Schmidt Place, pending confirmation of the tree species, as a Heritage Tree in the City of Tumwater.

Boardmember Sedore added that the tree is not native and is an exotic tree. He questioned whether the tree falls within the parameter of the City's heritage tree definition. Coordinator Jones Wood said the code does not specify that a tree must be a native tree.

Boardmember Sedore explained the significance of accurately defining the tree species. If the species of tree is identified as a saucer magnolia, the species is not rare or large and is a more common tree. He believes the tree is not a saucer magnolia. Typically, saucer magnolia trees have multiple stems.

MOTION: A voice vote approved the motion unanimously.

DRAFT MEETING Coordinator Jones Wood reviewed changes to the meeting schedule caused by the delay in the urban forestry amendments. The revised schedule reflects monthly Monday meetings and no joint meetings with the Planning Commission pending input from Manager Medrud. Coordinator Jones Wood reviewed a future field trip of potential planting areas in the City.

NEXT MEETING The Board agreed to cancel the August 7, 2023 meeting.

DATE:

MOTION: Chair Grantham moved, seconded by Boardmember Coval, to cancel the August 7, 2023 Tree Board meeting. A voice vote approved the motion unanimously.

ADJOURNMENT: With there being no further business, Chair Grantham adjourned the meeting at 8:05 p.m.

Prepared by Valerie L. Gow, Recording Secretary/President Puget Sound Meeting Services, psmsoly@earthlink.net

TO:	Tree Board
FROM:	Alyssa Jones Wood, Sustainability Coordinator
DATE:	October 9, 2023
SUBJECT:	Carbon Sequestration White Paper

1) <u>Recommended Action</u>:

Presentation and discussion item.

2) <u>Background</u>:

The Thurston Climate Mitigation Plan (TCMP) was accepted by the City Council via Resolution R2021-001 on January 19, 2021. The Phase 4 Interlocal Agreement (ILA) between the cities of Tumwater, Olympia, Lacey, and Thurston County established a 2022 Regional Work Program to implement the TCMP. One item in that 2022 Regional Work Program was "Program Design for a Carbon Sequestration Program". The Thurston Regional Planning Council released the Carbon Sequestration White Paper in February 2023.

3) <u>Alternatives</u>:

□ Schedule further discussion at the Tree Board's November 13, 2023, meeting

4) Attachments:

- A. Carbon Sequestration White Paper
- B. Carbon Sequestration White Paper Appendices
- C. Presentation

FEBRUARY 2023



CARBON SEQUESTRATION AS A CLIMATE MITIGATION STRATEGY FOR THE THURSTON REGION

Developed for the Climate Action Steering Committee

THURSTON REGIONAL PLANNING COUNCIL

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Acknowledgements

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For more information contact:

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1. Overview

Item 8.

The Thurston Climate Mitigation Plan (TCMP) includes carbon sequestration among the strategies and actions identified to meet the region's goal of reducing locally generated greenhouse gas emissions 85 percent from 2015 levels by 2050. This report outlines existing information and resources for policymakers and staff to inform next steps for increasing carbon sequestration in the Thurston region.

Findings from this report include:

- Existing forests and trees in Thurston County sequester approximately 927,000 MTCO₂e/year. This estimate provides a preliminary baseline that TCMP partners can use to monitor progress toward the carbon sequestration targets listed in the plan. Additional information is needed to estimate baseline sequestration provided by other land types, including agriculture and prairies.
- The sequestration target set in the TCMP is highly ambitious, and likely infeasible with actions currently included in the plan. Sequestration actions, including expanding regenerative agriculture, reforestation, prairie preservation, extended timber harvest, and tidal wetland restoration have the potential to increase sequestration by 122,411-314,290 MTCO₂e/year. This falls below the TCMP sequestration target of an additional 380,000 MTCO₂e/year over the baseline rate by 2050. This target may be harder to achieve as forested areas are developed and converted to other land uses—avoiding forest conversion does not increase sequestration potential, but can help maintain the existing sequestration provided by these areas.
- TCMP partners can choose from a range of policies and programs to increase sequestration in the region. Potential areas for initial focus include actions that preserve and increase sequestration in rural forests, align existing programs with sequestration goals, fill priority data gaps, and build relationships among community partners.

2. What is Carbon Sequestration?

Carbon sequestration is a process that removes carbon dioxide from the atmosphere and stores it in natural or artificial sinks, such as soil, vegetation, and the ocean. Other terms used to describe this process include carbon dioxide removal (CDR) and negative emissions technologies (NETs).





"The carbon cycle is nature's way of reusing carbon atoms, which travel from the atmosphere into organisms in the Earth and then back into the atmosphere over and over again. Most carbon is stored in rocks and sediments, while the rest is stored in the ocean, atmosphere, and living organisms."

- NOAA

Carbon sequestration is both a naturally occurring process and a potential strategy for mitigating climate change. In theory, actions taken to increase rates of carbon sequestration can offset greenhouse gas emissions from other sources. All pathways modeled by the IPCC that limit global warming to 1.5°C require carbon dioxide removal, and this modeling indicates that the longer it takes for countries to reduce emissions towards zero, the more sequestration will be needed to meet that target (IPCC, 2018).

Carbon sequestration is sometimes criticized as "band-aid" for the climate crisis that enables emitters to avoid making changes that reduce sources of emissions. Some opponents argue that a focus on carbon sequestration distracts and diverts limited resources that would be better invested in proven technologies that need to be rapidly scaled up to meet climate targets, such as renewable energy infrastructure and energy efficiency improvements (Palmgren et al., 2004, Garcia Freites and Jones, 2020). While carbon sequestration is a natural process, it can be challenging to determine the true effectiveness of actions intended to increase sequestration, and separate their benefit from what might have occurred without intervention (Badgley, et al, 2021).

3. Sequestration Strategies and Targets

The analysis completed for the Thurston Climate Mitigation Plan (TCMP) found that local actions identified to reduce emissions from sources like energy use and transportation will likely be sufficient to meet the region's 2030 goal, but fall short of the region's target for 2050 (Hammerschlag, 2020). The TCMP proposed using carbon sequestration to offset the gap with a target that the Thurston region sequester an additional 380,000 MTCO₂e/year by 2050 to offset continued emissions from other sectors and meet its emission reduction goal.

While carbon sequestration can take many forms,¹ the TCMP focuses on the role of terrestrial sequestration—processes by which trees and other types of plants capture carbon dioxide from the atmosphere through photosynthesis and store it in vegetation and soil. The TCMP focused on three strategies to reach its targets: regenerative agriculture, afforestation and reforestation, and conservation and restoration of native prairies.

Regenerative Agriculture is an approach to food production that employs a variety of practices with a holistic aim to improve soil and ecosystem health, increase biodiversity, and store carbon.² Practices like double cropping, using cover crops, planting perennials, or adding organic matter to the soil can increase carbon input, while practices that limit the amount and intensity of tillage, burning, and erosion can reduce the amount of carbon lost from the soil (Giller et al., 2021).

TCMP Sequestration Actions & Targets: Agriculture

STRATEGY & ACTIONS

Strategy A2. Support agricultural practices that sequester carbon.

• Action A2.1 – regenerative agriculture. Expand regenerative agricultural practices among farmers that aim for a "whole farm" approach. Provide education on how to increase organic matter content and water retention in soils within urban and agricultural settings.

TARGET

Manage 6,600 acres of agricultural land to store carbon through regenerative agriculture practices by 2050. This was estimated to increase carbon sequestration by 3,300 MTCO₂e/year.

Afforestation and Reforestation. Trees sequester carbon by capturing carbon dioxide from the atmosphere during photosynthesis and transforming it into biomass or storing it in deadwood and the soil. *Afforestation* is defined as planting trees in areas that have not historically been covered by forests and may involve land use transformation. *Reforestation* is defined as replacing trees in areas that have

¹ Other forms of carbon sequestration, including storing carbon through oceanic (blue carbon) and geologic processes were not included in the list of actions assessed to reach the TCMP's goals, but could be part of an overall carbon sequestration strategy.

² Despite widespread interest in regenerative agriculture, no legal or regulatory definition of the term

[&]quot;regenerative agriculture" exists nor has a widely accepted definition emerged in common usage. A survey of the term's use in journal articles and by practitioners found definitions often include a combination of process and outcomes (Newton et al., 2020). The authors recommend users of the term define it for their own purpose and context.

historically been covered by forests. The sequestration potential of trees can vary widely based on species, location, and age. The carbon density of coastal forests in the Pacific Northwest is up to twice that calculated for forests in the Midwest. Large individual trees can store significantly more carbon than small trees, so older, larger trees are important carbon stocks, though younger stands of smaller trees accumulate more carbon by area on an annual basis (carbon flux) (Case et al., 2021; Nowak & Crane, 2002; Gray et al., 2016).

TCMP Sequestration Actions & Targets: Forests

STRATEGY & ACTIONS

Strategy A5: Manage forests to sequester carbon.

 Action A5.1 – reforestation & afforestation program. Develop a coordinated reforestation/afforestation program. Begin by identifying priority areas where reforestation and afforestation may have carbon reduction benefits.

Strategy A6: Reduce emissions from the urban landscape.

- Action A6.5 municipal canopy. Maximize tree canopy on jurisdiction owned or managed land, where appropriate, in balance with other jurisdictional goals.
- Action 6.9 tree canopy preservation. Develop a tree canopy ordinance that establishes a
 baseline for current urban canopy and sets goals for future canopy to increase resilience.
 Combine direct cooling value (urban heat island mitigation) with carbon sequestration value
 when evaluating urban tree management.

TARGET

Manage sufficient forestland and prairies to sequester 375,000 tons of CO₂ annually by 2050.

Prairie Preservation and Restoration. Prairies have perennial grasses with deep fibrous root systems that can make up 60-80 percent of biomass in surrounding soil. Prairies in Thurston County and the South Puget Sound have native bunch grasses with roots that extend up to two feet deep, and some of the native forbs, including lupine and balsamroot, can have taproots that extend up to ten feet deep (Hamman 2020, pers comm.). This subterranean biomass creates sequestration potential, with some estimates that prairies hold approximately 20 percent of the world's soil carbon stock (Janowiak et al., 2017). Quantifying soil carbon sequestration is highly complex and varies based on climate, soil, and vegetation, though soil carbon stocks in prairies and grasslands tend to be the greatest in regions with

TCMP Sequestration Actions & Targets: Prairies

STRATEGY & ACTIONS

Strategy A7: Increase carbon sequestration in marine and prairie ecosystems.

Action A7.3 – prairie preservation. Support aggressive implementation of habitat conservation
plans that provide for preservation and restoration of prairie habitat for endangered and
threatened prairie species.

TARGET

Included in forests target.

the greatest rainfall, like Thurston County, and decrease with increasing annual temperature (Case et al, 2021).

The targets developed for the plan provide a rough calculation of how much TCMP partners would need to increase sequestration to meet the region's overall emissions reduction targets. The plan's analysis did not consider whether those targets are reasonable or feasible for local jurisdictions to achieve given practical constraints—such an assessment went beyond the scope and timeframe of the TCMP's development. The analysis also lacked data for several other strategies discussed in the plan that could contribute to a more complete estimate of sequestration potential:

- Baseline sequestration provided by existing land cover and land practices
- Change in emissions from anticipated development and changes to land uses between 2015 and 2050 (future baseline), and the sequestration potential of land conservation actions
- Sequestration rate of alternative forest, tree canopy, and agriculture management practices, including in urban areas
- Sequestration rate of restored prairie areas

These data gaps mean that while the TCMP recognizes the climate mitigation potential of conserving existing trees, forested areas, and prairies, these benefits were not quantified to set targets for the plan. Similarly, the potential benefits of restoring prairies and marine areas are discussed in the plan, but were not included in the sequestration target. Many other potential ways to increase carbon sequestration (such as climate-smart aquaculture practices like kelp farming) were not considered in developing the TCMP. For all these reasons, the quantitative targets developed for the plan should be viewed as a starting place to help frame regional discussions about the role of sequestration in climate mitigation. This report is a first step toward filling some of those data gaps.

4. Baseline Sequestration

How much carbon does land in Thurston County sequester each year?³

The Intergovernmental Panel on Climate Change (IPCC) recommends that greenhouse gases from land uses be reported in six categories: Forest Land, Cropland, Grassland, Wetlands, Settlements, and Other Land. To aid in this assessment, ICLEI⁴ developed the Land Emissions and Removals Navigator (LEARN) tool. As of 2022, the tool estimates local greenhouse gas impacts of forests and trees, but does not estimate emissions and sinks from other types of land uses, such as croplands and grasslands.

From 2006-2016, the LEARN tool estimates forests and trees in Thurston County sequestered 926,800 MTCO₂e/year.⁵ The bulk of that sequestration (93 percent) takes place in rural portions of the county; trees in urban areas contribute a relatively small proportion of sequestration countywide (7 percent).





This estimate provides a preliminary baseline that TCMP partners can use to monitor progress toward the carbon sequestration targets listed in the plan. To meet those targets, sequestration from forests and trees will need to increase to 1.3 million MTCO₂e/year, equivalent to the baseline figure plus an additional 375,000 MTCO₂e/year. Future analyses could improve on this data by developing baseline estimates for emissions from other land use categories, including agricultural lands and prairies.

³ See Appendix B for more in-depth review of existing, available methodologies and data sources to inform baseline and potential carbon sequestration in Thurston County.

⁴ ICLEI - United States chapter of the International Council for Local Environmental Initiatives

⁵ ICLEI LEARN tool estimates were re-run December 7, 2022, using current jurisdictional boundaries, and reflect updates made to the tool through that date. For more information, see Appendix B.

5. Carbon Sequestration Potential

How much more carbon could certain land covers (forest, agriculture lands, prairies) potentially sequester in the future under different climate mitigation strategies?

TRPC reviewed a variety of methodologies, data sources, and tools to estimate the carbon sequestration potential of different actions. This review suggests the sequestration target set in the TCMP is highly ambitious, and likely infeasible with actions currently included in the plan. Approaching the target will require a substantial investment of resources into sequestration actions and significant changes to development patterns and land use practices. In addition, TCMP partners should consider how future land cover changes could reduce sequestration capacity from the baseline discussed above, potentially pushing emissions targets farther out of reach. Alternatively, the TCMP partners could consider adjusting the sequestration target to a more attainable amount and increasing targets for reducing emissions from other sectors to close the gap. Findings from this review are summarized below; for additional detail, see Appendix A.

	Estimated Sequestration Potential (MTCO2e/year)	
Sequestration Strategies	Low	High
Sequestration actions included in the TCMP		
Regenerative agriculture (A2.1)	340*	6,990‡
Reforestation/afforestation (A5.1)	170*	118,820†
Prairie preservation (A7.3)	1*	4,760 [§]
Other sequestration actions		
Extended timber harvest	117,600*	171,180*
Tidal wetland restoration	4,300*	12,540*
SUBTOTAL	122,411	314,290
Actions that maintain sequestration capacity		
Avoided conversion of forests°	11,310*	56,490*

Table 1. Estimated sequestration potential of climate mitigation actions.

Sources – see Appendix A for additional detail:

* Robertson et al. (2021). Note that this analysis does not distinguish between activities occurring in urban versus rural areas. Most forested areas (93%) are in rural portions of Thurston County. † Reforestation Hub

‡ NRCS COMET-PLANNER, Washington Climate Smart Estimator

[§] CARB Land Restoration Benefit Calculator Tool

° Avoiding forest conversion will not increase total sequestration in the region. It will only reduce future net emissions.

Sequestration Potential of Actions Included in the TCMP

Regenerative Agriculture – TCMP Action A2.1

The TCMP set a target that 30 percent of cropland would be managed with regenerative agriculture practices by 2050 (6,600 acres). Data more recently developed for the Washington State Department of Agriculture and Conservation Commission suggests that the plan's analysis underestimates sequestration potential from this sector—land management practices are likely to have higher rates of sequestration than that used in the plan's analysis, and these practices could be applied on more land area, resulting in potential sequestration of nearly 7,000 MTCO₂e/year.

Reforestation/Afforestation – TCMP Action A5.1

Reforestation Hub, a project of Nature Conservancy and American Forests, identified just under 54,000 acres of land in Thurston County with reforestation potential, which, if restored at an average rate of 2,000 acres per year over 30 years, could sequester an estimated 119,000 MTCO₂e/year (Cook-Patton et al., 2020). This estimate is likely a high mark of how much reforestation is possible in Thurston County, but still falls short of the sequestration target for afforestation and reforestation in the TCMP (375,000 MTCO₂e/year).⁶ It assumes an approach that includes planting trees on large areas of urban open space and agricultural lands, which may be incompatible with other climate mitigation strategies and community goals. A more moderate approach that focuses on reforesting sensitive riparian areas at a rate of approximately 40 acres per year could result in additional sequestration of around 2,000 MTCO₂e/year by 2050 (Robertson et al., 2021).

Prairie Preservation – TCMP Action A7.3

Under Thurston County's approved Habitat Conservation Plan, nearly 3,500 acres of prairie land will need to be managed to mitigate for projected impacts from future development on listed species over the next 30 years (Thurston County 2022). These activities include enhancing existing reserve areas, establishing new reserves, and securing working land easements in areas that overlap with agricultural activities. Conservation and restoration also will be included in the Bush Prairie Habitat Conservation Plan under development for land within the Tumwater Urban Growth Area. Completing the conservation activities identified in Thurston County's approved Habitat Conservation Plan could increase sequestration by nearly 5,000 MTCO₂e/year, and additional efforts in the region could add to this potential.

Sequestration Potential of Additional Actions

Extended Timber Harvest

Most timberlands in Washington State are harvested after 30 or 40 years of growth—deferring harvests until 70 or 80 years allows substantial additional carbon to be stored in trees. One study estimates that extending harvest times on a greater proportion of private, state, and federal timber lands across the county could result in additional sequestration of up to 171,200 MTCO₂e/year in Thurston County (Robertson et. al, 2021). Extending timber harvests could affect the amount of timber excise taxes collected and distributed to counties and the state General Fund.

⁶ Though the study identifies a greater amount of potential land than needed in the plan, it uses a much more conservative sequestration rate.

Several actions on the long list considered for the TCMP focused on extending the length of timber harvest rotations, but none were ranked as a priority in the TCMP. With a better understanding of their sequestration potential, it may be worthwhile to revisit these actions and add them to the priority list.

Tidal Wetland Restoration

According to one analysis, restoration of tidal areas in Thurston County could sequester between 4,000 and 13,000 MTCO₂e/year. Two actions on the long list for the TCMP focused on increasing carbon sequestration in marine ecosystems, and these actions were a priority of the Squaxin Island Tribe, although they did not rank highly enough to be included in the plan. Revisiting these actions could help close any gap created by reducing expectations for other strategies.

Avoided Conversion of Forests

Forest conversion both creates a direct source of carbon emissions (by releasing a portion of the carbon stored in trees and roots into the atmosphere as carbon dioxide⁷) and reduces capacity for future forest carbon sequestration. Reducing the loss of forested areas to new development will not increase carbon sequestration, but could have substantial benefits by maintaining the region's existing baseline of carbon storage capacity. If future land use change is considered, the region will need to reduce emissions further to overcome the impacts of forest conversion and meet the TCMP targets. Avoiding forest conversion will minimize this additional gap.

The scenario analysis for the TCMP did not include an estimated rate of future forest conversion. One analysis estimates that if forest conversion continues at the rate seen in past decades, the region would lose 3,800 acres over next 30 years (Robertson et al., 2021). In contrast, TRPC estimates that by implementing existing local zoning and development codes that comply with the Growth Management Act—concentrating growth in urban areas and preserving rural character—local partners are already on a track to limit forest loss to nearly half that amount (2,100 acres). Concentrating a greater proportion of new development in urban areas and reducing development pressure on rural areas (as called for by the Sustainable Thurston land use targets adopted in the plan and actions listed under strategy T1) would further shrink that loss to around 1,300 acres of forest cover.⁸ This outcome could maintain an estimated 56,490 MTCO₂e/year of sequestration from forested areas that may otherwise be converted to developed land uses.

Several actions listed in the TCMP focus on tree cover in urban areas (A6.5, A6.9)—these actions are likely to have limited impact, given the relatively small contribution that urban areas make to the baseline sequestration estimate. Partners may wish to consider actions that focus on reducing forest conversion in rural areas, which have the bulk of forested land. The long list of actions considered for the TCMP included a strategy focused on land preservation (Strategy A4)—actions under this strategy did not rank as a high priority in the TCMP, since the greenhouse gas inventory at that time did not include an estimate of emissions from land conversion. With a better understanding of their sequestration potential, it may be worthwhile to revisit these actions and add them to the priority list.

⁷ Net emissions from forest conversion depend on how the timber cleared is used – some carbon continues to be stored for the long term as wood products.

⁸ Estimates of future forest cover used TRPC's land capacity model and population and employment forecast. See Appendix B and TRPC 2021.

6. Community Perspectives and Opportunities

TRPC staff interviewed local stakeholders⁹ to gain a better understanding about opportunities and concerns around the carbon sequestration targets and actions in the TCMP. Common themes from those interviews are listed in Table 2. For additional detail, see Appendix B.

Table 2. Summary of stakeholder perspectives on a regional carbon sequestration program

Vision	Regional in scale
	Includes wide range of practices: trees, agriculture, prairie preservation
	Accessible to all types of land owners (urban, rural, small and large)
	• Supports other community goals related to habitat protection, open space
	protection, cooling
	Focuses on voluntary and incentive-based tools, including education and
	technical support, with some regulatory support
	Coordinated with state efforts
Opportunities	Develop a baseline estimate of carbon sequestered through existing land uses
	(agriculture, forests, prairies) to account for impact of land conversion
	Develop outreach materials and provide technical assistance for various
	practices: regenerative agriculture, forest management (including extended
	rotations), urban tree preservation and landscaping
	• Connect to existing programs, like Transfer of Development Rights (TDR),
	Voluntary Stewardship Program (VSP), existing city tree programs
	Develop more consistent/complementary tree protection policies and
	standards across partner jurisdictions
	Regulatory reform to remove barriers to regenerative agriculture practices
Concerns	Appropriate balance among different sequestration forms: ex., where
	reforestation potential overlaps with existing agricultural lands or prairie areas
	Appropriate balance between tree protection in urban areas, need for dense
	urban development (another TCMP strategy), and residential development
	Financial cost of programs and staff time
	Lack of interest among landowners/land managers
	Ongoing maintenance requirements of lands used to account for sequestration
	How to keep all stakeholders involved in the process
	Voluntary, flexible tools are preferred, but may not meet the need
	More land use needs than available land
	Focus on carbon sequestration will reduce action on carbon reduction, allowing
	continued emissions from polluting entities
	Accounting, so carbon sequestration benefit is not counted more than once

These interviews suggest there is considerable interest among potential community partners in activities that increase carbon sequestration, but that any future steps should carefully consider how those actions support other regional goals. Existing federal, state, and local resources may help support the development of carbon sequestration actions. These resources are summarized in Appendix C.

⁹ Interviews were held with representatives from Thurston Conservation District, Capitol Land Trust, South of the Sound Community Farmland Trust, WSU Extension (Forestry), Thurston Climate Action Team, City of Lacey, and City of Olympia

7. Carbon Sequestration in Practice: Case Studies

Other cities, counties, and organizations have existing programs that incorporate elements of carbon sequestration, though few have done so as part of broader climate mitigation strategies. TRPC staff interviewed representatives from several different types of programs to better understand how sequestration could be addressed in the Thurston region.¹⁰ Complete information on the case studies is included in Appendix D.

The carbon sequestration initiatives profiled take three forms: carbon credit programs, community forests, and urban forestry programs. The profiled programs offer the following insights into the potential for a carbon sequestration program in the Thurston region.

Partnerships help leverage expertise and make efficient use of resources. Rather than developing programs entirely in-house, all the profiled programs depend on some level of partnership between local government, private entities, nonprofits, and the community. For example, the Tucson Million Trees Initiative is operated by the nonprofit Tucson Clean and Beautiful and the mayor's office. The nonprofit is responsible for primary operations while the directive and goal came from the mayor's office. Similarly, King County's carbon credit program operates through county partnerships with City Forest Credits, Verified Carbon Standard, Microsoft, and other local businesses. This allows the County to outsource the time-consuming process of determining credit value to an outside third-party, rather than taking on the expense and accountability for developing that expertise within its own staff. Partners can also help fund and staff programs. The staffing demands for each program differ but are supported and distributed through local partnerships.

Urban tree canopy programs can serve multiple community goals, are the most established type of program, and potentially are the easiest place to start, but they have a limited climate mitigation benefit and tracking for sequestration adds significant complexity. Representatives from Pierce Conservation District, Tucson Million Trees Initiative, Tacoma Urban Forestry Management Plan, and King County recommended using urban tree programs to meet carbon sequestration targets in combination with other community goals. Generally, these programs require less overhead management than programs that cover a wider range of habitat types, and tree maintenance falls on individual renters or property owners. Most existing urban tree planting initiatives identify equity, public health, and a cooling effect as their primary goals rather than sequestration. These examples are in line with broader studies of urban tree planting and tree management programs that conclude such programs have broad benefits for climate adaptation—including through cooling, stormwater absorption, and health benefits—but limited potential to appreciably mitigate greenhouse gas emissions (Pataki et. al, 2021). Accurately measuring the additional carbon sequestration provided by urban forestry programs can pose a challenge; for tracking the program's benefits relative to a specific climate mitigation goal like that in the TCMP, practitioners recommend using an established certification organization.

Communicating with the community and gaining support or approval prior to program implementation is essential. Community engagement is critical for urban forestry programs to

¹⁰ TRPC conducted interviews with representatives of the following profiled programs: King County Forest Carbon Program, Pierce Conservation District Partnership with City Forest Credits, Nisqually Community Forest, Tucson Million Trees, Tacoma Urban Forestry Management Plan

understand resident needs, ensure that individuals have tools to care for trees, and place trees in appropriate spaces. Community support is also essential for rural reforestation, preservation, and afforestation efforts to understand land use needs and develop maintenance plans. Carbon credit programs rely on community and local interest in purchasing the credits. Determining interest and support before initiating the program can increase participation and overall success.

Seed funding from grants, utilities, or taxes are key to initiating programs, but partners should consider developing a sustainable funding source for long-term program needs. Most programs received grant funding to initiate a small-scale pilot program before expanding efforts. Each program requires funding for initiation and ongoing maintenance and oversight. Funding from carbon credit sales were identified as essential in continuing preservation and maintenance work. Many tree planting efforts are transitioning to use funding from stormwater management to increase the availability and security of funding.

Carbon sequestration programs should highlight options to benefit marginalized or historically disadvantaged communities. The programs reviewed incorporate equity considerations to varying degrees. Carbon sequestration can raise equity and environmental justice concerns, including that sequestration projects may be located at a distance from the emissions they are intended to offset, and that their co-benefits (such as improved air and water quality) do not accrue to the people whose health and communities may be most directly impacted by sources of emissions and climate impacts. For example, programs intended to increase tree cover may disproportionately benefit white and affluent communities. Particularly in urban areas, such programs can have the unintended effect of increasing property values and housing costs, leading to gentrification and the displacement of low-income residents, people of color, and other vulnerable and marginalized communities (Wolch et al., 2014). Representatives from urban tree planting programs suggest designing regional programs to distribute trees to historically underserved communities. Similarly, preserving open spaces can occur in areas that increase accessibility to green spaces for marginalized communities. Many tree planting program representatives recommended working with American Forests to designate priority regions.
8. Policy Options

Regional partners have many options to move toward meeting the 2050 carbon sequestration targets outlined in the TCMP. TRPC staff developed a list of potential policy options based on conversations with stakeholders, case studies, and sequestration potential in the Thurston region; details of each action are included in Appendix E.

Cost Estimates

- \$ = less than \$100,000
- \$\$ = \$100,000-\$1,000,000
- \$\$\$ = \$1,000,000

More detailed cost estimates are included with the description of each action in Appendix E.

Staff Estimates

- Low = less than 1 FTE for limited duration, across all partners
- Medium = 1 FTE for longer duration, across all partners
- High = More than 1 FTE, for indefinite duration, across all partners

Carbon Sequestration Potential

		Low/High Baseline	Low/High Sequestration	Confidence/Probability of
		Sequestration Category	Potential	Impact
	Low	Low/Unknown	Low/Medium	Low
		(Urban Trees, Agriculture,	(regenerative agriculture,	(voluntary
		Prairies)	prairie preservation,	education/outreach, limited
			avoided conversion of	ability to scale)
a			urban areas, tidal wetland	
enti			restoration)	
ote	Med	Low	Low/Medium	Medium/High
L L		(Urban Trees, Agriculture,	(regenerative agriculture,	(monetary incentives,
tio		Prairies)	prairie preservation,	regulation, or capital project;
itra			avoided conversion of	potential for widespread
nes			urban areas, tidal wetland	application)
bed			restoration)	
L N		High	High	Low
, poq		(Rural Forest)	(avoided conversion of	(voluntary
Car			rural forest areas, extended	education/outreach, limited
all			timber harvest)	ability to scale)
ver	High	High	High	Medium/High
Ó		(Rural Forest)	(avoided conversion of	(monetary incentives,
			rural forest areas, extended	regulation, or capital project;
			timber harvest)	potential for widespread
				application)
	Enabling	No direct see	questration benefit, but enable	s other actions.

Table 3. Policy Options to Support Carbon Sequestration in the Thurston region. For details on each action, see Appendix E.

Action	Initial Cost	Ongoing Costs	Staff Requirements	Carbon Sequestration Potential	Potential Lead
Forests and Trees					
Rural/Forest Landowner Outreach and Technical Support Program	\$\$	\$\$	Medium	Medium	TCD, WSU Extension
Urban Tree Outreach and Technical Support	\$\$	\$\$	Medium	Low	Lacey, Olympia, Tumwater
Regional Urban Tree Canopy Assessment	\$	\$	Low	Enabling	TRPC, Thurston County, Lacey, Olympia, Tumwater
Tree Canopy Targets	\$	\$	Low	Enabling	TRPC, Thurston County, Lacey, Olympia, Tumwater
Urban Tree Management Plans and Code Review	\$\$	\$	Medium	Medium	Thurston County, Lacey, Olympia, Tumwater
Forest Conversion Ordinance and Rural Tree Standards Update	\$\$	\$	Medium	High	Thurston County
Comprehensive Plan Review and Update	\$\$	-	Medium	High	Thurston County, Lacey, Olympia, Tumwater
State Forest Lands Management Advocacy	\$	\$	Low	High	Thurston County, CASC
Working Forest Conservation Easements	\$\$\$	\$\$\$	High	High	Thurston County
Community Forests	\$\$\$	\$\$\$	High	High	Thurston County, Land Trusts
Regional Tree Fund	\$\$	\$	Medium	Enabling	Thurston County
Urban Forest Carbon Credit Program	\$	\$	Low	Low	Thurston County, Lacey, Olympia, Tumwater, TCD
Rural Forest Carbon Credit Program	\$\$	\$\$	Medium	High	Thurston County, TCD
Transfer of Development Rights Program Update	\$	\$	Medium	Medium	Thurston County
Land Conservation and Restoration Capacity	\$	\$	Medium	Enabling	Thurston County, Lacey, Olympia, Tumwater, Land Trusts

Action	Initial Cost	Ongoing Costs	Staff Requirements	Carbon Sequestration Potential	Potential Lead
Reforestation/Afforestation Projects ¹¹	\$\$	\$\$\$	High	High	Thurston County, TCD, Land Trusts
Agriculture					
Regenerative Agriculture Practice Tracking	\$	\$	Low	Enabling	TCD, WSU Extension
Regenerative Agriculture Outreach and Technical Assistance	\$\$	\$\$	Medium	Low	Thurston County, TCD
Agriculture Zoning and Development Code Review	\$	\$	Low	Medium	Thurston County
Conservation Programs Update	\$	\$	Low	Medium	Thurston County
Regional Agriculture Fund	\$	\$	Low	Enabling	Thurston County
Agriculture Carbon Credit Program	\$	\$\$	Medium	Medium	Thurston County, Lacey, Olympia, Tumwater, TCD
Prairies					
Prairie Soil Analysis	\$	\$	Low	Enabling	WSU Extension
HCP Implementation	\$\$\$	\$\$\$	High	Medium	Thurston County, Tumwater, Port of Olympia
Prairie Conservation and Enhancement Carbon Credit Program	\$	\$\$	Medium	Medium	Thurston County, CNLM
Supporting/Other Actions					
Land Use Change Emissions Inventory	\$	\$	Low	Enabling	TRPC
TCMP Action Update	\$	\$	Low	Enabling	TRPC
TCMP Target Update	\$	\$	Low	Enabling	TRPC
Sequestration Working Group	\$	\$	Medium	Enabling	TRPC
Blue carbon/Tidal restoration	\$\$\$	\$\$\$	Medium	Medium	Squaxin Island Tribe, cities, county

¹¹ A reforestation program focused on planting in rural areas would have the most potential for contributing to TCMP sequestration targets; planting projects incorporated into urban forest management programs would have limited sequestration potential.

9. Conclusion and Next Steps

This report outlines existing information and resources for policymakers and staff to consider in creating a regionally coordinated carbon sequestration program, though gaps remain that would help partners understand the long-term impacts of carbon sequestration. The carbon sequestration targets identified in the TCMP were based on what the region required to meet climate goals, but looking ahead, TCMP partners will need to balance the role of sequestration with other climate mitigation strategies and available resources.

As a first phase of addressing this sector, partners may opt to focus resources on the following areas:

- Initiate actions with low to medium staff requirements that address areas with the greatest carbon sequestration potential—rural forests.
 - Forest Conversion Ordinance and Rural Tree Standards Update
 - State Forest Lands Management Advocacy
- Lay the groundwork for more intensive actions that address sequestration in rural forests, including looking at feasibility of:
 - Working Forest Conservation Easements
 - Community Forests
 - o Rural/Forest Landowner Outreach and Technical Support Program
 - Regional Tree Fund
 - Carbon Credit Programs
 - Reforestation/Afforestation Projects
- Ensure the role of carbon sequestration is recognized and aligned in existing programs.
 - o Comprehensive Plan Updates
 - o Transfer of Development Rights Program Update
 - o Conservation Program Amendments
 - Habitat Conservation Plan Implementation
 - o TCMP Action and Target Update
- Fill priority data gaps to better enable and inform future work and sequestration estimates.
 - Land Use Change Emissions Inventory
 - Regional Urban Tree Canopy Assessment
 - Prairie Soil Analysis
 - Regenerative Agriculture Practice Tracking
- Help build relationships and capacity among regional partners
 - Land Conservation and Restoration Capacity
 - Sequestration Working Group

10. References

- Badgley, G., Freeman, J., Hamman, J., Haya, B., Trugman, A., Anderegg, W. R. L., Cullenward, D. (2021). Systematic over-crediting of forest offsets <u>https://carbonplan.org/research/forest-offsets-explainer</u>.
- Case, M. J., Johnson, B. G., Bartowitz, K. J., & Hudiburg, T. W. (2021) Forests of the future: Climate change impacts and implications for carbon storage in the Pacific Northwest, USA. Forest Ecology and Management, 482, 118886. https://doi.org/10.1016/j.foreco.2020.118886 Carbon sinks and sequestration. UNECE. <u>https://unece.org/forests/carbon-sinks-and-sequestration</u>.
- Cook-Patton, S. (2021) Reforesting the U.S.: Here's where we can put all those trees. The Nature Conservancy. <u>https://www.nature.org/en-us/what-we-do/our-priorities/tackle-climate-change/climate-change-stories/reforesting-united-states-susan-cook-patton/</u>.
- Cook-Patton, S., Gopalakrishna, T., Daigneault, A., Leavitt, S.M., Platt, J., Scull, S.M., Amarjargal, O., Griscom, B.W., McGuire, J.L, Yeo, S.M., Fargione J.E. (2020) Lower cost and more feasible options to restore forest cover in the contiguous United States for climate mitigation. *Elsevier Inc.* <u>https://doi.org/10.1016/j.oneear.2020.11.013</u>
- Garcia Freites, S. and Jones, C. (2020) A Review of the Role of Fossil Fuel-based Carbon Capture and Storage in the Energy System. Tyndall Centre for Climate Change Research for Friends of the Earth Scotland. <u>https://foe.scot/wp-content/uploads/2021/01/CCS_REPORT_FINAL.pdf</u>
- Giller, K. E., Hijbeek, R., Andersson, J. A., & Sumberg, J. (2021) Regenerative Agriculture: An agronomic perspective. Outlook on Agriculture, 50(1), 13–25. <u>https://doi.org/10.1177/0030727021998063</u>
- Hammerschlag, R. (2020) Scenario Analysis Tool and User's Guide developed for the Thurston Climate Mitigation Plan. <u>https://www.trpc.org/DocumentCenter/View/8317/TCMP_A5</u>
- IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.
- Janowiak, M., Connelly, W., Dante-Wood, K., Domke, G., Giardina, C., Kayler, Z., Marcinkowski, K., Onto, T., Rodriguez-Franco, C., Swanston, C., Woodall, C.; Buford, M. (2017) US Forest Service General Technical Report WO-95. Considering Forest and Grassland Carbon in Land Management. <u>https://srs.fs.usda.gov/stateline/2017-08-17/resources/docs/gtr_wo95.pdf</u>.
- Newton, P., Civita, N, Frankel-Goldwater, L., Bartel, K., & Johns, C. (2020) What is regenerative agriculture? A review of scholar and practitioner definitions based on processes and outcomes. Frontiers in Sustainable Food Systems. 4:577723. doi: 10.3389/fsufs.2020.577723

- Nowak, David J, & Crane, Daniel E. (2002) Carbon storage and sequestration by urban trees in the USA. Environmental Pollution (1987), 116(3), 381–389. <u>https://doi.org/10.1016/S0269-7491(01)00214-7</u>
- Pataki D.E., Alberti M., Cadenasso M.L., Felson A.J., McDonnell M.J., Pincetl S., Pouyat R.V., Setälä H. and Whitlow T.H. (2021) The Benefits and Limits of Urban Tree Planting for Environmental and Human Health. Front. Ecol. Evol. 9:603757. doi: 10.3389/fevo.2021.603757 https://www.frontiersin.org/articles/10.3389/fevo.2021.603757/full
- Robertson, J. C., Randrup, K. V., Howe, E. R., Case, M. J., & Levin, P.S. (2021) Leveraging the potential of nature to meet net zero greenhouse gas emissions in Washington State. PeerJ, 9, e11802. https://doi.org/10.7717/peerj.11802
- Thurston Regional Planning Council. (TRPC 2021). Thurston County Current and Future Basin Conditions Assessment. <u>https://www.trpc.org/DocumentCenter/View/8901/BasinConditionReport2021</u>. Note that to develop the estimates of future forest cover used in this report, TRPC re-ran the land capacity model using the under the Sustainable Thurston land use alternative developed for the 2021 Buildable Lands Report for Thurston County: <u>https://www.trpc.org/DocumentCenter/View/8542/2021-Buildable-Lands-Report-2021-08-22?bidId=</u>
- Thurston County. (2022) Thurston County Habitat Conservation Plan. <u>https://www.thurstoncountywa.gov/planning/HCP/Documents/HCP-February-2022-Combined.pdf</u>
- West, Tristram O., & Marland, G. (2002) "A Synthesis of Carbon Sequestration, Carbon Emissions, and Net Carbon Flux in Agriculture: Comparing Tillage Practices in the United States," Agriculture, Ecosystems & Environment 91, no. 1–3 (2002): 217–32, <u>https://doi.org/10.1016/S0167-8809(01)00233-X</u>
- Wolch, Jennifer R, Byrne, Jason, & Newell, Joshua P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough' Landscape and Urban Planning, 125, 234–244. <u>https://doi.org/10.1016/j.landurbplan.2014.01.017</u>

FEBRUARY 2023



CARBON SEQUESTRATION AS A CLIMATE MITIGATION STRATEGY FOR THE THURSTON REGION: APPENDICES

THURSTON REGIONAL PLANNING COUNCIL

Appendices

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Appendix A Carbon Sequestration Potential in Thurston County

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1. Background

Item 8.

The Thurston Climate Mitigation Plan (TCMP) set a target that the Thurston region sequester an estimated 380,000 tons of CO2 annually by 2050 to meet its emission reduction goal. To create that target, the scenario analysis for the plan combined estimates for two strategies: increased carbon storage in soils in agricultural lands and increased carbon storage in trees.

Table 1.	Carbon	sequestration	targets in	the Thurston	Climate	Mitigation	Plan
		1	5			5	

	Description	Estimated	Land area needed	2050
		Sequestration		Sequestration
		Rate		Target
Agriculture	Managing	0.14	6,600 acres [†]	3,300
Soil Carbon	agricultural land	MTCO₂e/acre-		MTCO₂e/year
	to store carbon in	year*		
	soil through			
	regenerative			
	agriculture.			
Afforestation/	Managing	10.18	37,000 acres	376,000
Reforestation	forested land to	MTCO ₂ e/acre-		MTCO ₂ e/year
	store carbon by	year [‡]		
	establishing trees			
	in areas not			
	previously			
	forested or where			
	trees have been			
	cleared.			

* West and Marland, 2002

⁺ Equivalent to 30% of 22,109 acres cropland identified in Thurston County in the USDA 2017 Agricultural Census.

[‡] Estimates provided by Dylan Fischer, professor in Forest Ecology at The Evergreen State College, based on reforestation projects in the Olympia area. Estimated sequestration rates were found to increase with time, ranging from 4.05 MTCO₂e/acre-year for first ten years, 8.65 MTCO₂e/acre-year over twenty years of growth, and 10.18 tCO₂/acre-year over thirty years of growth.

As noted in the plan, these estimates were developed to provide a rough calculation of how much sequestration may be needed to meet the region's overall emissions reduction targets, rather than an estimate of what might be reasonable or feasible for local jurisdictions given practical constraints. In particular, the estimate for afforestation/reforestation is ambitious, accounting for approximately 8 percent of the total land in Thurston County. The scenario analysis also lacked data for several other strategies discussed in the plan that could contribute to a more complete estimate of sequestration potential:

- Baseline sequestration provided by existing land cover and land practices
- Sequestration rate of alternative forest and tree canopy management practices, including in urban areas
- Sequestration rate of existing and restored prairie areas

These data gaps mean that while the TCMP recognizes the climate mitigation potential of conserving existing trees, forested areas, and prairies, these benefits were not quantified to set targets for the plan.

Similarly, the potential benefits of restoring prairies and marine areas are discussed in the plan, but were not included in the sequestration target.

Two key questions were raised during discussions about using carbon sequestration as a climate mitigation strategy in the Thurston Climate Mitigation Plan:

- How much carbon sequestration is currently occurring in Thurston County in existing land uses?
- How much carbon could certain land covers/uses (forests, agriculture, prairies) potentially sequester in the future, as a climate mitigation strategy?

This appendix reviews some existing, available methodologies and data sources that provide information on carbon sequestration and carbon sequestration potential in Thurston County. The concluding section presents conclusions from this review that can inform future work.

2. Terms

The global carbon cycle includes movement of carbon (C) among vegetation, soil, ocean, rock, and atmosphere. It is important to understand two concepts from that cycle that are sometimes conflated when discussing the potential for carbon sequestration as a climate mitigation strategy.

- **Carbon Stock** is the amount of carbon stored in a "pool" at a given time. Carbon pools include live and dead vegetation, soil, rocks, liquids, or gases. When we talk about the total amount of carbon stored (or sequestered) in existing ecosystems, like forests or agricultural soils, we are referring to carbon stocks. In this report, carbon stocks are reported as metric tons of carbon (tC).
- Carbon Flux is the movement of carbon from one pool to another over a length of time. Carbon sequestration is one type of carbon flux it is a process that removes carbon dioxide from the atmosphere and stores it a solid or liquid form where it can't contribute to the greenhouse effect that is causing climate change. For example, photosynthesis takes carbon dioxide from the atmosphere and changes it into the organic carbon that makes up the leaves or roots of a plant. Carbon emissions are another type of carbon flux a process where carbon in a solid or liquid form changes and is released into the atmosphere as carbon dioxide, such as when wood is burned as fuel. For consistency with the TCMP, this report uses metric tons of carbon dioxide equivalent (MTCO₂e) when discussing carbon fluxes.

Figure 1. Global Carbon Stocks and Fluxes. Source: Michigan State University Forest Carbon and Climate Program.



3. IPCC Guidance and US Greenhouse Gas Inventory

The Intergovernmental Panel on Climate Change (IPCC) is an international body charged with assessing science related to climate change. IPCC guidelines for National Greenhouse Gas Inventories outline methods for evaluating greenhouse gas emissions and removals (sinks or sequestration) from managed land use (IPCC 2019). The United States has applied this guidance at a national level, as part of its requirements under the United Nations Framework Convention on Climate Change (EPA 2021).

The IPCC recommends that greenhouse gases from land uses be reported in six main categories: Forest Land, Cropland, Grassland, Wetlands, Settlements, and Other Land. These categories are defined generally by the IPCC, and more specifically by individual nations or other practitioners – the definitions used by both the IPCC and the United States in the national greenhouse gas inventory are summarized in Table 2.

These land-use categories can be further subdivided by climate, soil type, management practices or other relevant factors. The guidelines include looking at how much land has changed from one category to another (converted) during a specified period, and estimating carbon stock changes in those different categories from various ecosystem components, including plant biomass, dead organic matter, and soils.

Land Use	IPCC Definition (IPCC 2019)	US Definition (EPA 2021)
Forest Land	All land with woody vegetation consistent with thresholds used to define Forest Land in the national greenhouse gas inventory.	Areas at least 120 feet wide (36.6 meters) and 1 acre (0.4 hectare) in size with at least 10 percent canopy cover (or equivalent stocking) by live trees. Land with such tree area and cover is not classified as forest if completely surrounded by urban or developed lands (such land is classified as Settlements); land that is predominantly under agricultural land use is also not considered Forest.
Cropland	Cropped land, including rice fields, and agro-forestry systems where the vegetation structure falls below the thresholds used for the Forest Land category.	Areas used for the production of adapted crops for harvest. This category includes both cultivated (row crops, close-grown crops) and non-cultivated (hay, orchards) land.
Grassland	Rangelands and pastureland that are not considered Cropland. It also includes systems with woody vegetation and other non-grass vegetation such as herbs and bushes that fall below the threshold values used in the Forest Land category. The category also includes all grassland from wild lands to recreational areas as well as agricultural and silvi- pastural systems, consistent with national definitions.	Areas on which the plant cover is composed principally of grasses; grass-like plants (i.e., sedges and rushes); forbs; or shrubs suitable for grazing and browsing. It includes both pastures and native rangelands. Grassland includes pasture and rangeland that are primarily, but not exclusively used for livestock grazing. Rangelands are typically extensive areas of native grassland that are not intensively managed, while pastures are typically seeded grassland (possibly following tree removal) that may also have additional management, such as irrigation or interseeding of legumes. Woodlands are also considered grassland and are areas of continuous tree cover that do not meet the definition of forest land.
Wetlands	Areas of peat extraction and land that is covered or saturated by water for all or part of the year (peatlands and other wetland types) and that does not fall into the Forest Land, Cropland, Grassland or Settlements categories.	Land covered or saturated by water for all or part of the year, as well as areas of lakes, reservoirs, and rivers.
Settlements	All developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other categories.	Developed areas consisting of units of 0.25 acres (0.1 hectare) or more that include residential, industrial, commercial, and institutional land (including farm buildings and road networks). Also includes tracts of less than 10 acres (4.05 hectares) that may meet the definitions for Forest Land, Cropland, Grassland, or Other Land but are completely surrounded by urban or built-up land.
Other Land	Bare soil, rock, ice, and all land areas that do not fall into any of the other five categories.	Bare soil, rock, ice, and all land areas that do not fall into any of the other five land use categories; carbon stock changes and non-CO2 emissions are not estimated for Other Land, because these areas are largely devoid of biomass, litter, and soil carbon pools.

Table 2. Land Use Category Definitions for Greenhouse Gas Inventories

The most recent United States greenhouse gas inventory estimates that in 2019, land use categories, including forestry, contributed to a net removal of 789 million MTCO₂e (EPA 2021). Forestland and urban trees (trees in settlements) are the two most significant carbon sinks estimated for that inventory (Figure 2). Land use conversion, including converting forested areas to settlements (which may or may not be urban) and to agricultural use are two sources of land use emissions.



Figure 2. Key land-related emissions and removals in the United States GHG Inventory. Source: EPA 2021

Developing a greenhouse gas inventory for land use requires landscape-scale data that is complete across the area being assessed, capable of representing land-use categories and conversions over time, and consistent in its reporting. The United States Greenhouse Gas Inventory uses a combination of three datasets for its analysis:

 National Resources Inventory (NRI) – Used for non-federal, non-Forest lands in the mainland US and Hawaii. The NRI is a statistical survey conducted by the USDA Natural Resources Conservation Service with information on land use, soil conditions, and land management

practices, which makes it useful for assessing carbon stock changes for Cropland and Grassland categories. Land use trends are available in five-year intervals, with the most recent from 2017.

- Forest Inventory and Analysis (FIA) Used for Forest Land estimates. The FIA is an inventory survey conducted by the US Forest Service with detailed information on forest conditions. In the western United States, a portion of survey plots are sampled each year, with all plots sampled every 10 years. The most recent data available for Western Washington runs through 2019.
- National Land Cover Database (NLCD) Used for federal, non-Forest lands, and to cover any
 other gaps in NRI and FIA data. NLCD data is also used to estimate percent tree cover in
 settlement areas. The NLCD is released by the United States Geologic Survey (USGS) which uses
 30-meter resolution imagery to map land cover. It is available in five-year increments, with the
 most recent data from 2019.

4. Thurston County Land Cover and Land Use Estimates

TRPC typically uses data from NOAA's Coastal Change Analysis Program (C-CAP) to estimate land cover. C-CAP data provides more detailed land cover categories for coastal areas, especially wetlands and shorelines, and is intended to be consistent with NLCD categories, however, a comparison of 2016 NLCD and C-CAP land cover data for Thurston County found significant differences in how land was classified (Table 3).

Table 3. Thurston County Land Cover Categories, comparing 2016 NLCD and C-CAP Data. Land cover categories were consolidated into the six IPCC categories, using the same reclassification scheme employed by Birdsey and Harris (2021) for the ICLEI LEARN tool discussed below. Note that the total land amounts may differ from other estimates due to differences in map projections and data boundaries.

IPCC Categories	NLCD Categories Included	C-CAP Categories Included	NLCD 2016 (acres)	C-CAP 2016 (acres)	Difference (acres)
Forest Land	Deciduous Forest, Evergreen Forest, Mixed Forest, Woody Wetlands	Deciduous Forest, Evergreen Forest, Mixed Forest, Palustrine Forested Wetland	238,090	230,011	8,079
Cropland	Cultivated Crops	Cultivated	1,009	6,302	-5,294
Grassland	Pasture/Hay, Grassland/Herbaceous, Scrub/Shrub	Pasture/Hay, Grassland, Shrub/Scrub	133,028	146,132	-13,104
Wetland	Open Water, Emergent Herbaceous Wetlands	Water, Palustrine Scrub/Shrub Wetland, Palustrine Emergent Wetland, Estuarine Emergent Wetland, Unconsolidated Shore, Palustrine Aquatic Bed, Estuarine Aquatic Bed	42,583	47,901	-5,319
Settlement	Developed Open Space, Developed Low Density, Developed Medium Density, Developed High Density	Developed Open Space, Developed Low Density, Developed Medium Density, Developed High Density	78,041	62,459	15,582
Other Land	Perennial Ice/Snow, Barren Land	Barren Land, Snow/Ice	2,469	2,414	55
Total			495,220	495,220	0

Excluding open water categories, Thurston County's land area is approximately 462,000 acres. The Scenario Analysis Tool used for the development of the TCMP used a land area estimate provided by Thurston County of 462,080 acres. Table 4 shows how the six IPCC land categories are distributed among some land use categories relevant to the TCMP.

Table 4. Comparing Thurston County Land Cover Categories by some land uses. Land cover categories were consolidated into the six IPCC categories, using the same reclassification scheme employed by Birdsey and Harris (2021) for the ICLEI LEARN tool discussed below. Note that the total land amounts may differ from other estimates due to differences in map projections and data boundaries.

		Land Uses (acres)							
_		<u>Ru</u>	ral		<u>Urb</u>	<u>an</u>	Tribal	Total	
IPCC Land Cover Category	Park	Forestry	Prairie Soils	Other	Park	Other	Reservation		
Forest Land	6,681	124,532	26,770	55,349	1,534	12,339	1,791	228,996	
Cropland	250	89	3,447	2,335	11	117	38	6,287	
Grassland	3,582	61,604	31,953	40,605	303	6,939	689	145,676	
Wetland	2,472	2,809	566	9,314	160	1,277	116	16,715	
Settlement	308	1,115	12,581	11,288	838	35,638	281	62,050	
Other Land	6	1,020	574	277	4	389	53	2,324	
Total	13,299	191,169	75,891	119,168	2,850	56,699	2,968	462,048	

Notes:

• Data Source: 2016 NOAA C-CAP

• Rural = Land in unincorporated rural Thurston County

• Urban = Land in an incorporated city or Urban Growth Area (UGA).

• Park = Land identified as a public park, open space, or preserve.

• Forestry = Land zoned as Long-Term Forestry (LTF) or in current use forestry or open space timber tax program (Assessor use codes 88 and 95), excluding 'Park.'

 Prairie Soils = Soils in which Thurston County CPED requires a prairie plant review prior to permitting. Excludes 'Forest' and 'Park.' List of soils:

https://www.thurstoncountywa.gov/planning/planningdocuments/gopher-2021-soils-list-gopher-prairie.pdf (7/26/2021)

Figure 3. Relative Area of Thurston County Land Cover Categories, Comparing Rural, Urban, and Tribal Areas. Source: 2016 NOAA C-CAP



This review suggests a few observations relevant to developing and reviewing estimates of carbon sequestration potential in Thurston County, in line with the Thurston Climate Mitigation Plan:

- Land Cover Estimates. Estimates of Thurston County land cover area will vary depending on the methodology used, including differences in boundaries, map projections, and definitions.
- Urban and Rural. Rural unincorporated areas account for most of Thurston County's land area (86 percent); cities, towns, and unincorporated urban areas account for 13 percent of all land. These divisions do not correspond cleanly to the IPCC Settlement category—about 60 percent of areas classified as settlement are within a designated Urban Growth Area (UGA) boundary. This is because a portion of development in Thurston County exists outside designated UGA) boundaries.
- Forested Areas and Timberlands. Half of Thurston County's land area (50 percent) is covered by forested land covers. Evergreens dominate, making up 64 percent of forested areas. Mixed forest and deciduous forest cover make up smaller proportions (23 percent and 13 percent of forested areas, respectively). The bulk of forested land cover is in the rural area (93 percent), and about 60 percent of that is in "Forestry" use, including two-thirds of all evergreen forest areas. Only a small portion of forested land (3 percent) is in a designated park or preserve—the remaining 40 percent is in private (non-forestry use) ownership.
 - Forest Age. The age of trees can play a role in planning for carbon sequestration. A study using data from Pacific Northwest National Forest lands suggests that older, larger trees are important carbon stocks and accumulate more carbon individually, while younger stands of smaller trees accumulate more carbon by area (Gray et al. 2016). Data from the Washington Department of Natural Resources indicates that most forested areas in Thurston County have relatively young trees, with 60 percent of stands under 40 years. As shown in Figure 4, areas managed for forestry generally have younger trees, especially when compared to those within public parks and preserves.
 - Future Loss of Forest Cover. TRPC estimates that under current regulations, future development will result in a loss of about 1,000 acres of forest cover by 2030 and 2,100 acres of forest cover by 2045 less than one percent of all forest cover in Thurston County (0.4 percent) (TRPC 2021). This loss is evenly split between rural areas and urban areas. Achieving the Sustainable Thurston preferred land use scenario included as a target in the TCMP, which concentrates a higher proportion of new development in urban areas and within urban centers and corridors, would reduce the loss of forest cover 1,300 acres by 2045 (0.3 percent of Thurston County forest cover). While this difference in acreage is small, it shows that concentrating development in urban areas can reduce the loss of carbon sequestering forested areas countywide.

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Figure 4. Forest Land Cover and Forest Stand Age, Thurston County. Source: NOAA C-CAP 2016; DNR Remote Sensing Forest Inventory 2021



- Agriculture. The IPCC-based land classifications result in a much more limited estimate of agricultural land than has been used in other estimates for Thurston County. In part, this outcome occurs because the methodology focuses only on cultivated area and excludes pasture/hay, which is the predominant agricultural land cover in Thurston County. Even with this consideration, the total acreage is small (~6,000 acres). The U.S. Department of Agriculture's 2017 Census of Agriculture estimated approximately 62,250 acres of farmland in Thurston County, including 22,100 acres of cropland (23 percent of which was used for growing hay). The TCMP used the USDA cropland estimate as the basis for estimates of carbon sequestration from regenerative agriculture practices.
- Prairies. Restoration of prairies is a particular interest in Thurston County, with a specific regulated definition, but this definition does not fit neatly into the IPCC classification categories. Most lands classified as "Grassland" do not have underlying soils associated with Puget Sound prairies, so the Grassland category cannot be used as a proxy for sequestration provided by prairies. While nearly half of the land with prairie soils (42 percent) falls into the "Grassland" category, most of that is in areas used for pasture and hay, which is frequently considered an agricultural use. A third of the land with prairie soils (34 percent) currently has forest cover, mostly evergreen forest. Because of these overlaps between prairie soils and areas in agricultural and forestry uses, careful thought will need to be given to any estimates of carbon sequestration for this land use.

5. Estimates of Sequestration in Existing Land Uses

TRPC staff reviewed several existing tools to develop an initial, rough estimate of sequestration from different land uses in Thurston County.

5.1 Forests and Trees

Both older, larger trees and younger, smaller trees contribute to carbon sequestration, though they do so in different ways. Older, larger trees serve as important carbon stocks and accumulate more carbon individually, while younger stands of smaller trees accumulate more carbon by area on an annual basis (carbon flux) (Gray et al. 2016).

ICLEI Protocol and LEARN Tool

The United States chapter of the International Council for Local Environmental Initiatives (ICLEI – also called Local Governments for Sustainability) develops tools and technical assistance to advance climate action, including industry standard guidance for community-scale greenhouse gas inventories. Appendix J of ICLEI's protocol provides guidance on estimating greenhouse gas emissions from land uses, with a focus on Forest Land and Trees (Birdsey et al, 2019). Because ecological processes and land use practices can vary from year to year, ICLEI recommends using an annual average over a period of five to ten years that span the community's baseline year to develop a baseline inventory of greenhouse gases from land use.

ICLEI's Land Emissions and Removal Navigator (LEARN) tool compiles national land cover data into an interactive map that applies the protocols developed by ICLEI for estimating emissions from forests and trees outside of forests, including in urban areas. The tool does not estimate emissions and sinks from

other types of land uses, such as croplands and grasslands. The LEARN tool uses NLCD data to estimate land cover change, including data from 2001 through 2019.

TRPC staff used the LEARN tool to estimate baseline land cover change and net carbon flux for forests and trees (emissions + sequestration). Staff used current jurisdiction boundaries; selected Seattle, Washington, as the reference community for emission and removal factors; and used an inventory interval of 2006 to 2016. This ten-year period spans the region's emission reduction baseline year of 2015. Note that the LEARN tool only provides emissions estimates for trees outside forest land for the period of 2011-2016.

Table 5. Thurston County's GHG fluxes from forests and trees for inventory period 2006-2016, using ICLEI LEARN tool. All values reported in (MTCO₂e/year).

	Removals (MTCO ₂ e/vear)	Emissions (MTCO2e/year)
Undisturbed Forest	-996,786	(
Forest Disturbances from insect/disease		71,945
Non-Forest to Forest (Reforestation/Afforestation)	-184,637	
Forest Conversion to Settlement		17,568
Forest Conversion to Grassland		328,043
Forest to other non-forest lands		2,241
Trees outside forests (i.e., trees in settlement areas, urban trees)	-183,690	18,459
TOTAL	-1,365,113	438,256
Net GHG Balance	-926,857	

This analysis estimates that in Thurston County, forests and trees annually sequester an approximate net 926,900 MTCO₂e/year. This figure could be used as a provisional baseline estimate of carbon sequestration from trees in Thurston County. A review of the results from the tool suggests the following findings:

- The bulk of sequestration (93 percent) takes place in rural portions of the county; trees within urban areas contribute a relatively small proportion to sequestration countywide (7 percent).
- Undisturbed forestland makes up the largest source of sequestration in the Thurston region (73 percent)—this estimate includes areas within forested timberlands as well as forested areas not used for forestry. Trees outside forest lands include, but are not exclusively, trees within designated urban areas—these comprise a relatively small source of sequestration (13 percent).
- Reforestation (non-forested areas restored to forest) accounts for 14 percent of overall sequestration. Forest land increased by approximately 32,800 acres between 2006 and 2016

- Conversion of forest land to other land uses is the most significant source of emissions in this sector (80 percent), and most of that conversion was land that changed from a forested condition to grassland. As noted in the previous section, most land classified as "grassland" in Thurston County is used for pasture or hay or has a land cover of scrub/shrub. The conversion shown is most likely change from forested cover to these land conditions, rather than prairie restoration.
- The tool estimates carbon sequestration at rates that fall within the range of estimates used for the TCMP (4.05-10.18 MTCO₂e/year), but well below the sequestration rate of 10.18 MTCO₂e/acre-year used to generate estimates for the longer term 2050 target. That higher rate was based on results of a local study that indicated older forest stands would sequester at higher rates:
 - Forest Remaining Forest (Undisturbed) = 5.88 MTCO₂e/acre-year average
 - Reforestation = 5.60 MTCO₂e/acre-year average
 - Trees Outside Forests (including Urban Trees) = 4.19 MTCO₂e/acre-year average

The LEARN tool does not report a margin of error for its estimates, but ICLEI does include this caveat:

There are significant uncertainties in the estimates. Although not quantified here, typical greenhouse gas inventories of forests using similar approaches, including the national GHG inventory, report uncertainties in the net GHG balance that can be as high as ±45% (with 95% confidence). In the results presented here, the most uncertain estimates involve emissions from land-use change which are based on welldocumented remote-sensing products, but relatively few field observations from a statistical sampling of county forests. While uncertainties can be high, the estimates can still provide useful information on the relative magnitude and importance of such GHGs; subsequent analyses can also provide information on the directionality of emissions and removals from land management.

US Forest Service Forest Inventory and Washington Forest Carbon Inventory

As noted above in Section 2, the USDA Forest Service conducts regular surveys of forest plots throughout the country, and maintains detailed information on forest conditions through the Forest Inventory and Analysis Program (FIA). In response to a request from the Washington State Legislature, the US Forest Service, Pacific Northwest Research Station partnered with the Washington Department of Natural Resources to develop the first forest ecosystem carbon inventory for the state of Washington (Christensen et al., 2020).

Through the FIA, a portion of survey plots are sampled each year, with all plots sampled every 10 years. The assessment compared survey data gathered from 2012-2016 to the previous inventory (2002-2011) to develop estimates of changes in carbon stocks, fluxes, and trends, and provides some data at the county scale. Carbon stocks are measured or modeled from various carbon pools, including live trees, dead trees, understory vegetation, and soil. Forest Service staff shared updated information from the 2019 survey for forest area and aboveground live tree carbon estimates (USDA 2021).

The FIA defines forest land as:

"...land with at least 10 percent cover by live forest trees of any size, or that formerly had such cover and that will be artificially or naturally regenerated (i.e., is not being managed for non-

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forest uses). The area must be at least 1 acre in size and at least 120 feet wide. Tree-covered areas where management precludes natural vegetation development (e.g., through mowing, disking, regular herbicide application, or intensive grazing) are not considered forest land."

It excludes areas with trees that are surrounded by urban or developed land—these are classified as "Settlement" areas. Using this definition, the FIA estimates Thurston County as having 234,000 acres of Forest Land. This total falls between the areas estimated by NLCD and NOAA C-CAP data described above. Most of Thurston County's Forest Land (73 percent) is in private ownership.

Forest Ownership, Thurston County	Acres	Percent of Total Forestland
Federal	12,000	5%
State/Local	52,000	22%
Private	170,000	73%
TOTAL	234,000	

rable 0.2010 rolest Land Ownership, maiston county. Source, $0.00 h 2021$

Researchers estimated carbon flux, the change in the amount and rate of gaseous carbon being emitted or sequestered by various carbon pools in the forest, including live and dead trees, understory vegetation, roots, forest floor, and soils. The authors indicate a greater confidence in their results for carbon pools that are based on field measurements (including aboveground trees and downed wood) and less confidence in the results for modeled carbon pools (including belowground roots, soils).

The USFS study found that there are approximately 27 million tons of carbon stored in forest land in Thurston County, including in forest soils. The analysis estimates that between 2007 and 2016, forest land in Thurston County annually sequestered a net 541,800 tons of carbon dioxide equivalent (MTCO₂e/year). However, the USFS figure has a high sampling error that indicates a high level of uncertainty in the results. The study authors have higher confidence in statewide estimates, and less confidence in estimates for smaller areas like the County scale.

This sequestration estimate is substantially lower than that offered by the ICLEI LEARN tool, which is approximately 845,000 MTCO₂e/year after removing the estimate for trees within urban (settlement) areas. By including modeled estimates of soils and belowground, the FIA analysis predicts a larger amount of sequestration overall, but also estimates greater emissions from tree mortality and forest harvest than shown in the ICLEI tool. It does not estimate emissions from forest land converted to other uses at the County scale.

Table 7. Washington State and Thurston County Forest Ecosystem Carbon Summary, 2007-2016. Source: Christensen et al., 2020. Note high sampling errors for County-scale estimates.

		Thurston County		Washington State	
	Unit	FIA Inventory Estimate	Sampling Error of the Estimate (SE)	FIA Inventory Estimate	Sampling Error of the Estimate (SE)
Total forest carbon					
stocks	million tons C	27.3	4.6	2,718.20	18.5
Average carbon					
stocks per acre (all					
ownerships)	tons C/acre	114.1	7.8	122.9	0.7
Annual net change					
in forest carbon					
(flux) vegetation					
only	MTCO₂e/year	462,100	690,600	16,060,500	4,274,300
Annual net change					
in forest carbon					
(flux) including					
soils and forest					
floor	MTCO₂e/year	541,800	706,000	16,135,100	4,396,300
Average annual					
flux per acre					
(sequestration	MTCO ₂ e/acre-				
rate)	year	2.27	2.95	0.73	0.20

A review of the results from the USFS analysis suggests the following conclusions to inform sequestration activities in Thurston County:

- Counties west of the Cascades account for 93 percent of Washington's annual forest carbon sequestration (annual carbon flux), with Lewis, Skamania, and King Counties generating the most carbon storage. Thurston County, which is much smaller in total area with less forest land than these counties, accounts for just 3 percent of the state estimate, and has a lower average carbon stock per acre when compared with the state average.
- Trees are often the focus of sequestration efforts, though the analysis finds that almost half of all stored carbon in forests is found belowground in soils (45 percent). These stocks are less likely to change from year to year compared with tree growth, so soils make up only a small percentage of statewide annual carbon flux (2 percent) while gross tree growth accounts for 94 percent of annual carbon flux.
- The study found significant differences in carbon stock and carbon flux among forest lands with different ownership. Carbon stocks were highest in areas under federal management, including National Forests, because these lands tend to have older stands of trees and more down and dead wood than intensively managed private forest land. Though National Forests are sequestering the highest total quantity of CO₂e per year in the state, the rate of sequestration per acre from tree growth is highest on private corporate and state DNR lands, where trees are younger on average. These gains in sequestration are partially offset by higher timber harvest

rates, so a full accounting would need to include the amount of carbon stored in harvested wood products. In Thurston County, most forest lands are in private ownership, rather than under state or federal jurisdiction, and as described in Section 3, these lands tend to have younger stands of trees when compared with the relatively small areas designated as parks.

i-Tree

i-Tree is a suite of free software tools offered by the USDA Forest Service that can be used to assess the condition, value, and benefits of urban and rural forest resources. The i-Tree Landscape tool combines 2011 National Land Cover Database (NLCD) land cover data with environmental data to develop area estimates for various benefits and risks including carbon storage and sequestration, air pollution removal, wildfire potential, and more. Within urban areas (settlements), the tool uses a statewide estimate of net sequestration, based on the same data used for urban trees in the ICLEI LEARN tool. Within forest lands, the tool uses USDA Forest Service Inventory and Analysis (FIA) survey data combined with NLCD data for forest canopy cover.

i-Tree estimates approximately 12 million tons of carbon stored in forest land in Thurston County, though this estimate only includes aboveground sources. The analysis estimates that forest land in Thurston County annually sequesters a net 588,800 tons of carbon dioxide equivalent (MTCO₂e/year). The tool estimates the value of carbon storage and sequestration at \$188/metric ton of carbon, using values from the Interagency Working Group.

A comparison of the three studies discussed above shows there is variation in their estimates of how much trees and forest areas sequester in the Thurston region. ICLEI's LEARN tool generates the highest estimates among the three, but also most closely follows international guidance for greenhouse gas inventory estimates.

		Tools & Assessments			
	Unit	ICLEI LEARN [*]	WA Forest Carbon Inventory ⁺	iTree-Landscape [#]	
Period		2006-2016	2007-2016	2011	
Canopy/Forest Land	Acre	238,175	234,000	235,852	
Carbon Storage	ton C	n/a	27,300,000	11,790,336	
Baseline Annual CO ₂ Equivalent Sequestration	MTCO₂e/year	926,860	541,800	588,340	
Sequestration Rate	MTCO ₂ e/acre- year	4.1-5.88	2.27	2.49	
Comparison		 Based on national land cover estimates Estimates change between two years Includes rural and urban areas Includes land conversion Does not estimate carbon storage 	 Based on local tree plot survey data sampled over a 10-year interval Includes only rural forest areas Does not include land conversion at county scale (though data may be available) Estimates above and belowground carbon storage 	 Based on national land cover estimates Provides a point-in-time estimate, rather than change in land cover between two years Includes rural and urban areas Does not include land conversion Only includes aboveground carbon storage 	

Table 8. Comparison of forest sequestration assessment tools for Thurston County, w	Table	8. C	omparison	of 1	forest s	equestration	assessment tool	s for	[.] Thurston	County,	WA
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Notes – initial estimates were generated or reviewed in December 2021. ICLEI LEARN tool estimates were updated in December 2022 to reflect updates to the tool.

* ICLEI Land Emissions and Removal Navigator (LEARN): https://icleiusa.org/tools/learn/

+ Washington Forest Carbon Inventory, Christensen et al., 2020

i-Tree Landscape: https://landscape.itreetools.org/

5.2 Agriculture

Agricultural lands can be either a net source or sink of emissions, depending on land management practices (EPA 2021). Currently, no tool provides the same level of geographically specific baseline estimates of greenhouse gas emissions and removals for cropland, as ICLEI's LEARN tool provides for forestland, though this tool may provide support for this category in the future. Additional information is needed to develop estimates relevant to TCMP sequestration strategies using ICLEI's protocol, including:

- What land base (acreage) should be used for assessing agricultural land?
- What soil types characterize these areas (organic or mineral)?
- What is the area of various management practices?
 - o Crop types and acreages, to provide estimates of biomass and dead organic matter
 - Mineral Nitrogen fertilizer application
 - o Manure amendment
 - Tillage practices
 - Cover crop management

The 2017 USDA Census of Agriculture estimated that in 2017, Thurston County had 62,250 acres of farmland, of which, 22,109 was classified as cropland (growing a crop for harvest). It also includes information on the extent of a few types of management practices relevant to the TCMP, including acres of crop types, acres of fertilizer application, and acres of a few regenerative practices, including no-till and cover cropping. This information was used to develop the sequestration estimates in the scenario used for the TCMP. The Census also includes information on the number of farms that use other regenerative practices, but does not provide acreage (alley cropping, silviculture). The next Census of Agriculture is scheduled for release in 2024.

The Voluntary Reporting Carbon Management Tools developed by the USDA NRCS (COMET-FARM and COMET-PLANNER) estimate carbon sequestration and greenhouse gas emission reductions associated with different conservation practices for cropland, pasture, rangeland, orchards, and agroforestry.

Practice	2017 Acres*	Sequestration Rate	2017 GHG Reductions**			
		(MTCO ₂ e/acre-year)	(MTCO ₂ e/year)			
No-till† (CPS 329) 403 0.23 94						
Cover Crop+ (CPS 340) 416 0.15 61						
TOTAL 155						
Notes:						
* Source: USDA 2017 Census of Agriculture; acreages are not totaled since they may overlap.						
https://quickstats.nass.usda.gov/						

Table 9. Carbon sequestration from existing agricultural activities, using USDA's COMET-PLANNER tool

<u>https://quickstats.nass.usda.gov/</u> ** Source: NRCS COMET-PLANNER; all estimates were generated in December 2021 using the highest

estimates for each practice category. <u>http://comet-planner.com/</u>

† Intensive till to no till or strip till on irrigated cropland

+ Add legume seasonal cover crop (with 50% Fertilizer N Reduction) to irrigated cropland

This estimate could be used as a rough baseline for the carbon sequestration provided by existing regenerative agricultural practices in Thurston County, but it is limited in scope and not comparable or consistent with the land use change protocol used for greenhouse gas inventories, such as described above for forests. It does not include any estimates for carbon flux on land using regenerative agriculture practices other than no till and cover cropping, and does not consider the carbon flux and storage of other agricultural lands. Additional information is needed to understand how to best use this data to develop a more complete baseline estimate, especially where different management practices (and data sources) overlap. Research underway at Washington State University Extension could contribute to improved estimates.

5.3 Prairies

In general, established grasslands sequester more carbon than croplands and much more than settlement areas (though less than forest lands), so understanding the contribution of this land category is critical to understanding the sequestration of existing land use in Thurston County.

Currently, there is no tool that provides geographically specific estimates for greenhouse gas emissions and removals for grasslands, as ICLEI's LEARN tool provides for forestland. In addition, Thurston County's definition of prairies does not coincide with the definition typically used for grasslands in developing an estimate of carbon sources and sinks. Prairie areas in Thurston County include dry, upland areas with well-drained gravelly soils and wet, clay-rich outwash areas; they may have little tree cover or include oak woodland habitat. Prairie areas can coexist with some agricultural uses, and often require active management, such as regular burning, to maintain native species. Additional data on prairie land cover and spatial information on management approaches is needed to develop estimates relevant to the TCMP sequestration strategies using ICLEI's protocol, including:

- What land base (acreage) should be used for assessing grasslands and prairies?
- What subcategories define grasslands, such as shrublands, and pasture? Different types of grassland will have different estimates of aboveground and belowground biomass.
- What is the area of different disturbances, such as managed fire?
- What is the area of different management practices?

6. Future Sequestration Potential

The TCMP sequestration target (380,000 MTCO₂e/year) relied on roughly estimated benefits of just two actions, with a very heavy reliance on reforestation/afforestation (376,300 MTCO₂e/year) and a lesser focus on expansion of regenerative agriculture practices (3,300 MTCO₂e/year). One goal of this white paper was to gather information that can provide a more nuanced picture of sequestration potential that includes a wider range of actions.

A study by a team from The Nature Conservancy and University of Washington (Robertson et. al. 2021) quantified potential emissions reductions from natural climate solutions in Washington state at the county scale. Looking out 30 years at three levels of implementation intensity, they estimated the strategies considered could reduce annual emissions in Thurston County by between 0.31 and 0.2 million metric tons of CO₂ equivalent. The study modeled several strategies similar to those highlighted in the TCMP, including regenerative agricultural practices, replanting trees along riparian areas, and prairie conservation and preservation. The authors estimated these practices could contribute substantial, but relatively small annual offsets – not sufficient to meet the TCMP sequestration target.

Greater reductions were predicted for three strategies not evaluated for the TCMP: extending harvest rotations, avoiding conversion of existing forestland, and restoring tidal wetlands. Collectively, even the most ambitious scenario does not estimate enough sequestration to meet the TCMP target.

Table 10. Estimated Emissions Reductions from Natural Climate Solutions, Thurston County. Adapted from Robertson et. al., 2021

	Estimated Emissions Reductions by		
	Scenario		
	(MTCO ₂ e/year in year 30)		
Natural Climate Solutions	Ambitious	Moderate	Limited
TCMP Sequestration Strategies			
Regenerative agricultural practices (cover crop	-5,129	-2,435	-340
application, no-till, and nutrient management)			
Riparian reforestation	-6,881	-1,789	-166
Restoration and avoided conversion of grassland	-14	-14	-1
Other Strategies			
Extended timber harvest	-171,177	-117,598	-172,665
Avoided conversion of forests to urban development	-114,373	-56,491	-11,310
Tidal wetland restoration	-12,544	-8,622	-4,302
TOTAL	-310,117	-186,948	-188,784

6.1 Forests and Trees

Natural Climate Solutions

One measure assessed by Robertson et al. (2021) focuses on reforesting riparian areas. This moderate approach increases the amount of area restored to approximately 40 acres per year and could result in additional sequestration of around 1,800 MTCO₂e/year by 2050. A more ambitious effort that would ramp up to restoring around 200 acres annually would sequester an additional 6,900 MTCO₂e/year by 2050. Neither estimate would be sufficient to meet the sequestration target in the TCMP, and both are based on more conservative sequestration rates than used in the TCMP's scenario analysis.

An additional strategy not included in the TCMP—extended timber harvests—could have substantial sequestration potential. Most timberlands in Washington State are harvested after 30-40-years. Deferring harvests to 70-80 years allows substantial additional carbon to be stored in trees. This strategy also can have co-benefits like improved habitat, and improved water and soil quality. The study estimated that a moderate increase in extended harvest times¹ could result in additional sequestration of 117,600 MTCO₂e/year in Thurston County. A more ambitious approach² could result in greater reductions (Robertson et. al, 2021). In combination with other strategies, extended harvest times could make the TCMP sequestration target more feasible. Extending timber harvests could affect the amount of timber excise taxes collected and distributed to counties and the state General Fund.

¹ Moderate scenario assumes extended timber harvest applied on 30 percent of private lands, 15 percent of state lands, and 75 percent of federal lands.

² Ambitious scenario assumes extended timber harvest applied on 40 percent of private lands, 32 percent of state lands, and 100 percent of federal lands.

Robertson et al., also propose that avoiding conversion of forests to urban and rural development could have substantial carbon storage benefits (11,310-114,373 MTCO₂e/year). Avoiding forest conversion will not increase the rate of carbon sequestration, but can help maintain the region's existing carbon storage. The researchers assumed the rate of conversions from forest to developed area will be the same over the next 30 years as it was between 1994 and 2013 (equivalent to a loss of approximately 1,280 acres over a decade or 3,800 acres over 30 years). This baseline is likely high, and the authors acknowledge that, "recent analysis by the Washington Department of Fish & Wildlife and the Puget Sound Partnership found that conversion of forest cover loss to development has declined considerably and continuously in the region since 1991.... If the existing declining trend in forest conversion in Washington State, though the net emissions reductions would likely still occur with or without implementing NCS under our scenarios."

TRPC's population forecast model suggests that under current regulations, a greater proportion of future development in our region will locate in areas that are already developed. Under those regulations, TRPC estimates that future development will result in a loss of about 1,000 acres of forest cover countywide by 2030 and 2,100 acres of forest cover by 2045 (TRPC 2021). This outcome corresponds most closely with the Limited scenario. Concentrating a higher proportion of new development in urban areas and within urban centers and corridors, as proposed in the T1 actions of the TCMP, could reduce the loss of forest cover by 800 acres by 2050.³ This estimate is most closely represented by the Moderate scenario.

Reforestation Hub

The Reforestation Hub, developed by The Nature Conservancy and American Forests, maps reforestation opportunities across the United States (Cook-Patton et al., 2020). The analysis identifies areas of opportunity that historically had more than 25 percent tree cover, but currently have less. It excludes many areas where reforestation may be unpractical or undesirable, such as urban cores, along major roads, wetlands, native prairies, and productive croplands, and focuses on areas adjacent to streams (riparian areas), within floodplains, and along migratory bird corridors. The analysis identified just under 54,000 acres of land in Thurston County with reforestation potential, which, if restored, could sequester an estimated 119,000 MTCO₂e/year. This estimate falls short of the sequestration target for afforestation and reforestation in the TCMP. Though the study identifies a greater amount of potential land than needed in the plan, it uses a much more conservative sequestration rate of 2.2 MTCO₂e/acre-year. Most land identified (95 percent) is in private ownership, and the most likely land types are pasture, urban open space (mostly lawn areas), and floodplains.

This acreage estimate is likely a high mark of how much reforestation is possible in Thurston County, and would require a planting effort of nearly 2,000 acres per year. The authors caution that an understanding of site-specific needs is essential to determine the best options at any given location and maximize sequestration potential.

³ Estimates of future forest cover used TRPC's land capacity model and population and employment forecast. See TRPC 2021.

Table 11. Reforestation Opportunities in Thurston County. Source: Reforestation Hub, Cook-Patton et al., 2020

	Acres with Reforestation Opportunity	Sequestration Potential (MTCO2e/year)
Total opportunity	53,955	118,816
Land Type*		
Pasture	28,817	63,509
Urban Open Space	21,854	48,207
Floodplains	11,337	24,964
Corridors	3,494	7,710
Postburn	1,428	3,114
Streamside/Riparian	1,152	2,536
Grassland	766	1,607
Shrub	672	1,452
Forest	376	816
Challenging Cropland	235	513

* Note that the total opportunity is less than the sum of individual land types listed, as some land type categories overlap.

The study also looked at cost-effectiveness of reforestation, and estimated that the restoration of forest cover across the United States can cost less than \$50/tCO₂, not including any potential timber or carbon revenue. In urban areas, where trees provide additional benefits including mitigation of heat islands, pollution reduction, and improved human health outcomes, the study estimates that every dollar spent on urban tree planting and maintenance delivers \$5.82 in benefits (Cook-Patton et al., 2020).



Figure 5. Reforestation potential in Thurston County. Source: The Nature Conservancy (Cook-Patton et al., 2020)

6.2 Agriculture

Robertson et al. (2021) suggests a moderate approach to applying regenerative agriculture practices could sequester an additional 2,000 MTCO₂e/year, while a more ambitious approach could offset emissions by 5,000 MTCO₂e/year (Robertson et. al, 2021). This scenario is limited to the same categories of regenerative agriculture practices assessed for the TCMP – no-till management, cover cropping, and nutrient management.

NRCS COMET-PLANNER and Washington Climate Smart Estimator

As noted above, NRCS's COMET-PLANNER tool develops generalized estimates of the greenhouse gas impacts from conservation practices. The Washington Climate Smart Estimator, a new application developed by the Washington State Department of Agriculture, uses the same NRCS information to estimate greenhouse gas emission reduction potentials from different conservation practices across Washington State.

Sequestration rates vary greatly among different agriculture practices, depending on many conditions, including the intensity of the change and whether the land is irrigated. The practices with the greatest sequestration potential focus on planting trees and shrubs, including in hedgerows and buffers, though some of the practices identified may overlap with reforestation strategies considered on other lands.

Most provide higher rates of greenhouse gas reductions than the 0.14 tCO2/acre-year used in developing agricultural sequestration estimates for the TCMP.

Table 12. Comparison of average sequestration rates of different regenerative agriculture practices.

	Average sequestration rate
Regenerative Agriculture Practices	(MTCO ₂ e/acre-year)
Cropland Management	0.29
Conservation Crop Rotation	0.22
Cover Crop	0.08
Mulching	0.32
Residue and Tillage Management	0.14
Stripcropping	0.24
Forage and Biomass Planting	0.84
Vegetative Barriers (Conservation Cover/Contour Buffer Strips/Field	
Border/Filter Strip/Herbaceous wind barriers/riparian herbaceous cover)	0.46
Grazing Lands	0.19
Prescribed grazing	0.03
Range planting	0.50
Restoration of Disturbed Land	2.05
Critical area planting/Riparian restoration	2.05
Woody Planting	5.43
Hedgerow Planting	4.72
Riparian Forest Buffer	5.89
Tree/shrub establishment	5.23
Windbreak/Shelterbreak Establishment	6.93
Windbreak/Shelterbreak Renovation	0.40
Average sequestration rate of all practices	1.95

Source: Washington Climate Smart Estimator; excludes strategies related to nutrient management, reduced use of fertilizer, and increased efficiency of farm equipment which are covered under non-sequestration strategies of the TCMP.

The TCMP set a target that 30 percent of cropland would be managed with regenerative agriculture practices by 2050 (6,600 acres). This review suggests that the estimate created in the scenario analysis underestimates sequestration potential from this sector. Additional conservation practices are likely to have higher rates of sequestration than that used in the initial analysis, and these practices could be applied on more land area.

An alternative target, presented in Table 12, creates a scenario where 30 percent of cropland is managed with a range of relevant regenerative practices, 30 percent of rangeland (pasture and grazing areas) are managed with a range of relevant regenerative practices, and 2.5 percent of cropland (1 acre per 80 acres) is converted or restored to woody plantings. This scenario would generate a sequestration target close to 7,000 MTCO₂e/year.

	Acres	Sequestration Rate (MTCO2e/acre-year)	Sequestration Potential (MTCO₂e/year)
Cropland Management	6,600*	0.29	1,910
Grazing Lands	11,000**	0.19	2,090
Woody Planting	550†	5.43	2,990
TOTAL			6,990

Table 13. Alternative Target Estimate of Sequestration Potential from Regenerative Agriculture Practices

Notes:

* 30 percent of USDA 2017 Cropland

** 30 percent of NOAA C-CAP 2016 Land Cover, Pasture/Hay (36,785 acres)

+ 2.5 percent of USDA 2017 Cropland, based on guidance of Monette and Hobbs (2020).

6.3 Prairies

CARB Grassland Conservation and Restoration Benefit Tool

Though there is an extensive and growing body of research on the carbon storage potential of grassland areas, little of this research has been focused on the prairie ecosystem specific to the South Puget Sound. Carbon sequestration may be increased through two general strategies: reducing conversion of grasslands to other land uses (such as agriculture or settlement) and restoring grassland areas. Gains in sequestration vary based on soil and vegetation type as well as management practices (grazing, irrigation, etc.) – as with reforestation efforts, gains in sequestration continue to accumulate and may increase over time as underground root systems develop (Diaz et al. 2014). Active restoration of sites, with a focus on creating a greater diversity of species, can significantly increase carbon storage over time (Yang 2019).

Under Thurston County's approved Habitat Conservation Plan, nearly 3,500 acres of prairie land will need to be managed to mitigate for projected impacts from future development on listed species over the next 30 years. These activities include enhancing existing reserve areas, establishing new reserves, and securing working land easements in areas that overlap with agricultural activities. Conservation and restoration also will be included in the Bush Prairie Habitat Conservation Plan under development for land within the Tumwater Urban Growth Area.

As part of California's cap-and-trade program, the California Air Resources Board (CARB) has developed guidance for quantifying greenhouse gas emission reductions from land restoration projects, including grasslands. Using the Grassland module of the Land Restoration Benefits Calculator Tool, TRPC staff developed a rough estimate of the carbon sequestration potential of the land proposed to be conserved and restored through the draft Thurston County HCP. This estimate includes a range of soil types, but does not account for the additional sources, sinks, and reservoirs associated with these improvement types, such as reduced fertilizer application or increased managed burning. In addition, the tool is designed for application to a temperate dry climate, rather than the cooler, moister conditions of Thurston County. With these caveats, the analysis provides a starting place for estimating the role that
prairie restoration could play in achieving the emission reduction targets of the TCMP. These estimates are substantially greater than those proposed in the analysis by Robertson et al. (2021).

Table 14. Sequestration potential of conserved and restored prairie habitat proposed through the draft ThurstonHabitat Conservation Plan using California Grassland Restoration Tool

HCP Conservation Objective	Acres*	Improvement Type and Sequestration Rate (MTCO2e/acre-year)**	Sequestration Potential (MTCO2e/year) **
New Reserves – Acquire, from willing sellers, new reserves to secure, stabilize, and expand species strongholds, while also building the framework for covered species recovery. Habitat on each permanently protected parcel will be enhanced and funded for long-term management.	2,698	 Convert from severely degraded grasslands (0.33- 1.11) Restore to improved grassland (0.12-0.40) 	1,220-4,080
Working Lands Easements – Secure permanent Working Lands Easements, via Conservation Easements with willing landowners, to conserve, stabilize, and expand species distributions, and demonstrate land uses compatible with Covered Species. Habitat on each permanently protected parcel will be maintained with funding for long-term management.	433	 Convert from farmland (0.33-1.11) Restore to improved grassland (0.12-0.40) 	180-590
Enhance Existing Preserves - Enhance the habitat for covered species populations at existing, protected preserves with current or historical populations of the Covered Species.	339	 Convert from moderately degraded grasslands (-2.28 0.15) Restore to improved grassland (0.12-0.40) 	30-90
TOTAL	3,469		1,420-4,760

Sources:

* Draft Thurston County Habitat Conservation Plan, Table 7.7

** California Air Resources Board (CARB) Benefits Calculator Tool, Grassland. Results are rounded to the nearest ten. The range reflects results for two soil types common in Thurston County prairie areas covered by the Thurston County HCP: Nisqually (Inceptisol) and Spanaway (Andisol).

7. Conclusions and Opportunities

This analysis used publicly available data and tools to develop a partial response to two questions posed in the development of the TCMP: how much do existing land types in Thurston County sequester carbon, and how much could certain land uses sequester in the future? The results of this review are summarized in Table 15 and in the conclusions below.

Table 15.Summary of sources reviewed to show the range of baseline carbon sequestration from existing land covers in Thurston County.

	Existing Annual GHG Sequestration (MTCO2e/year)			
	Low	High		
Forests	541,800*	926,900†		
Agriculture	155‡	Additional information needed		
Prairies	Additional	information needed		
Sources: * Washington Forest Carbon Inventory; + ICLEI LEARN tool; + NRCS COMET-PLANNER				

Table 16. Summary of sources reviewed to show the range of carbon sequestration potential from climate mitigation strategies in the Thurston region.

	Estimated Sequestration Potential (MTCO2e/year)	
Sequestration Strategies	Low	High
Sequestration actions included in the TCMP		
Regenerative agriculture (A2.1)	340*	6,990‡
Reforestation/afforestation (A5.1)	170*	118,820†
Prairie preservation (A7.3)	1*	4,760 [§]
Other sequestration actions		
Extended timber harvest	117,600*	171,180*
Tidal wetland restoration	4,300*	12,540*
SUBTOTAL	122,411	314,290
Actions that maintain sequestration capacity		
Avoided conversion of forests°	11,310*	56,490*

Sources – see Appendix B for additional detail:

* Robertson et al. (2021). Note that this analysis does not distinguish between activities occurring in urban versus rural areas. Most forested areas (93%) are in rural portions of Thurston County.

† Reforestation Hub

‡ NRCS COMET-PLANNER, Washington Climate Smart Estimator

[§] CARB Land Restoration Benefit Calculator Tool

[°] Avoiding forest conversion will not increase total sequestration in the region. It will only reduce future net emissions.

Sequestration from Existing Land Uses

- Additional information and analysis is needed to develop a comprehensive estimate of emissions from existing land uses in Thurston County. The IPCC and ICLEI provide guidance for evaluating greenhouse gas emissions and removals from land use and land use change (LULUC) as part of a greenhouse gas inventory, and such information would be useful for providing a more complete picture of emissions across Thurston County, including from changes among land use categories. A complete analysis is more complex than other sectors, and partners would need to fill information gaps on the land area of different management practices before including it in the Thurston County greenhouse gas inventory. The land use categories in this methodology do not match the definitions typically used in the region for other analyses, and could pose a communication challenge. Alternatively, the region could choose to assess changes only in land uses that are the focus of the TCMP (forests, agriculture, prairies), though such an approach would not provide as complete a picture of how trends like land conversion affect emissions over time. LEARN is the best tool currently available for this purpose although it only provides information on forest land and trees— additional information would be required to match the accuracy of other sectors. Because most land cover data is updated infrequently (5-10 years), this information would not be tracked annually.
- Forests and trees are a significant carbon sink in the Thurston region. There are approximately 230,000 acres of forested land across Thurston County this accounts for about half of Thurston County's land area. These areas store approximately 27 million tons of carbon, and annually sequester up to 927 thousand MTCO₂e–equivalent to about a third of the annual emissions of the Thurston region (2.9 million MTCO₂e).
- Rural areas are most important to carbon storage and sequestration; urban trees provided limited sequestration. The bulk of forested land cover is in the rural area (93 percent), including two-thirds of all evergreen forest area. This means most sequestration (93 percent) comes from rural areas—trees within developed areas contribute a relatively small proportion to countywide sequestration (7 percent).
- Timberlands, areas managed for commercial harvest of trees, play a significant role in the region's sequestration picture. Most forested areas in Thurston County (60 percent) are managed as commercial timberlands. Most timberlands in Thurston County are in private ownership (73 percent), rather than public (local, state, or federal). Areas in private ownership that are managed for timber harvest tend to have the youngest trees among forested lands, with most stands less than 40 years old.
- Reforestation is happening, but not at a pace to outweigh the loss of sequestration capacity from conversion of forested areas. Between 2006 and 2016, Thurston County gained more forest cover than it lost however, emissions from converted forest land are greater than the sequestration benefit provided by the reforested land. Most of this forest land conversion is occurring in rural areas of the county, rather than urban areas. Some of this change may be attributable to commercial timber harvest patterns, where the loss is not permanent, or to differences in methodology. Additional review of ICLEI's methodology could help reduce this uncertainty and better identify trends.
- Additional information is needed to assess the sequestration provided by existing management of agricultural and prairie lands. Information available on the extent of some regenerative agriculture practices suggest these existing practices annually sequester 155 MTCO₂e, but this estimate provides a very limited picture. TCMP entities could work with other regional partners, like Thurston

Conservation District and WSU Extension, to gather more specific relevant information, or could wait for the development of better information through ICLEI or the state.

Sequestration Potential

- The sequestration target set in the TCMP is highly ambitious, and likely infeasible with the actions *currently included in the plan.* The TCMP sequestration target (380,000 MTCO₂e/year) relied on the estimated benefits of just two actions, with a very heavy dependence on reforestation/afforestation (375,000 MTCO₂e/year) and a lesser focus on expansion of regenerative agriculture practices (3,300 $MTCO_2e/year$). It did not include an estimate of a future baseline that accounts for how changes in land use might reduce sequestration provided by forests and other ecosystems. Nor did it estimate how strategies and actions included in the plan might help maintain that sequestration capacity, such as avoided conversion of forest land through more concentrated growth in urban areas (T1), preservation of existing tree canopy in urban areas (A6.5 and A6.9) or preservation of prairie areas (A7.3). The information reviewed for this report suggests that the reforestation sequestration rate used in the TCMP scenario analysis, though based on local data, is higher than that used in most other assessments. By contrast, the regenerative agriculture sequestration rate that was used for the scenario analysis is lower than suggested by a review of rates for Washington State, and was applied to a smaller land base than might be feasible. With these adjustments, and the addition of several actions discussed below, the sequestration potential ranges from 122,411-314,290 $MTCO_2e/year$, still below the TCMP sequestration target. Achieving even these levels of sequestration would require extensive investment of resources into sequestration actions and significant changes to development patterns and land use practices. Alternatively, the TCMP partners could consider adjusting the sequestration target to a lower amount and increasing targets for reducing emissions from other sectors to close the gap.
- Forest and tree strategies provide the greatest sequestration potential, but TCMP partners should continue to evaluate what level of effort is practically feasible. Depending on how extensively they are implemented, avoiding forest conversion, restoring forest areas, and extending timber harvest rotations have the potential to sequester between 130,000-406,000 MTCO₂e/year. The high estimates for this sector likely push the limits of credible feasibility, because they come at the cost of avoiding all conversion of forestland, dramatically changing forest practices, and planting trees on large areas of urban open space and agricultural lands. Adopting a more moderate approach would increase the likelihood of success, but would make it challenging to reach the current sequestration target, and would require that other TCMP targets be revisited to further reduce emissions.
- Future updates to the TCMP should include refining actions focused on avoiding loss of forest areas and adding actions focused on extending timber harvest rotations, in addition to setting a more feasible reforestation target. Several actions in the TCMP reduce loss of forest areas (T1 actions, A6.5, A6.9), but these mostly focus development patterns and tree cover in urban areas; actions should also look for ways to reduce loss of forest in rural areas, which have the bulk of forested land and are seeing the highest rate of forest land conversion. Extending the length of timber harvest rotations was included as an idea on the long list of actions considered for the TCMP (A5.3), but was not ranked as a priority. With a better understanding of the potential sequestration benefit, it may be worthwhile to revisit this action and add it to the priority list. Reforestation efforts could focus initially on restoring degraded riparian and floodplain areas to provide the broadest community benefit, as well as working with rural landowners, where the largest opportunities are available.

- Applying a wider range of regenerative agriculture practices to a broader land area could increase the sequestration benefit of this strategy. Expanding the application of regenerative agriculture practices (Action A2.1), including through cropland management, on grazing lands, and with woody plantings could increase sequestration in the Thurston region by nearly 7,000 MTCO₂e/year. Future work may also want to consider the sequestration benefit of limiting conversion of farmland to other uses.
- Restoring prairie habitat can be a substantial source of carbon sequestration. Completing the conservation activities identified in Thurston County's Habitat Conservation Plan could increase sequestration by nearly 5,000 MTCO₂e/year, and additional work in the region could add to this potential. Action A7.3 of the TCMP calls for aggressive implementation of local plans to support federally listed endangered and threatened prairie species.
- Opportunities for sequestration through forests, agriculture, and prairies overlap, and it will be important to define how these different approaches should be combined and prioritized. For example, some areas with reforestation potential are currently managed as agriculture or may have the potential for prairie restoration. Should the highest priority be for reforestation—which would result in the most sequestration—or should the sequestration target be balanced with other community goals, like preservation of agricultural lands and prairie restoration? In other areas, combinations of reforestation, regenerative agriculture, and prairie conservation practices may be complementary on the same piece of land.
- Additional sequestration opportunities, especially restoration of marine areas, could help meet the sequestration target. According to one analysis, restoration of tidal areas in Thurston County could sequester between 4,000 and 13,000 MTCO₂e/year. An effort focused on this action could help close any gap created by reducing expectations for other strategies.

8. References

Birdsey, R, N. Harris, D. Lee, S. Ogle. (2019) U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, USCP Appendix J, Forest Land and Trees. <u>https://icleiusa.org/ghg-protocols/</u>

Birdsey, R, N. Harris. (2021) Methods for Calculation of Activity Data and Removal and Emission Factors for Community-scale Forest and Tree Greenhouse Gas Inventories. http://d1ps9kreypzu9a.cloudfront.net/GHGInventory/LEARN%20tool%20documentation.pdf

California Air Resources Board (CARB) (2020). Revised Quantification Methodology for Land Restoration. <u>https://ww2.arb.ca.gov/sites/default/files/auction-proceeds/landrestore QM 18-19 revised final.pdf</u> CARB Land Restoration Benefits Calculator Tool available for download: <u>https://ww2.arb.ca.gov/resources/documents/cci-guantification-benefits-and-reporting-materials</u>

Christensen, G, Gray, A, Kueger, O, & Siemann, D. (2020) Washington Forest Ecosystem Carbon Inventory: 2002-2016. U.S. Forest Service, Pacific Northwest Research Station, and Washington Department of Natural Resources.

https://www.dnr.wa.gov/publications/em_wa_carbon_inventory_final_111220.pdf

Cook-Patton, S.C., T. Gopalakrishna, A. Daigneault, S.M. Leavitt, J. Platt, S.M Scull, O. Amarjargal, P.W. Ellis, B.W. Griscom, J.L. McGuire, S.M. Yeo, and J.E. Fargione. (2020) Lower cost and more feasible options to restore forest cover in the contiguous United States for climate mitigation. One Earth 3, 739-752.

Diaz, D., B. Rashford, S. De Gryze, S. Zakreski, R. Dell, M. Niles. (2014) Evaluation of Avoided Grassland Conversion and Cropland Conversion to Grassland as Potential Carbon Offset Project Types. The Climate Trust. <u>https://climatetrust.org/wp-content/uploads/2014/07/Evaluation-of-Avoided-Grassland-</u> Conversion-and-Cropland-Conversion-to-Grassland-as-Potential-Carbon-Offset-Project-Types-.pdf

Environmental Protection Agency (EPA). (2021) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019. Most information used in this report comes from Chapter 6 – Land Use, Land Use Change, and Forestry. <u>https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2019</u>

Eve, M., D. Pape, M. Flugge, R. Steele, D. Man, M. Riley-Gilbert, and S. Biggar, (Eds), 2014. Quantifying Greenhouse Gas Fluxes in Agriculture and Forestry: Methods for Entity-Scale Inventory. Technical Bulletin Number 1939. Office of the Chief Economist, U.S. Department of Agriculture, Washington, DC. 606 pages. July 2014. https://www.usda.gov/sites/default/files/documents/USDATB1939_07072014.pdf

Gray, A. N., T. R. Whittier, and M. E. Harmon (2016) Carbon stocks and accumulation rates in Pacific Northwest forests: role of stand age, plant community, and productivity. Ecosphere 7(1):e01224. 10.1002/ecs2.1224. <u>https://www.fs.fed.us/pnw/pubs/journals/pnw_2016_gray001.pdf</u>

IPCC (2019) 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize S., Osako, A., Pyrozhenko, Y., Shermanau, P. and Federici, S. (eds). Published: IPCC, Switzerland. https://www.ipcc-nggip.iges.or.jp/public/2019rf/vol4.html

Monette, P, J. Hobbs. (2020) A guide to Hedgerows: Plantings that Enhance Biodiversity, Sustainability, and Functionality. Oregon State University.

https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em8721.pdf

Nowak, D. (2021) Understanding iTree: 2021 Summary of Programs and Methods. USDA Forest Service, General Technical Report NRS-200-2021. <u>https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs200-2021.pdf</u>

Palmer, M, Christensen, G, Kuegler, O. (2019) Washington's Forest Resources, 2007-2016: 10-Year Forest Inventory and Analysis Report. United States Department of Agriculture, General Technical Report PNW-GTR-976. <u>https://www.fs.fed.us/pnw/pubs/pnw_gtr976.pdf</u>

Siemann, D. (2020) Safeguarding Our Lands, Waters, and Communities: DNR's Plan for Climate Resilience. Washington State Department of Natural Resources. <u>https://www.dnr.wa.gov/publications/em_climaterresilienceplan_feb2020.pdf</u>

Thurston Regional Planning Council (TRPC). (2021) Thurston County Current and Future Basin Conditions Assessment. <u>https://www.trpc.org/DocumentCenter/View/8901/BasinConditionReport2021</u>. Note that for the estimates of future forest cover used in this report, TRPC re-ran the land capacity model using the under the Sustainable Thurston land use alternative developed for the 2021 Buildable Lands Report for Thurston County: <u>https://www.trpc.org/DocumentCenter/View/8542/2021-Buildable-Lands-Report-2021-08-22?bidld=</u>

U.S. Department of Agriculture, Forest Service (USDA) (2021) Pacific Northwest Research Station, Forest Inventory and Analysis Database (PNW-FIADB). Version 2019. Portland, OR: <u>https://www.fs.usda.gov/pnw/tools/pnw-fiadb-forest-inventory-and-analysis-databases</u> (Accessed 8 December 2021).

Yang, Y., Tilman, D., Furey, G. et al. (2019) Soil carbon sequestration accelerated by restoration of grassland biodiversity. Nat Commun 10, 718. https://doi.org/10.1038/s41467-019-08636-w

Appendix B

Stakeholder Interview Summary

Overview

As part of the development of the carbon sequestration white paper, Thurston Regional Planning Council (TRPC) staff conducted a series of interviews with community stakeholders to gain a better understanding about local opportunities and concerns around the carbon sequestration targets and actions in the Thurston Climate Mitigation Plan. Interviews were held with representatives from the following organizations: Thurston Conservation District, Capitol Land Trust, South of the Sound Community Farmland Trust, WSU Extension (Forestry), Thurston Climate Action Team, City of Lacey, and City of Olympia. Interview subjects were asked versions of the following questions:

- Do you have a vision for what carbon sequestration should look like in Thurston County? What is needed to accomplish that vision?
- How do you see the role of regenerative agriculture practices, reforestation, and habitat preservation balancing in a carbon sequestration program?
- What role do you see (your organization) having in a regional carbon sequestration plan going forward?
- Who do you think is best positioned to oversee a carbon sequestration program? Ex: local organizations, city governments, conservation district, county jurisdictions, etc.?
- What concerns do you have about a carbon sequestration program?

Interview responses are summarized in the table below.

Carbon Sequestration as a Climate Mitigation Strategy for the Thurston Region Appendix B: Stakeholder Interview Summary

Stakeholder	Vision/Ideas for Carbon Sequestration	Role	Leading Administrator	Concerns
Thurston Conservation District	Includes technical and financial support and incentives for a variety of programs to support regenerative agriculture, forest management planning, and conservation grazing. Takes a multi-scale approach that focuses on voluntary participation and that is accessible to all Encourages innovation through site- specific plans. Emphasis on soil health. Regulatory reform to remove barriers for regenerative agriculture. Mentorship opportunities to support the next generation of farmers	 Partner: Education on link between carbon sequestration and land management Support leading entity 	Non-regulatory, regional, and neutral entity Partnership of multiple entities with all stakeholders included: agricultural community	All forms of carbon sequestration must be incorporated. Involvement of all stakeholders and entities in the process.
Capitol Land Trust	Focuses on trees and agriculture, including increased urban tree canopy. Regional in scale, or possibly state scale. Collaborates with the Department of Natural Resources and Capitol State Forest. Incentive program to promote regenerative agriculture	 Participant: Collaborate with individual landowners to preserve parcels Outreach Interest in a regional credit program 	Should be broad - County State (Ecology, Agriculture, DNR) Conservation District	Balance the need for residential development with habitat preservation Conflict between land demands for sequestering carbon through agriculture, prairies, and trees. Concerned about pressure to plant trees on sensitive prairie areas.

Carbon Sequestration as a Climate Mitigation Strategy for the Thurston Region

Appendix B: Stakeholder Interview Summary

Stakeholder	Vision/Ideas for Carbon Sequestration	Role	Leading Administrator	Concerns
	Program to support habitat maintenance work. There are resources available for tree planting, but few resources available for maintenance. Prairie preservation has a high management requirement.			Lack of interest among private landowners/managers Ongoing maintenance requirements
South of the Sound Community Farmland Trust	All landowners participate, all sizes of property Create a baseline for amount of carbon already sequestered through agriculture, forests, and prairies. Includes strategy for preserving farmland and accounting for loss of sequestration potential through conversion to development Should be coordinated with the Voluntary Stewardship Program (VSP)	 Participant: Collaborate with individual landowners to preserve agricultural land Outreach to support regenerative agriculture 	Conservation District	Concern about accounting for sequestration already occurring. Defining regenerative agriculture practices Regenerative agriculture practices can increase the amount of Nitrous Oxide released Preserving existing agricultural land
WSU Forestry Extension	Prioritize afforestation and incorporate agroforestry Complete a coordinated research effort and outreach campaign on agroforestry in the region for small landowners	 Participant: Outreach and Education: Demonstration Sites 	Conservation District WSU Extension Department of Natural Resources	Difficulty of facilitating a flexible and voluntary program while also maximizing potential Financial cost of programs and required staff time More land use needs than available land.

Carbon Sequestration as a Climate Mitigation Strategy for the Thurston Region

Appendix B: Stakeholder Interview Summary

Stakeholder	Vision/Ideas for Carbon Sequestration	Role	Leading Administrator	Concerns
	Cost-sharing program for small landowners participating in outreach campaign.			
	Planting trees is more easily implemented than protecting existing trees or preserving habitat for immediate action.			
Thurston Climate Action Team (TCAT)	Tree protection and policies across jurisdiction and coordination to identify areas to plant. Regenerative agriculture education campaign. Restrictions on commercial forestry including requiring longer rotations and managed thinning. Point system to account for and protect trees during development	Oversight: Minimal active role Outreach and Education Support 	Regulatory Entity	Allowing large-scale industries/operations to pollute. Development threatening existing trees.

Carbon Sequestration as a Climate Mitigation Strategy for the Thurston Region Appendix B: Stakeholder Interview Summary

Stakeholder	Vision/Ideas for Carbon Sequestration	Role	Leading Administrator	Concerns
City of Lacey	Incorporate local codes and jurisdictional requirements into the program. Regional tree policies and standards around measuring Combine tree canopy and urban density goals to protect open spaces.	Enforcement and Implementation	County Jurisdictional application and enforcement	Focus on carbon sequestration will reduce action on carbon reduction Flexibility in a carbon sequestration program to identify opportunities and not limit planning efforts. Feasibility of the carbon sequestration goal in the TCMP
City of Olympia	Countywide approach to tree codes to create a more consistent approach that also supports existing local programs County policy reducing tree removal Supports longer-lived and larger trees for urban tree canopy Created incentives for increased rotation of timber harvest Incorporate potential for blue carbon. Transfer of Development Rights program	Enforcement and Implementation	Unified Effort TRPC County	Double counting - If carbon credits are purchased can they also be counted in a regional sequestration program? Need a clear distinction between the role of individual trees in urban areas and the shade, cooling, health, etc., benefits vs carbon sequestration benefit

Appendix C

Existing Community Resources and Programs

Existing Resources to Support a Carbon Sequestration Program

While new resources and programs are necessary to meet the carbon sequestration goals outlined in the TCMP, existing federal, state, and local resources may help support the development of a carbon sequestration program.

Key to Program Application

	Program applies to agriculture.
	Program applies to trees and/or forests.
883	Program applies to prairies.

Federal			
US Department of Agriculture			
 The Natural Resources Conservation Service (NRCS) administers several technical and financial assistance programs, including: The Healthy Forests Reserve Program (HFRP) provides financial assistance to landowners to restore and protect forestland on private and tribal lands. This program provides easements with 30-year contracts and ten-year cost-share agreements to promote the recovery of endangered species, improve biodiversity, and enhance carbon sequestration (USDA). 		Х	
 The Environmental Quality Incentives Program (EQIP) provides financial and technical assistance to agricultural producers and forest managers to address environmental concerns and improve environmental health. The program aims to support 	х	х	

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historically underserved participants with advanced payments			
to offset the costs of purchasing materials and contracting			
services. In 2021, the department offered a Climate-Smart			
Agriculture and Forestry EQIP Pilot program that emphasizes			
building soil health based on demand for climate-smart			
practices.			
 The Conservation Stewardship Program (CSP) provides 			
technical and financial assistance to implement and maintain			
conservation activities on land in agricultural production. In	v		
Washington State's program, CSP enhancements include	X		
many regenerative practices, including no-till, crop rotation,			
and cover cropping.			
The US Forest Service Community Forest Program is a competitive			
grant program that provides financial assistance to tribal entities, local			
governments, and gualified conservation non-profit organizations to		х	
acquire and establish community forests that provide community			
benefits.			
State			
Department of Natural Resources			
DNR manages over 2 million acres of forest trust land in Washington			
State, including more than 60,000 acres in Thurston County. The		v	
agency's recently completed Climate Resilience Plan (2020) and Forest		^	
Action Plan (2020) highlight the agency's shift toward incorporating			
carbon sequestration opportunities within its programs.			
- The Small Forest Landowner and Stewardship programs			
provide family forest owners with assistance to improve forest			
health, reduce vegetative fuels, support revenue generation,		Х	
enhance fish and wildlife habitat, and increase recreation			
opportunities.			
 The Urban and Community Forestry Program provides 			
technical, educational, and financial assistance to create urban			
and community forestry programs that preserve, plant, and		Х	
manage forests and trees for stormwater mitigation, public			
health benefits, and quality of life.			
 Launched in 2022, DNR's Carbon Project conserves areas of 			
state trust land previously intended for harvest in order to			
generate carbon offset credits. The funds from sale of the		Х	
credits will be used as a revenue stream to offset the loss of			
revenue from timber harvest.			

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 Washington State Conservation Commission The Washington State Conservation Commission administers the Voluntary Stewardship Program (VSP) and works to protect and enhance critical environmental habitat areas overlapping agricultural activities to better regulate conversion. The program is flexible and helps develop free site-specific individual stewardship plans for landowners based on Natural Resources Conservation Service (NRCS) procedures. Suggested practices of the VSP include cover cropping, exclusion fencing, and prescribed grazing. The Thurston Conservation District is the technical provider for the VSP program in Thurston County. 	x		
 The Sustainable Farms and Fields Program is a grant program established in 2020 to help farmers implement projects that increase carbon sequestration and reduce greenhouse gas emissions. Funding for the program has not yet been dedicated by the legislature. 	х		
Department of Ecology			
 The Climate Commitment Act, passed in 2021, tasked Ecology with setting a cap on greenhouse gas emissions from entities that emit more than 25,000 metric tons of carbon annually. The policy may help fund sequestration efforts if it allows carbon credits to be sold to participants in the program. The program will begin in January 2023, and the allowances will slowly decline over time, driving a potential market for offsets. 	х	х	X?
Local			
The Thurston Conservation District offers many kinds of technical assistance to local farms, including soil testing services, equipment rental, and assistance developing conservation plans.	х	х	
Washington State University – Thurston County Extension develops research and provides technical assistance to support the South Sound food system.	х	х	x
Thurston County 's Conservation Futures program uses a portion of local property taxes to acquire land for conservation purposes, including outright purchase and easements.	х	х	x
All four partner jurisdictions involved in the TCMP have urban tree management programs. ⁴		х	

⁴ See the Appendix for an outline and comparison of existing tree ordinances in Lacey, Olympia, and Tumwater.

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- Olympia has an Urban Forestry Manual (2016) that outlines			
tree protection, maintenance, and planting standards. The			
Urban Forestry Manual is updated annually.			
- Lacey has an Urban Forest Management Plan (2021) that			
outlines goals for tree canopy cover, protection, and planting.			
- Tumwater also has an Urban Forest Management Plan (2021)			
that focuses on community and urban forests, implementation			
plans, and monitoring techniques.			
 Thurston County's Urban Forest Data Development Report 			
(2011) analyzed existing tree canopy and highlights			
opportunities for future plans.			
Several local jurisdictions are developing Habitat Conservation Plans			
(HCPs) to allow development activity to proceed while protecting			
several federally listed threatened and endangered species, most			
associated with prairie habitat. Mitigation fees will help fund			
conservation and restoration of prairie lands as a means to protect			
viable population of the species covered by the plans. These projects			v
could also have carbon sequestration benefits.			^
- Thurston County's draft HCP estimates a need to mitigate more			
than 5,200 functional acres of prairie habitat over the next 30			
years.			
- Tumwater and the Port of Olympia are partnering to develop a			
Bush Prairie HCP.			
All four partner jurisdictions collect funding through Stormwater utility			
Fees that could potentially be directed to programs that also benefit		Х	
water quality and water flow.			
Thurston Waterways is a collaborative partnership among the South			
Sound Salmon Enhancement Group, Thurston Conservation District,		v	
and Thurston County to offer tools and resources to smaller, rural		^	
landowners for restoring riparian areas.			
A number of local nonprofits and community groups have existing			
expertise in land conservation and habitat restoration, including:			
- Capitol Land Trust			
 Center for Natural Lands Management 			
- Creekside Conservancy	Х	Х	Х
 Nisqually Land Trust 			
- Olympia Coalition for Ecosystems Preservation			
 South of the Sound Community Farmland Trust 			
- South Sound Salmon Enhancement Group			
The Thurston Climate Action Team is a nonprofit focused on unifying			
the community to address climate change. Their Tree Action Group	v	v	
meets once a month to promote tree planting and forest protection	Λ	^	
and develop a plan to protect mature trees. They also have a Food and			

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Agriculture Group focused on supporting a transition to regenerative		
agriculture.		

Urban Tree Management Plans and Policies

Lacey, Olympia, and Tumwater each have a series of tree ordinances and urban forestry plans to address the urban tree canopy. The tree ordinances for each city address tree removal, replacement, protection, and maintenance while the urban forestry plans highlight each city's goals and vision for the urban forest, plan for future action, and challenges in protecting the urban forest. Thurston County also has tree protection and forest preservation efforts, but this appendix focuses on city-level ordinances.

As the Thurston region grows in population and density, its urban trees will continue to face increasing pressure. The tree canopy faces competition with solar panels, views, utilities, transportation systems, and denser development (Seattle Urban Tree Plan, 2020). A one percent increase in the percent of the population living in urban areas corresponds with a .54 percent loss of forest cover in the city (Clement, Chi, & Ho, 2015). As the population in Lacey, Olympia, and Tumwater continues to grow, plans and policies ordinances to protect urban trees may need to be reviewed and updated to maintain and increase their effectiveness in supporting climate and other community goals.

While an estimate of urban tree carbon sequestration for the entire region is under development, Zarghami (2020) determined that Olympia street trees sequester roughly 210 tons (420,000 pounds) of atmospheric carbon dioxide in the above-soil and below-soil parts of trees. This estimate does not account for trees that die or decompose and carbon released during tree maintenance. As of 2020, Olympia's street tree forest stored more than 2,500 tons of carbon (5,023,314 pounds. Zarghami, 2020). From these estimates, the Northern red oak sequesters the most carbon (approximately 16.1 percent of total carbon stored). These estimates can provide guidance for the scale of sequestration possible in Thurston County's urban regions and the role that urban forestry plans and ordinances can have in a regional carbon sequestration program.

Urban Forestry Plans

Lacey

Lacey revised its Urban Forestry Plan in Fall 2021. The city planning commission, staff, and an ad hoc citizen task force prepared the plan as an element of Lacey's Comprehensive Plan after evaluating maps, aerial photos, Landsat photos, and the city transportation plan. The evaluation included interviews with city council members, discussions with Lacey Public Works staff, and an inventory of all private street trees. The updated plan recognizes the environmental, psychological, and economic benefits of urban trees and highlights the existing 28.3 percent canopy cover in city limits and 31.3 percent canopy cover in the Lacey Urban Growth Area.

Tumwater

The City of Tumwater also recently updated and approved its Urban Forestry Management Plan with a detailed zone-by-zone analysis of planting potential. Tumwater's plan builds on the city's 1996 Urban Forestry Plan and 2002 Comprehensive Street Tree Plan to provide recommendations for updating the Tumwater Municipal Code and guide improvement of the urban forest over the next twenty years. The city designed the report through a series of public meetings, inventories, and surveys. The Peninsula Environmental Group completed the inventories and assessments while city staff led public engagement on the plan. The assessment consolidates 23 land use designations into nine categories, and evaluates the potential for expanding the urban canopy in each zone. The existing canopy cover and 2040 canopy cover goal for each zone is outlined in the chart below. The plan estimates a 42 percent average canopy cover with significant differences in each zone.

Table 17. Tumwater urban forestry canopy cover goals per land use designation. Table from the Tumwater Urban Forestry Plan.

Tree Canopy Cover Percentages					
Land Use Type	2019 Developed Area	2019 Undeveloped Area	2019 Undevelopable Area	2019 Total Area of City and UGA	Recommended 2040 Goal
Port of Olympia- Olympia Regional Airport	2%	53%	6%	3%	3%
Port of Olympia- Industry	18%	54%	49%	41%	25%
Industrial	17%	40%	39%	32%	25%
City Core Mixed Use	23%	43%	25%	27%	25%
Other Mixed Use	27%	34%	22%	30%	25%
General Commercial	22%	55%	50%	41%	30%
Single-Family Residential	45%	58%	54%	52%	50%
Multifamily Residential	34%	45%	51%	40%	40%
Open Space & Green Belt	61%	59%	46%	49%	55%
Tumwater+ Urban Growth Area	31%	50%	48%	42%	39%

Olympia

Unlike Lacey and Tumwater, the City of Olympia has series of documents that outline tree protection requirements and guidelines but does not have an urban forest management plan. Olympia has an Urban Forestry Manual that describes a vision for Olympia in twenty years with a sustainably managed

and diverse urban forest (City of Olympia, 2016). The manual highlights the existing tree ordinances and requirements for developers, property owners, and city maintenance staff, and describes six levels of tree plan standards. The Urban Forest Manual is updated annually to provide clarity and clear instructions for developed and developing parcels. Olympia is the only jurisdiction of the three cities with an urban forester on staff, and since 2011, Olympia has had a Recommended Street Tree list that is regularly refined in consultation with a veteran arborist. The list includes classification by tree species, 'soil volume' requirements, and also includes data on height, spread, form, flower, fall color, and planting strip width. This list is restricted to climate adapted species. While the City of Olympia does not have an overarching canopy cover goal or updated urban forestry plan, the Urban Forestry Program Manager hopes to apply for grants to develop an urban forest management plan.

Future urban forestry plans could benefit from a detailed canopy cover comparison by zone, similar to the analysis in Tumwater's Urban Forestry Plan. Achieving the goals and timelines outlined in the plans will require additional staff time and, in some cases, the expertise of a contract forester.

Tree Ordinances

Lacey, Olympia, and Tumwater each have a series of tree ordinances that present standards for maintenance, planting, replacement, and removal. The existing ordinances for each City provide strong protection standards and planting guidelines, but the average canopy cover continues to decline. Although the tree ordinances for each city take different forms, they share many common characteristics. Each city addresses hazard trees, heritage or landmark tree designations, critical root zones, tree maintenance, replacement, and removal. The chart below outlines common elements in the existing tree ordinances for each jurisdiction. Note that this information was gathered in 2021 and 2022, and may be out of date. As of early 2023, several jurisdictions are reviewing their tree ordinances and may have updated their ordinances and other program components.

Areas for Growth

While existing plans and ordinances protect trees, each of the cities could benefit from an updated tree planting list to accommodate changing climate conditions and space availability, outreach and education for developers and residential property owners, enhanced fee-in-lieu programs for development, and clarified maintenance standards. Strengths and areas for growth for each city are outlined in the chart below.

The City of Woodinville offers an example of a strong tree ordinances and goals. As of 2017, Woodinville had an average canopy cover of 45 percent with eleven percent possible planting area and a goal to maintain a tree canopy of 40 percent. The City of Woodinville's ordinances outline clear standards for maintenance and require a minimum tree density of 70 tree credits for residential zones. The city also has a tree fund supported by payments from fees-in-lieu of supplemental plantings, civil penalties, sale of trees or wood from city property, and donations. Woodinville's urban forestry plan analysis and maintenance standards could guide future code updates or Urban Forestry Plan editions for Lacey, Olympia, and Tumwater.

	Integrate urban forestry concepts and preferences with development design. Maintain tree canopy in developed areas. Develop a street tree program as an essential component of Lacey's Urban Forestry Plan. Create a heritage and specimen tree program that recognizes special trees worthy of extra attention, notoriety, and protection. Develop an Urban Forestry Plan that promotes safety and healthy trees. Create an Urban Forestry Program that is publicized, easily understood, has brood support, promotes pride in our Tree City USA distinction and is enforced. Create a citizen advisory board for urban forestry issues Develop a method to process Class IV Forest Practice Applications pursuant to requirements of RCW 76.09.240.	Encourage the planting of new trees and the maintenance of existing trees for all the benefits they provide to the community. Protect critical areas, associated buffers, and their functions, and values while allowing reasonable use of property	
Current Canopy Cover Estimates	 28.3 percent canopy cover in City Limits 31.3 percent canopy cover in Urban Growth area 3,208 privately maintained street trees 2,973 street trees maintained by Parks Maintenance staff Tree City USA 	60 new street trees are typically planted each year. 2,500 street trees are maintained by the City Tree City USA	 53 percent of inventoried trees under ten years old 82 percent of trees under 25 years old Three types street trees account for over ten percent of the street tree population 42 percent canopy cover in 2019 Tree City USA
Existing Staff	Two Contract Foresters	City Forester on Staff	Contracted Forester (Sound Urban Forestry)

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Existing			Tumwater Tree Board
Community			
Strengths	Evaluation of urban growth areas Recognition of urban tree benefits	Accessible outline of existing tree ordinances and requirements Detailed requirements for different levels of tree plans, depending on site characteristics.	2040 recommended canopy cover goal by land use type Criteria for the Sustainable Community Framework
Areas for Growth	 Canopy cover goals by land use type Update urban forest planting plan 	 Develop a long-term urban forest management plan Canopy Cover strategies and targets by land use types Estimate and publish existing canopy cover 	 Additional contract forester/staff member Update approved street tree list to account for changing climate
Tree Ordinances Not	te that ordinances were reviewed in late 2021 and in this table may not reflect the most surrout very	l early 2022 – as of early 2023, several jurisdicti	ions are actively reviewing their regulations,
Ordinances	INC 14 22: Vegetation Brotestion and	OMC 16 49: Clearing	TNAC 12 24 Street Trees
Ordinances	Preservation Ordinance LMC 16.24.040: Standards for development LMC 16.80.050 Types of Landscaping LMC 16.80.070 Species Choice LMC 16.80.080: Maintenance of plant materials	OMC 16.48. Clearing OMC 16.56: Landmark Tree Protection OMC 16.58: Public Trees OMC 16.60 Tree, Soil, and Native Vegetation Protection and Replacement OMC 18.36: Landscaping and Screening OMC 13.16.017: Drainage Design and Erosion Control Manual; and The Engineering Design and Development Standards (specifically Chapter 4 Transportation and 4H.100 Street Trees) OMC 18.32: Critical Areas OMC 12.44 Street trees	TMC 12.24 Street Trees TMC 16.08 Protection of Trees and Vegetation. TMC 18.47: Landscaping
Hazard Trees	Any tree that is dead, dying, damaged, diseased, or structurally defective, recently exposed by adjacent clearing, or some other factor that will subject the tree to failure, and the tree could reasonably reach a target, as	Any tree with a combination of structural defect and/or disease that makes it subject to a high probability of failure, and is within close proximity to where persons or property	Any tree that, due to its health or structural defect, presents a risk to people or property (TMC 16.08).

	determined by the tree protection professional (LMC 14.32).	could be harmed or damaged if the tree were to fail (OMC 16.60.020).	
Heritage/Landmark Trees	 Historical tree" is a tree or group of trees designated as such by the city because of its historical value to the residents of the city. Process: Nomination by the property owner, a neighborhood organization, or any person by submitting a map, a photograph, and a narrative description including the location, species, approximate age, and the characteristics on which the nomination is based. The director decides if the tree meets requirements and records designation. Removal: A permit is required for removal of a historical tree. Permit is granted if tree is dead, diseased, or hazardous (LMC 14.32). 	A tree or group of trees designated as such by the city because of its exceptional value to the residents of the city. Value is determined by factors such as a. association with historic figures, events, or properties, b. rare or unusual species, or c. exceptional aesthetic quality. <u>Process</u> Nomination by owner, neighborhood organization, or any person submitting by a map, photograph, and narrative description including the location, species, approximate age, and the characteristics on which the nomination is based. The Director evaluates the nomination and hears public comment. If owner of tree does not approve of designation the nomination is disapproved. Appeals must be submitted within 10 days of decision <u>Removals</u> No person shall remove landmark tree. Any proposals for removal must apply for tree removal permit. Approval is based on health of tree or potential hazard. If the tree is determined to be healthy or treatable the director will deny. The advisory board holds public meeting within 30 days of appeal for landmark tree removal.	 Trees designated by the city and their owners as historical, specimen, rare, or a significant grove of trees (TMC 16.08) Process: Application signed by landowner and nominator with short description including address or location and landowner's name and phone number. Tree board reviews application. Heritage tree added to city tree inventory and public works maps. Classified as historical, specimen, rare, or significant grove. Removal: Tree removal permit required and city tree protection professional evaluates the tree before decision on the removal permit. Dead or hazardous trees are exempt from a tree removal permit after verification by the city tree protection professional.

Critical Root Zones	Root protection zone" is an area around the tree to be saved equal to one foot of radius for each one inch of tree diameter measured four and one-half feet above the ground line (DBH), unless otherwise designated by the city's tree protection professional (LMC 14.32).	The area where the tree's roots are located, generally the area surrounding a tree at a distance which is equal to one foot for every inch of tree diameter breast height (OMC 16.60.020).	Area on the ground with radius of one foot for every inch of tree diameter, measured from four and one-half feet above ground level, not less than a six-foot radius (TMC 16.08)
Maintenance	Thinning activities shall be strictly limited to less than thirty-five percent of the volume every ten years. High grading or top-down thinning shall not be permitted (LMC 14.32).	No landmark tree shall have major pruning or disturbance of over 10 percent of the root zone within a 3-year period. Topping of trees is prohibited. Pruning Standards: Deciduous Trees: Year One: only dead/broken branches removed Year Two: Class one prune to American National Standard Institute a 300. Year 3: Prune to establish permanent architecture Conifer Trees: Year One: minimal pruning Year Two: Maintain soil hydration Year 3: Retain brown areas of growth and only remove bottom branches when necessary,	"Trees are to be maintained in a vigorous and healthy condition, free from diseases, pests and weeds. Trees which become diseased, severely damaged or which die shall be removed by the owner as soon as possible but no later than sixty days after notification by the city" (16.08)
Replacement	 Order or Priority 1. On site 2. Off site: When space is unavailable for planting the required trees on-site, then they may be planted at another approved location within the city of Lacey or Lacey's growth area. 	Number of replacement trees determined by tree units. Tree units are determined by measuring the trunk size of existing individual trees. Larger and more mature trees are worth more tree units.	Replacement trees replaced by healthy trees of the same size and species required by the approved tree protection plan for the property (16.08). If tree dies due to construction, the city tree protection professional will determine the

	When both on and off-site locations are unavailable, the applicant must pay the replacement cost to the city's tree account plus planting and maintenance cost for three years (LMC 14.32).		value of the tree, and the applicant plants the equivalent value of trees on site.
Tree Removal	Removal of no more than five trees in any thirty-six consecutive months or ground cover for the purposes of solar access, general property and utility maintenance, landscaping or gardening, provided a minimum tree threshold is maintained. This exemption does not apply to historical trees or trees and ground cover in environmentally sensitive areas (LMC 14.32).	A tree removal permit is required to remove or destroy any tree within the city, and a soil and vegetation plan is required to obtain a tree removal permit (OMC 16.60.030). OMC 16.60.050 establishes six levels for required Soil and Vegetation Plans, based on the type of project or activity. Requirements for each level are delineated in the Urban Forestry Manual. Tree removal is just one element considered in the analysis required as a part of development review. On undeveloped properties, a maximum of six trees per acre, up to a total of six trees within any twelve-month consecutive period, may be removed from an undeveloped property without a permit. (OMC 16.60.040 – Exemptions) Removal of any public tree must be approved by the city's urban forester, and is only allowed when the tree is infected to prevent transmission, public nuisance, safety hazard, severely interferes with growth of another tree, infrastructure work would kill tree, necessary for vegetation management plan, access to private property (OMC 16.58.060 – Public Trees).	No more than thirty percent of the trees on any parcel of land shall be removed within any ten-year period, unless the clearing is accomplished as part of an approved development plan. One tree must be planted for every tree removed. Replacement trees must be seedlings of similar species to those removed and at least two years old. In lieu of planting replacement trees, applicants can make a cash payment to the city's tree account equal to one hundred twenty five percent of the retail value replacement cost. For land clearing permits that are part of a development plan, trees removed count towards required tree retention/replacement.

Strengths	Opportunities for off-site tree planting replacement	Ordinance Specificity Requirements for Tree, Soil, and Native Vegetation Areas Pruning Standards Six levels of tree plan standards	Heritage Tree Program
Areas for Growth	 Clarification of regulations contained in LMC 14.32 pertaining to tree replacement on individual lots as suggested in the Lacey Urban Forestry Plan (2021) Clarification of definitions contained in LMC 14.32 as suggested in the Lacey Urban Forestry Plan (2021) Clarification of recommendations for tree protection required in tree protection professional reports in LMC 16.24.040 Implementation of Fee-in lieu program discussed in the Lacey Urban Forestry Plan (2021) 	 Update recommended tree planting list Develop Urban Forest Management Plan 	 Expansion of tree ordinances to meet goals identified in the Tumwater Urban Forestry Plan (2021) Tree maintenance requirement specificity

Appendix D Case Studies

Other cities, counties, and organizations have existing programs that incorporate elements of carbon sequestration, though not many have done so as part of broader climate mitigation strategies. TRPC staff interviewed representatives from several different types of programs to better understand how sequestration could be addressed in the Thurston region. The carbon sequestration initiatives profiled take three forms: carbon credit programs, community forests, and urban forestry programs. These programs include:

- <u>King County Forest Carbon Program</u>
- Pierce Conservation District Partnership with City Forest Credits
- <u>Nisqually Community Forest</u>
- Tucson Million Trees
- <u>Tacoma Urban Forestry Management Plan</u>

Carbon Credit Programs

Carbon credit programs provide local businesses and organizations the opportunity to offset carbon emissions by purchasing carbon credits. Each carbon credit generated is equivalent to one ton of CO2 taken out of the atmosphere. Crediting programs offer multiple benefits including quantifying sequestration, supporting conservation work, and fostering community support for sequestration. Most carbon credit programs involve a partnership with an outside crediting organization. Organizations like City Forest Credits (CFC), Gold Standard, South Pole, and Verified Carbon Standard (VCS) have established protocols for verifying carbon credits from reforestation efforts to offset emissions. Each organization has unique eligibility requirements, verification processes, and support protocols. Either the crediting organization or a third party will market the generated credits, which are commonly purchased by private companies or groups looking to offset their emissions.

King County's Forest Carbon Program is part of the county's <u>Land Conservation Initiative</u>, a partnership between King County, cities, businesses, farmers, and environmental partners to protect forests, farms, rivers, trails, and urban green spaces with a goal to protect 65,000 acres of natural lands and urban greenspaces by 2050. The county's Forest Carbon Program has two branches: urban carbon credits and rural carbon credits. Both programs aim to generate carbon credits and support King County's goals by preserving parcels of land that would otherwise be harvested or developed. The Land Conservation Initiative that houses both programs has committed to addressing the historic and unequal lack of investment in open space, and dedicated \$160 million toward increasing underserved communities access to open space. This commitment has influenced where new parcels are acquired for use in the crediting program. King County requires all generated credits to be sold within the county.

The urban credit program operates through a partnership with CFC. King County acquires parcels in or directly adjacent to urban regions, preventing further development on each parcel and ensuring that all credits generated are an addition to what was already being sequestered in the county. The first round of verification was completed in 2017 by CFC and produced 3,025 mtCO2e of verified and registered

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credits, while also producing local community and environmental co-benefits. 2,360 credits were purchased by three local companies and 265 credits are currently available for purchase (CFC).

King County's rural program partners with VCS and is open to any parcels that are not eligible for the urban program. The County completed the first round of verification for the rural program in September 2020 with almost 900 acres and 26,317 mtCO2e of verified credits. Microsoft purchased all the generated credits from the first round of verification and the second round is expected to be completed in Fall 2021. All land enrolled in the program is currently county-owned and includes forestlands, floodplains, some agricultural areas, riparian areas, and wetlands. King County does not currently include prairies in the program because they are not prominent in that region. However, some crediting organizations have protocols focused on grasslands and different land types that might apply to prairies in Thurston County.

Pierce Conservation District has a similar carbon credit program and partnership with CFC. The District received a grant from Boeing's community support program to create a pilot program operated within the District's existing water quality and habitat restoration programs. The first round of verification generated 4,630 credits from a 10-acre parcel, and the District has partnered with South Pole, a carbon broker program, to begin selling the credits. The estimated co-benefits from the site include a total savings or avoided cost of \$166,145.21 per year and \$4,153,630.21 over 25 years. This includes savings for rainfall interception, air quality improvement, cooling effects, and natural gas (CFC). Unlike King County, Pierce Conservation District is not committed to selling credits locally. They hope to apply funds generated from selling carbon credits to habitat maintenance and enroll more acres in future years.

Carbon credit programs are relatively new and still developing protocols. One significant challenge for both carbon credit programs is selling generated credits. While Microsoft purchased the first round of King County's rural credits, the County will have to find interested buyers for future rounds of verification. Identifying and building relationships with buyers requires significant staff time or a partnership with another organization, like South Pole. Both King County and Pierce Conservation District shared that overhead requirements for urban programs and partnerships with CFC are limited. However, rural programs require more planning, staff time, and are more difficult to maintain. Additionally, identifying initial project funding and conducting preparational surveys require significant staff time and resources.

Nisqually Community Forest

The Nisqually Community Forest is a wholly owned subsidiary of the Nisqually Land Trust but is largely operated as an independent body. The vision for the forest is a locally-owned, economically self-sustaining forest with multiple benefits including sustainable forestry, recreation, and education. The forest aims to redefine how profit is measured to include the additional benefits. Funding for the early stages of the forest development came from the Washington Wildlife and Recreation program, Pierce County Conservation Futures, US Forest Service Community Forest Programs, Conservation Fund, and Puget Sound Energy Foundation.

In 2016, the community forest developed the first carbon credit program in the Pacific Northwest. This program registered and sold credits on the California market. The community forest enrolled 520 acres in the project and sequestered carbon equivalent to taking 6,600 cars off the road. In 2020, the community forest developed a new project to enroll 3,400 acres in a crediting program.

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The community forest is managed in accordance with a comprehensive forest management plan specific to separate stands within the forest. The community forest prioritizes ecological health and logged about 24 acres in 2018, 25 acres in 2019, and 40 acres in 2020 which is well below the sustained yield or annual allowable harvest. The revenue from logging helps to make the community forest self-sufficient and supports local communities with jobs. Reaching the annual allowable harvest would facilitate eight local jobs in the community. The community has been certified by the Forest Certified Council which increases the value of timber. The forest also follows a silvocultural strategy to create a more diverse forest with variable degrees of thinning and encourage natural regeneration.

Urban Forestry Programs

Most of the carbon sequestration required to meet 2050 climate goals is assumed to come from reforestation and afforestation. Urban forestry efforts address these goals while generating community support for climate efforts by involving the community in planting efforts and increasing access to green spaces. The Tucson Million Trees Initiative and Tacoma Urban Forestry Management Plan are two urban tree-planting programs.

Tucson Million Trees in Tucson, Arizona, involves a partnership with Tucson Clean and Beautiful and the mayor's office with a goal to plant one million trees by 2030. The initiative aims to increase tree canopy cover for enhanced air quality and cooling effect and does not measure sequestration rates. The program is funded by local businesses and organizations. Tucson Clean and Beautiful, a local nonprofit, oversees most operations and heavily depends on relationships with volunteers and community groups. The program supplies and plants trees on residential properties at no cost and has generated wide-spread community support. Since 2020, the initiative has planted 3,100 trees. While there is a high demand for trees from the program, the primary challenge is maintaining tree health with a water shortage.

Tacoma's Urban Forestry Management Plan set a target to increase tree canopy cover from 20 percent to 30 percent by 2030 to create a vibrant and healthy community and promote safety by improving air quality, saving energy, reducing the need for street maintenance, raising property values, conserving water and soil, protecting wildlife, diminishing urban heat islands, and increasing resident quality of life. Tacoma's strategy places a strong emphasis on supporting neighborhoods that have been historically underserved. Tacoma has an Equity Index that uses 29 data points to highlight disparities in the Tacoma community and determine where resident needs are not being met. The Urban Forestry Management Plan uses the Equity Index to determine where trees are most needed in the community

and develop programs to distribute new trees. Tacoma's tree coupon program offers individuals a \$30 discount on trees planted on residential properties or in the right-of-way. Similarly, the Grit City Tree program provides free trees to individuals in underserved neighborhoods highlighted in the Equity Index, some of which have a tree density below three percent. The plan also highlights concentrated tree planting efforts around the Tacoma Mall neighborhood, plans for a landmark tree program, and ongoing research in Tacoma with the Nature Conservancy on how tree planting impacts overall health.

Urban forestry and tree-planting efforts like the Tucson Million Trees Initiative and Tacoma Urban Forestry Management Plan also present challenges. Tree maintenance is the responsibility of the property owner or renter and can pose a challenge. However, at least 90 percent of trees planted through Grit City Trees and the Tree Coupon program in Tacoma survive the first three years. Tree maintenance, transportation of trees, water access, and landowner approval are additional barriers in distributing trees or tree coupons. In Tacoma, city code also poses a challenge. The city permitting requirements make removing a tree easier than planting new trees, so further policy work and code updates are currently underway. Additionally, neither program identifies carbon sequestration as the primary goal, largely due to difficulty in tracking sequestration. It is likely that additional tree surveys or a partnership with a crediting organization would be necessary to track sequestration in newly planted urban trees.

Common Themes

The profiled programs offer insight into the potential for a carbon sequestration program in the Thurston region.

- Partnerships help leverage expertise and make efficient use of resources. Rather than developing programs entirely in-house, all the outlined programs depend on some level of partnership between local government, private entities, nonprofits, and the community. For example, the Tucson Million Trees Initiative is operated by the nonprofit Tucson Clean and Beautiful and the mayor's office. The nonprofit is responsible for primary operations while the directive and goal came from the mayor's office. Similarly, King County's carbon credit program operates through county partnerships with City Forest Credits, Verified Carbon Standard, Microsoft, and other local businesses. This allows the County to outsource the time-consuming process of determining credit value to an outside third-party, rather than taking on the expense and accountability for developing that expertise within its own staff. Partners can also help fund and staff programs. The staffing demands for each program differ but are supported and distributed through local partnerships.
- Urban tree canopy programs can serve multiple community goals, are the most established type of program, and potentially are the easiest place to start, but tracking for sequestration adds complexity. Representatives from Pierce Conservation District, Tucson Million Trees Initiative, Tacoma Urban Forestry Management Plan, and King County strongly recommended using urban tree programs to meet carbon sequestration targets. Generally, these programs require less overhead management than programs that cover a wider range of habitat types and tree maintenance falls on individual renters or property owners. Most existing urban tree planting initiatives identify equity, public health, and a cooling effect as the primary goal rather than sequestration. Measuring carbon sequestration for individual urban forestry program poses a significant challenge and likely requires partnership with an established certification organization.
- Communicating with the community and gaining support or approval prior to program implementation is essential. Community engagement is critical for urban forestry programs to understand resident needs, ensure that individuals have tools to care for trees, and place trees in appropriate spaces. Community support is also essential for rural reforestation, preservation, and afforestation efforts to understand land use needs and develop maintenance plans. Carbon credit programs rely on community and local interest in purchasing the credits. Determining interest and support before initiating the program can increase participation and overall success.
- Seed funding from grants, utilities, or taxes are key to initiating programs. Most programs received grant funding to initiate a small-scale pilot program before expanding efforts. Each program requires funding for initiation and ongoing maintenance and oversight. Funding from

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carbon credit sales were identified as essential in continuing preservation and maintenance work. Many tree planting efforts are transitioning to seek funding from stormwater management to increase the availability and security of funding.

• Carbon sequestration programs should highlight options to benefit marginalized or historically disadvantaged communities. All of the highlighted programs incorporate equity considerations to varying degrees. Representatives from urban tree planting programs suggest designing regional programs to distribute trees to historically underserved communities. Similarly, preserving open spaces can occur in areas that increase accessibility to green spaces for marginalized communities. Many tree planting program representatives recommended working with American Forests to designate priority regions.

Case Studies

Program: King County Land Conservation Initiative/Forest Carbon Program- Rural Contact Information: Anne-Gigi Chan, <u>annchan@kingcounty.gov</u>

Year Implemented: 2018

Goals:

Generate carbon credits and support the land conservation initiative by preserving parcels that might otherwise be harvested or developed.

Progress/Current Status:

Two Components: urban and rural

- Urban credit program is verified by City Forest Credits and has strict geographical restrictions. All parcels must be in areas identified as urban spaces in the US Census data, directly adjacent to an urban area, or touching an urban growth boundary.
- The Rural Program is open to any areas in the county that cannot be included in the urban program. The rural program operates with a more traditional verified carbon standard and any forested land the county acquires is verified under rural standards. During the first round of verification the rural program had approximately 900 acres and will include 700 more acres during the next round of verification.
- Currently, all land enrolled in a crediting program is county owned. The county is in the process of opening the programs to third parties to increase participation.
- Traditionally, at least 1,000 acres are required to make crediting economically feasible.
 However, at the county level several parcels are combined, making crediting economically feasible.
- Only parcels acquired by King County from 2015 and onwards can be enrolled in the program to emphasize additionality and the protection of new areas that otherwise would be developed or deforested.
- Protection of existing trees is not counted in the urban program, eliminating questions about whether the trees would or would not have been harvested and if the program adds to existing sequestration.
- The land the county acquires includes floodplains, some agriculture lands/conservation easements, forestlands, land along the river, wetlands. King County does not currently include prairies in the crediting program, but there are protocols focused on grasslands and available for different land types.
- Currently, the rural program is undergoing the second round of verification. Microsoft committed to buying all credits from the first verification from the rural program, and funds from that sale will be used to purchase parcels in the future. Future rounds of verification will have to actively find buyers. King County was approached by individuals from Atlanta interested in purchasing credits but did not sell the credits and remains dedicated to building local partnerships and selling credits within the county.

Challenges:

- Significant challenges exist in both the urban and rural programs.
- In the urban program, the county has faced difficulty acquiring eligible urban parcels.
- The rural program requires more management than the urban program. The urban program requires familiarity with GIS, but all spreadsheets and resources and provided by City Forest Credits. CFC also has a third-party verification already in place. The rural program requires an additional contractor and auditor to verify credits.
- A challenge for both programs is marketing the credits. While Microsoft committed to purchasing the first round of credits, it is likely that significant staff support and time will be needed to market the next round of credits.

Recommendations:

- The representative from King County highly recommended partnering with City Forest Credits as the project design is more straightforward and includes the possibility for including tree planting initiatives along with land conservation efforts.

Future:

- King County is considering implementing a pilot program with tree planting that would further the urban credit program. Tree planting provides an opportunity to further engage the community and unite existing tree efforts into the carbon programs.
- The carbon credit program is still new in King County and is the first crediting program at the county level. As such, staff are focused on establishing strong processes and comprehensive protocols so that all parties are coordinated.

Program: Pierce County Conservation District Partnership with City Forest Credits

Contact Information: Allan Warren

AllanW@piercecd.org 253-845-9770 ext 1121

Year Implemented: 2020

Goals:

Pierce Conservation District aimed to expand existing habitat restoration efforts, measure the impact of restoration work, and create a revenue stream through its partnership with City Forest Credits.

Progress/Current Status:

- Following a one-year pilot program funded by a Boeing Grant, the conservation district's partnership with CFC is focused on two projects: water quality and habitat restoration.
 These projects generate credits by protecting or restoring natural areas and planting trees or native plants.
- Although staffing and workload was initially a concern, it has not posed a challenge for the conservation district. There was some additional paperwork required at the beginning of the process, but the long -term monitoring is limited. Monitoring involves a simple annual report and overall has few overhead requirements. The conservation district was already

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doing restoration work prior to the partnership, so a restoration and maintenance team was already established.

- Pierce Conservation District's partnership with CFC includes a twenty-five-year commitment. The pilot program included ten acres and generated 4,600 carbon credits that were just certified and will be sold soon.
- The conservation district expects approximately \$75,000 upon completion of the partnership that is paid in semi-regular portions to ensure that all trees generating credits are still living and viable.
- Funds generated from the program are reinvested to help with ongoing maintenance and stewardship of the restored area.
- While CFC provides most resources, the conservation district contracted South Pole, a broker, to sell credits. CFC is looking to launch a program to sell all of the credits it helps generate on a national scale.
- The information and verification from CFC now help the conservation district quantify the economic benefit of restoration work to gain public support.

Funding:

- The partnership between CFC and Pierce Conservation District was supported by a grant from Boeing's community support program. The conservation district used the grant funds for a one-year pilot program and a GIS analysis to identify eligible properties according to the conservation district's priorities and CFC's requirements.

Challenges:

- Some staff members initially had concerns about green washing and selling credits that are not creating something new or performing additional sequestration. But, in this program the protocol system is only for new trees. While CFC established the system, a third-party verifier confirms the credits based on established criteria that minimized concerns.
- Concern about who is purchasing the credits. The conservation district does not monitor or restrict who can purchase the credits, but some concerns were raised about who the credits can be sold to. Originally, the conservation district wanted to sell credits locally, but plans shifted with the pandemic. Conversations are ongoing as the first sale is approaching.

Future:

- Pierce Conservation District hopes to integrate more habitat restoration areas into its partnership with City Forest Credits. The conservation district is looking for bigger acreage programs in water quality and farm areas but remains focused on habitat restoration.
- The Conservation District is interested in learning more about CFC's programs for one-off tree plantings. Representative suggested that these programs might be ideal for a city or county scale, but the conservation district remains focused on larger acreage.

Program: Nisqually Community Forest

Goals:

The Nisqually Community Forest is a locally-owned, economically self-sustaining forest with multiple goals including sustainable forestry, recreation, and education.

Progress/Current Status:

- The Land Transferred 1,920 acres to the Land Trust in 2020. Then, in April 2021 the Land Trust acquired 960 acres along Busy Wild Creek that will be transferred to the Community Forest. The Nisqually Indian Tribe will also acquire 1,240 acres that will be managed under the Community Forest Management plan.

Future

- The Nisqually Community Forest is working to continue increasing opportunities for carbon credit programs and sustainable harvesting to become financially self =-sufficient. The forest is also looking to incorporate new acreage.

Program: Tacoma Urban Forest Management Plan

Contact Information:

trees@cityoftacoma.org (253)-502-2138

Goals:

The Urban Forest Management Plan was designed out of a need for a broader and more unified plan that identifies a decadelong strategy for urban forestry. The plan followed policies dating back 2010 and a tree canopy goal of 30 percent tree canopy by 2030. The plan development began in 2017 and involved two years of external community engagement and work to connect urban forestry goals with equity and climate.

Progress/Current Status:

- The urban forestry programs are operated under environmental services in the sustainability office. The team includes three full time staff members and additional arborists and tree-related positions around the city. Currently, the city has 20 percent existing tree canopy, one of the lowest in the region and not equitably distributed.
- The Urban Forestry Management Plan engages several programs to reach the 2030 tree canopy goal. The Tree Coupon Program planted 2,500 trees in 2020. The GRIT City Trees program provides free trees to Tacoma residents and prioritizes individuals from neighborhoods identified as historically underserved. The program is open to individuals who rent or own their homes, but the resident is responsible for tree maintenance and the tree must be planted in the right of way. The city supplies some watering supplies with the GRIT City tree to support maintenance. Both GRIT City Trees and the Tree Coupon Program are successful programs that grow at least ten percent every year. The survivability of planted trees is over ninety percent in the first three years.
- The urban forest management plan includes working with one neighborhood each year to increase tree canopy. Currently, the Tacoma Mall area in the south-central part of the city is

a focus area. This region has one of the lowest tree canopies, a high renter population, lots of impervious surfaces, is not pedestrian friendly, and is increasing in density. Efforts in the neighborhood have centered around community outreach and a partnership with the Tacoma tree foundation.

- The city has a contract with Tacoma Tree Foundation which supplies advertising for GRIT City Trees and helps provides feedback for what residents in the Tacoma Mall neighborhood would like to see. Tacoma also has a partnership with the Nature Conservancy to observe public health outcomes from increased greening in the Tacoma Mall neighborhood.
- Carbon sequestration is not an explicit goal in the tree planting efforts, largely because of monitoring difficulties. However, the city is currently drafting an updated environmental action plan for the coming decade that may place a greater emphasis on carbon sequestration. Each of the programs employs a 'Right Tree, Right Place' framework and focuses on tree diversity for pest and disease resistance. The program has found success with trees that are more drought tolerant and relies on tree inventories to ensure diversity of species.

Funding:

The forestry programs have a stable budget from surface water funds because of the demonstrated benefit trees can have on surface water quality and protection.

Challenges:

- Each of the programs within the urban forestry management plan has unique challenges. However, inconsistencies within the right-of-way code around tree protection pose a challenge to meeting the 2030 goal. The management plan identified discrepancies that make it easier to remove trees than it is to plant trees.
- Tree planting efforts have also encountered challenges with the bureaucratic system as tree removals are automatically approved in the permitting department.
- While public response the programs has been very positive, the efforts always encounter concerns about green gentrification and place a strong emphasis on acquiring neighborhood support prior to project implementation.
- There have also been some challenges in collaborating with outside partners and working across jurisdictions.

Future:

- In the coming years, Tacoma is looking to introduce a heritage tree program to protect existing trees. In this program, community members could nominate a tree on their property, in the right of way, or on public property for heritage tree status. Once granted, the trees are protected unless they are dead, dying, or pose a significant safety hazard.
- The city also plans to identify additional regions to initiate focused efforts like the Tacoma Mall area.
Recommendations:

The program representative highly recommended emphasizing community collaboration and engagement at the start of all tree planting initiatives. He also recommended analyzing tree canopy data to identify regions with the most need for tree planting. While he recognized the benefit of carbon sequestration, he suggested that sequestration is a secondary benefit to the public health effects of tree planting.

Program: Tucson Million Trees Initiative

Contact Information: Year Implemented: 2020

Goals:

The Tucson Million Trees Initiative aims to plant one million trees by 2030 to provide shade and have a cooling effect on the city. The initiative seeks to build a more equitable community and create opportunities to engage community in creating a sustainable future.

Progress/Current Status:

Currently, the initiative has planted 3,100 trees in neighborhoods where individuals are responsible for tree maintenance and care. The program does not have any data on who is most likely to participate in the program. However, the initiative works with American Forests to prioritize regions with demonstrated need.

Funding:

Secure funding for the Tucson Million Trees initiative has posed a challenge. The program is operated as a partnership between Trees Clean and Beautiful, a nonprofit, and city government. All funding for trees in the nonprofit comes from private business investments. The city also contracts with arborists for specialized care, but there are no arborists on city staff. The initiative has had success in finding funding through stormwater management utility fees. The nonprofit regularly relies on volunteers to help plant trees and offers an opportunity for young people to help plant trees on weekend mornings for a small stipend.

Challenges:

The primary challenge for the Tucson Million Trees Initiative has been keeping trees alive. The region is prone to extreme heat and drought conditions and representatives cited keeping trees watered until they are established as the most significant challenge. All trees planted are drought-tolerant and determined to be suited to the local climate but still require additional support and watering in the warmer months. Additional challenges include tree maintenance, secure funding, and greenwashing concerns. The plan also aims to plant one million trees by 2030, which at the current rate of planting is likely unattainable. The scale of the project and distance from the goal poses a challenge in public support, coordination, and long-term planning. Support from the city government and direct connection with the Mayor's office has helped the program and drawn in community and business support.

Future

The Tucson Million Trees Initiative remains dedicated to working towards the goal of a million trees by 2030. Future efforts involve propagating trees, addressing tree cost, securing funding, and expanding planting efforts.

Recommendations:

Carbon sequestration is not the primary goal of the Tucson Million Trees Initiative and is not measure in the program. The program representative suggested that the greatest benefit is not from sequestration but from the cooling effect, air quality changes, and overall health benefits. Suggestions for tree planting efforts included planting native trees and fruit/food trees.

Appendix E

Policy Options Detail

Overview

Regional partners have many options to move toward meeting the 2050 carbon sequestration targets outlined in the TCMP. TRPC staff developed policy options based on conversations with stakeholders, case studies, and sequestration potential in the Thurston region.

Cost Estimates

- \$ = less than \$100,000
- \$\$ = \$100,000-\$1,000,000
- \$\$\$ = \$1,000,000

More detailed cost estimates are included with the description of each action.

Staff Requirements

- Low = less than 1 FTE for limited duration, across all partners
- Medium = 1 FTE for longer duration, across all partners
- High = More than 1 FTE, for indefinite duration, across all partners

Carbon Sequestration Potential

		Low/High Baseline	Low/High Sequestration	Confidence/Probability of			
		Sequestration Category	Potential	Impact			
	Low	Low/Unknown	Low/Medium	Low			
		(Urban Trees, Agriculture,	(regenerative agriculture,	(voluntary education/outreach,			
		Prairies)	prairie preservation, avoided	limited ability to scale)			
a			conversion of urban areas,				
n Potentia			tidal wetland restoration)				
	Med	Low	Low/Medium	Medium/High			
		(Urban Trees, Agriculture,	(regenerative agriculture,	(monetary incentives,			
tio		Prairies)	prairie preservation, avoided	regulation, or capital project;			
tra			conversion of urban areas,	potential for widespread			
sər			tidal wetland restoration)	application)			
edr		High	High	Low			
S		(Rural Forest)	(avoided conversion of rural	(voluntary education/outreach,			
- So			forest areas, extended	limited ability to scale)			
Carl			timber harvest)				
Ĩ	High	High	High	Medium/High			
era		(Rural Forest)	(avoided conversion of rural	(monetary incentives,			
ð			forest areas, extended	regulation, or capital project;			
			timber harvest)	potential for widespread			
				application)			
	Enabling	No direct sequestration benefit, but enables other actions.					

Table 18. Policy Options to Support Carbon Sequestration in the Thurston region

Action	Initial Cost	Ongoing Costs	Staff Requirements	Carbon Sequestration Potential	Potential Lead
Forests and Trees					
Rural/Forest Landowner Outreach and Technical Support Program	\$\$	\$\$	Medium	Medium	TCD, WSU Extension
Urban Tree Outreach and Technical Support	\$\$	\$\$	Medium	Low	Lacey, Olympia, Tumwater
Regional Urban Tree Canopy Assessment	\$	\$	Low	Enabling	TRPC, Thurston County, Lacey, Olympia, Tumwater
Tree Canopy Targets	\$	\$	Low	Enabling	TRPC
Urban Tree Management Plans and Code Review	\$\$	\$	Medium	Medium	Thurston County, Lacey, Olympia, Tumwater
Forest Conversion Ordinance and Rural Tree Standards Update	\$\$	\$	Medium	High	Thurston County
Comprehensive Plan Review and Update	\$\$	-	Medium	High	Thurston County, Lacey, Olympia, Tumwater
State Forest Lands Management Advocacy	\$	\$	Low	High	Thurston County, CASC
Working Forest Conservation Easements	\$\$\$	\$\$\$	High	High	Thurston County
Community Forests	\$\$\$	\$\$\$	High	High	Thurston County, Land Trusts
Regional Tree Fund	\$\$	\$	Medium	Enabling	Thurston County
Urban Forest Carbon Credit Program	\$	\$	Low	Low	Thurston County, Lacey, Olympia,

Action	Initial Cost	Ongoing Costs	Staff Requirements	Carbon Sequestration Potential	Potential Lead
					Tumwater, TCD
Rural Forest Carbon Credit Program	\$\$	\$\$	Medium	High	Thurston County, TCD
Transfer of Development Rights Program Update	\$	\$	Medium	Medium	Thurston County
Land Conservation and Restoration Capacity	\$	\$	Medium	Enabling	Thurston County, Lacey, Olympia, Tumwater, Land Trusts
Reforestation/Afforestation Projects	\$\$	\$\$\$	High	High	Thurston County, TCD, Land Trusts
Agriculture					
Regenerative Agriculture Practice Tracking	\$	\$	Low	Enabling	TCD, WSU Extension
Regenerative Agriculture Outreach and Technical Assistance	\$\$	\$\$	Medium	Low	Thurston County, TCD
Agriculture Zoning and Development Code Review	\$	\$	Low	Medium	Thurston County
Conservation Programs Update	\$	\$	Low	Medium	Thurston County
Regional Agriculture Fund	\$	\$	Low	Enabling	Thurston County
Agriculture Carbon Credit Program	\$	\$\$	Medium	Medium	Thurston County, Lacey, Olympia, Tumwater, TCD
Prairies					
Prairie Soil Analysis	\$	\$	Low	Enabling	WSU Extension
HCP Implementation	\$\$\$	\$\$\$	High	Medium	Thurston County, Tumwater, Port of Olympia
Prairie Conservation and Enhancement Carbon Credit Program	\$	\$\$	Medium	Medium	Thurston County, CNLM

Action	Initial Cost	Ongoing Costs	Staff Requirements	Carbon Sequestration Potential	Potential Lead
Supporting/Other Actions					
Land Use Change Emissions Inventory	\$	\$	Low	Enabling	TRPC
TCMP Target and Action Update	\$	\$	Low	Enabling	TRPC
Sequestration Working Group	\$	\$	Medium	Enabling	TRPC
Blue carbon/Tidal restoration	\$\$\$	\$\$\$	Medium	Medium	Squaxin Island Tribe, cities, county

Forests and Trees

Rural/Forest Landowner Outreach and Technical Support Program

- o **TCMP Action:** Supports existing Action A5.1
- Description: Develop an educational outreach campaign for rural landowners with guidance and technical support on best management techniques for conserving existing trees, extending timber rotations, and planting new trees to maximize carbon sequestration benefits. Campaign should provide options targeted to both small and large landowners, and include connecting landowners to funding resources like conservation easements and cost-share programs. Such campaign could build off existing programs, including the Voluntary Stewardship Program, Thurston Waterways, and Thurston Conservation District's technical support programs.
- **Potential Lead:** Thurston Conservation District, WSU Extension
- o Partners: Thurston County, DNR Small Forest Landowner Office
- Estimated cost: \$150,000 to establish program; ongoing funding to support outreach staff would depend on scope and reach of program
- **Potential Funding source:** Grant for program establishment

Urban Tree Outreach and Technical Support

- o TCMP Action: Supports existing Action A6.5
- Description: Develop an educational outreach campaign for urban residents that highlights the social, environmental, and health benefits of trees while also sharing information on existing tree regulations and best practices for working with trees in an urban setting to maximize carbon sequestration as well as other community benefits. This could include developing a recommended tree list and siting and maintenance considerations for trees on urban properties. Materials could provide general information across all three cities and UGAs, but implementation would be within each jurisdiction.
- Potential Lead: Olympia, Lacey, and/or Tumwater
- Partners: Thurston Conservation District, WSU Extension, DNR Urban and Community Forest Program

- Estimated cost: \$150,000 to establish program; ongoing funding to support outreach staff would depend on scope and reach of program
- Potential Funding source: Grant for program establishment; local funds

Regional Urban Tree Canopy Assessment

- **TCMP Action:** Supports existing Action A6.9
- Description: Measuring the carbon sequestration potential of urban trees generally requires a detailed tree inventory with information about tree age, height, width, and type. Some jurisdictions have gathered or are in the process of gathering information on trees within their boundaries, but this data is not available for the region at a scale that would be helpful for tracking carbon sequestration benefits. A complete tree inventory of the region's urban areas would supply the information needed to include urban trees in total carbon sequestration estimates. Such an inventory could build off the canopy assessment currently under development for Olympia, and would need to be updated periodically to track changes over time.
- Potential Lead: Thurston County, TRPC, or individual cities
- Partners: Olympia, Lacey, Tumwater
- **Estimated cost:** \$50,000 to develop first layer; additional costs would depend on frequency of updates
- **Funding source:** Grant DNR Urban Forest program

Tree Canopy Targets

- TCMP Action: Supports existing Action A6.9
- **Description:** Set targets for tree canopy, consistent with extent needed to support TCMP sequestration target. These could be set at a regional level, with general targets for individual jurisdictions. In addition to the regional goal, each jurisdiction could opt to establish urban tree canopy targets per land use designation. This action is dependent on partners completing the regional tree canopy assessment identified in a previous action.

Alternatively, partners could set a more general land-use related target for forest cover through a task described above.

- Potential Lead: TRPC, Thurston County, and/or individual cities
- **Partners:** Cities, community stakeholders
- Estimated cost: \$80,000
- Funding source: Grant or TCMP Work Program

Urban Tree Management Plans and Code Review

- o TCMP Action: Supports existing Action A6.5
- Description: A comparison of existing urban tree management policies of Lacey, Olympia, and Tumwater (summarized in Appendix D) suggests some areas for improvement, including updated tree planting list to accommodate changing climate conditions and space availability, outreach and education for developers and residential property owners, enhanced fee-in-lieu programs for development, and clarified maintenance standards. Both Lacey and Tumwater have recently completed updates to their urban forest management plans, and have code updates underway or planned, and work is planned in Olympia and in

Thurston County for the Urban Growth Areas of Lacey, Olympia, and Tumwater as part of the Joint Plan code update process (currently planned for 2023-2024). One short term action could include a regional informational summit on approaches to urban tree management to share information, successes, lessons, and best practices.

- o Potential Lead: Olympia, Thurston County
- o Partners: Lacey, Tumwater, community stakeholders
- o Estimated cost: Will vary depending on scope identified by each jurisdiction
- Funding source: Individual jurisdictions

Forest Conversion Ordinance and Rural Tree Standards Update

- o **TCMP Action:** New Action
- Description: Update Thurston County's forest conversion ordinance and tree planting standards (TCC 17.25 and Title 18) to minimize the impacts of forest conversions with the aim of growing and restoring forests in the rural areas of the county.
- **Potential Lead:** Thurston County
- Partners: community stakeholders
- Estimated cost: This effort is currently funded through the Thurston County Development Code Docket
- Funding source: Thurston County

Comprehensive Plan Review and Update

- **TCMP Action:** New Action, but also supports existing actions T1.1, T1.2, T1.3, and T1.4
- Description: Review, and if necessary, update existing Comprehensive Plans and associated zoning and land use policies to increase urban density and minimize the conversion of forests, agricultural lands, and prairies consistent with the Sustainable Thurston land use targets adopted in the TCMP, which will help maintain the region's existing sequestration capacity.
- **Potential Lead:** Thurston County, cities
- Partners: community stakeholders
- Estimated cost: Will vary depending on scope for each jurisdiction, costs will be for additional staff time and community outreach
- **Funding source:** County and city budgets, state grants may support some portion of the updates

State Forest Lands Management Advocacy

- **TCMP Action:** New Action, but could connect to G5.5, legislative agenda
- Description: Washington State manages significant areas of timberland within Thurston County (52,000 acres, according to the US Forest Service), mostly through the Department of Natural Resources (DNR). TCMP partners could advocate for changes to DNR forest cutting permit rules, such as requiring a carbon impact analysis, increasing protections of critical areas, creating incentives for climate-smart forestry practices (including prescribed fire applications, diverse plantings, variable density thinning/retention harvests, etc.), and longer harvest rotations. Partners could also advocate for DNR to enroll more of its land in its Carbon Project and employ extended harvest rotations on its lands in Thurston County. Note that land enrolled in the Carbon Project program could not count toward the TCMP

> target, unless the credits generated by the change are purchased by an entity within Thurston County to offset emissions that contribute to the Thurston region's countywide total or purchased and not used to offset emissions.

- Potential Lead: Thurston County, Climate Action Steering Committee
- **Partners:** TCMP partners
- **Estimated cost:** none for advocacy, could be included within standing tasks of the TCMP Work Program. There would be a cost to purchase the value of certified credits.
- Potential Funding source: TCMP Work Program

Working Forest Conservation Easements

- o TCMP Action: New Action
- Description: Work with owners of private timberlands to establish conservation easements that set permanent requirements for extended timber harvest cycles and other benefits, like maintaining a certain percentage of older trees. Amend Thurston County's Conservation Futures program to make these types of projects eligible for funding and develop other sources of funding. According to the US Forest Service estimates, there are 170,000 acres of privately owned working forest land in Thurston County, and the scenarios reviewed for the emission potential section proposed that extended rotation be applied on 30-40 percent of these lands (51,000-68,000 acres).
- **Potential Lead:** Thurston County
- **Partners:** Land Trusts, Community stakeholders
- Estimated cost: Difficult to estimate as the cost of conservation easements vary considerably based on their specific conditions. Assuming a rough easement cost of \$1,000/acre⁵ the total cost would be \$51-68 million. Spread over a 25-year time period (2025-2050), this would equate to \$2-2.7 million per year. This strategy could be combined with a carbon crediting system, as described below, which could offset some costs.
- Potential Funding source: Conservation Futures, State and Federal grants, Utility Funds, Private funding

Community Forests

- o TCMP Action: New Action, Promotes A5.2 from Communitywide Long List of TCMP Actions
- Description: Expand community forest model into Thurston County, leveraging existing infrastructure of Nisqually Community Forest. This action would expand sequestration capacity if new community forests are managed with longer harvest rotations and climate-smart forestry practices. This action would go one step further than purchasing working forest easements (described above), by establishing new entities that would purchase forest land and manage for multiple community benefits (including sequestration). The Nisqually Community Forest in Pierce County grew to 4,120 acres over five years; assuming that rate of expansion could be matched in Thurston County over 25 years, this would result in around 20,000 acres of forestland managed in the Community Forest model by 2050.
- o Potential Lead: Thurston County, Land Trusts
- Partners: Land Trusts

⁵ Review of Pacific Forest Trust working forest easements - https://www.pacificforest.org/.

- Estimated cost: High \$\$\$. Initial costs include the administrative tasks to establish a new community forest (\$500,000) and purchase of initial 2,0000 commercial forestland (\$7 million, estimated at \$3,5000/acre⁶). Ongoing costs would include personnel and other cost to support administration and financial management, land stewardship, and outreach, as well as average acquisition rate of 800 acres/year over 25 years an estimated \$3-4 million/year. Costs could be offset through revenue from timber sales, recreation fees, and/or fundraising, depending on the structure of the organization.
- **Potential Funding source:** Conservation Futures, State and Federal grants, Utility Funds, Private funding, Timber sales

Regional Tree Fund

- TCMP Action: New Action
- Description: Establish a regional fund, coupled with replanting requirements, that would allow developers to pay a set amount if clearing is unavoidable, and tree planting can't occur on site. Funds could be directed to pay for replanting in degraded riparian corridors, identified heat islands, or other areas identified as a priority by the partners.
- Potential Lead: Thurston County, individual cities
- **Partners:** TCMP partners
- Estimated cost: Initial costs would be moderate to establish program administration; ongoing program administration could be paid for out of program fees, but success would be dependent on having enough developers paying into the account to offset costs.
- o Potential funding source: TCMP Work Program, State or Local Grants, Development fees

Urban Forest Carbon Credit Program

- o TCMP Action: Supports existing actions A5.1 and A6.5
- Description: An urban carbon credit program could be a means to preserve trees and increase planting in urban areas, quantify progress toward sequestration targets, and generate funding to offset administrative costs. This type of program would likely involve a partnership with an organization like City Forest Credits or Verified Carbon Standard to certify credits. Challenges to carbon credit programs include that projects expected to count toward the TCMP sequestration target should only be used to offset emissions included in the Thurston region's countywide total, and not be double counted toward some other offset measurement. Areas also may need to demonstrate a tangible threat of conversion. With this restriction, part of the program effort would need to include marketing the credits to potential local purchasers. This strategy could have three general phases:
 - Phase 1 Assess feasibility and applicability of program
 - Phase 2 Program development and set up
 - Phase 3 Ongoing program administration
- o Potential Lead: Thurston County, individual cities, Thurston Conservation District
- **Partners:** TCMP partners, private carbon credit certification and verification company, land trusts, local businesses
- **Estimated cost:** Phase 1: \$15,000, Phase 2: \$50,000, Phase 3: \$20,000. Case study examples suggest administrative overhead for urban credit programs is relatively low, at least through

⁶ Source: Nisqually Land Trust

City Forest Credits. Costs, especially for Phase 1, could be combined with other Carbon Credit Program strategies.

o Potential funding source: TCMP Work Program, State or Local Grants, Private investment

Rural Forest Carbon Credit Program

- **TCMP Action:** Supports existing Action A5.1
- Description: A rural carbon credit program could be a means to preserve forested areas, extend harvest rotations, and increase planting on rural lands; quantify progress toward sequestration targets; and generate funding to offset administrative costs. This type of program would likely involve a partnership with an organization like Verified Carbon Standard to certify credits. Challenges to carbon credit programs include that projects expected to count toward the TCMP sequestration target should only be used to offset emissions included in the Thurston region's countywide total, and not be double counted toward some other offset measurement. Areas also may need to demonstrate a tangible threat of conversion. With this restriction, part of the program effort would need to include marketing the credits to potential local purchasers. This strategy could have three general phases:
 - Phase 1 Assess feasibility and applicability of program
 - Phase 2 Program development and set up
 - Phase 3 Ongoing program administration
- Potential Lead: Thurston County, Thurston Conservation District
- **Partners:** TCMP partners, private carbon credit certification and verification company, land trusts, local businesses
- **Estimated cost:** Phase 1: \$15,000, Phase 2: \$180,000, Phase 3: \$40,000. Costs, especially for Phase 1, could be combined with other Carbon Credit Program strategies.
- o Funding source: TCMP Work Program, State or Local Grants, Private investment

Transfer of Development Rights Program Update

- **TCMP Action:** Supports existing Action T1.1 and could benefit from a new action focused on rural land conservation
- Description: Review and update Thurston County's Transfer of Development Rights program to permit lands important to carbon sequestration to be included as sending areas. For this tool to be successful, there would need to be ongoing costs dedicated to administering and marketing the program.
- Potential Lead: Thurston County
- Partners: cities
- Estimated cost: \$80,000 (0.25 FTE over two years)
- Potential Funding source: Thurston County; state grant

Land Conservation and Restoration Capacity

- TCMP Action: Supports existing Action A5.1
- Description: There already exist numerous programs focused on funding land conservation and restoration work in the region, including programs tied to salmon recovery, water quality and quantity improvement, flood mitigation, and recreation that fund projects with potential sequestration benefits. One of the bottlenecks that limits work on the ground is

staff capacity at local organizations to identify, develop, and manage projects through the application and implementation process, and maintain projects over the long term. Another bottleneck is a lack of sufficient local matching funds for state and federal grant opportunities. This strategy could look for ways to increase the number and extent of conservation and restoration projects being implemented locally, and quantify and track their carbon sequestration benefit as part of the overall TCMP monitoring program. It could also include updating Conservation Futures program eligibility to prioritize funding for projects with a carbon sequestration or climate benefit and reviewing and updating stormwater utility or other local funding mechanisms to ensure they can be used as match for appropriate projects. Scaling up to achieve large reforestation targets faces significant constraints, including current nursery production of tree seedlings and available workforce (Fargione et al 2021). Part of this strategy could include working with local economic development partners to help address these constraints and develop local workforce opportunities.

- **Potential Lead:** Land Trusts, Thurston County, cities
- Partners: Community stakeholders
- Estimated cost: \$50,000/year (0.25-0.3 FTE) Could include additional local funds provided as match for projects or to fund projects outright.
- **Funding source:** TCMP Work Program, Conservation Futures, Thurston Waterways program, local Utility rates, State and Federal grants, other local funds

Reforestation/Afforestation Projects

- o TCMP Action: Supports existing Action A5.1
- Description: Looking at land use change from 2011 to 2016, substantial reforestation is happening in the Thurston region without an active focus on increasing sequestration rates. It is not clear whether this trend will continue, and to what extent it may be sufficient to meet the TCMP targets, a gap that may be partially addressed by the monitoring strategies identified. To accelerate that trend, TCMP partners could directly fund planting projects on suitable land. A program focused on planting in rural areas would have the most potential for contributing to TCMP sequestration targets, though some planting projects could be incorporated into urban forest management programs. Projects could also prioritize replanting areas with multiple benefits, like riparian corridors and floodplains. This strategy could have three general phases:
 - Phase 1 Assess feasibility and applicability of program
 - Phase 2 Program development and set up
 - Phase 3 Ongoing program administration
- o Potential Lead: Thurston County, Thurston Conservation District, Land Trusts,
- o Partners: Thurston County, cities, Community stakeholders
- Estimated cost: Varies depending on program scope and details. According to one review, the median cost of reforestation in the western United States is \$428 per acre (range of \$349-522 per acre).⁷ Assuming a goal of 800 acres/year over 25 years (20,000 acres) and

⁷ Fargione J. et al (2021) Challenges to the Reforestation Pipeline in the United States. Front. For. Glob. Change 4:629198. doi: 10.3389/ffgc.2021.629198. <u>https://www.frontiersin.org/articles/10.3389/ffgc.2021.629198/full</u>

program administration costs of 1 FTE, such a program would cost an estimated \$500,000 annually, with costs likely to increase over time with inflation.

• **Funding source:** TCMP Work Program, Conservation Futures, Thurston Waterways program, local Utility rates, State and Federal grants, other local funds

Agriculture

Regenerative Agriculture Practice Tracking

- **TCMP Action:** Supports existing Action A2.1
- Description: Survey Thurston County farmers on a recurring basis to track the implementation and extent of various regenerative agricultural practices, in order to track progress toward the TCMP target. Survey could also identify barriers to implementing such practices more widely.
- o Potential Lead: WSU Extension, Thurston Conservation District
- **Partners:** Thurston County
- Estimated cost: \$50,000
- o Funding source: Grant, TCMP Work Program

Regenerative Agriculture Outreach and Technical Assistance

- o **TCMP Action:** Supports existing Action A2.1
- Description: Develop an educational outreach campaign for farmers with guidance and technical support on best management practices for implementing regenerative agriculture practices to maximize carbon sequestration benefits. Campaign should provide options targeted to both small and large landowners, and include connecting landowners to funding resources like conservation easements and cost-share programs. Such campaign could build off existing programs, including the Thurston Conservation District's technical support programs.
- Potential Lead: Thurston County, Thurston Conservation District
- Partners: WSU Extension, Washington State Department Agriculture and Conservation Commission
- **Estimated cost:** \$160,000 to establish program; ongoing funding to support outreach staff would depend on scope and reach of program
- Funding source: Sustainable Forest and Fields grant program

Agriculture-related Zoning and Development Code Review

- TCMP Action: New Action
- Description: Review and update planning codes and permit processes to expand zoning protections for lands in agricultural use, and incentivize regenerative agriculture and climate-smart conservation practices.
- **Potential Lead:** Thurston County
- **Partners:** Thurston Conservation District, WSU Extension, Washington State Department Agriculture and Conservation Commission
- **Estimated cost:** Low \$. Initial costs cover staff review and development of code changes, stakeholder outreach, and public process.
- Funding source: State grant, local funds

Conservation Program Amendments

- TCMP Action: New Action
- Description: Review and update existing County land conservation efforts including the Transfer of Development Rights, Conservation Futures, and Open Space Taxation programs to include criteria for carbon sequestration through conservation of agricultural lands and expansion of regenerative agriculture practices. Review whether cost of application to programs are a barrier and, if so, reduce fees to increase participation.
- Potential Lead: Thurston County
- **Partners:** Thurston Conservation District, WSU Extension, Washington State Department Agriculture and Conservation Commission
- **Estimated cost:** Low \$. Initial costs cover staff review and development of code changes, stakeholder outreach, and public process.
- **Funding source:** State grant, local funds

Regional Agriculture Fund

- TCMP Action: New Action
- Description: Establish a regional fund to provide direct support to farmers in their transition from conventional to regenerative agriculture. Fund also could also be used for fee-simple acquisition of agriculture lands or agricultural easements that support regenerative practices.
- Potential Lead: Thurston County, individual cities
- Partners: TCMP partners, Conservation District, WSU Extension
- Estimated cost: Initial costs would be moderate to establish program administration; ongoing program administration could be paid for out of program fees, but success would be dependent on having enough developers paying into the account to offset costs.
- Potential funding source: TCMP Work Program, State or Local Grants, Development fees

Agriculture Carbon Credit Program

- TCMP Action: Supports existing Action A2.1
- Description: An agricultural carbon credit program could be a means to increase application of regenerative agriculture practices, quantify progress toward sequestration targets, and generate funding to offset administrative costs. This type of program would likely involve a partnership with an organization like Verified Carbon Standard to certify credits. Challenges to carbon credit programs include that projects expected to count toward the TCMP sequestration target should only be used to offset emissions included in the Thurston region's countywide total, and not be double counted toward some other offset measurement. Areas also may need to demonstrate a tangible threat of conversion. With this restriction, part of the program effort would need to include marketing the credits to potential local purchasers. This strategy could have three general phases:
 - Phase 1 Assess feasibility and applicability of program
 - Phase 2 Program development and set up
 - Phase 3 Ongoing program administration
- Potential Lead: Thurston County, individual cities, Thurston Conservation District
- **Partners:** TCMP partners, private carbon credit certification and verification company, land trusts, WSU Extension, local businesses

- **Estimated cost:** Phase 1: \$15,000, Phase 2: \$180,000, Phase 3: \$40,000. Costs, especially for Phase 1, could be combined with other Carbon Credit Program strategies.
- o Funding source: TCMP Work Program, State or Local Grants, Private investment

Prairies

Prairie Soil Analysis

- TCMP Action: Supports existing Action 7.3
- Description: Develop range of estimates of carbon sequestration rates provided by South Sound prairies under different land management approaches. Project could include a review of scientific literature and local soil sampling. Integrate this information into future greenhouse gas emission inventories.
- **Potential Lead:** WSU Extension
- o Partners: Center for Natural Lands Management, WDFW
- Estimated cost: \$80,000
- o Funding source: Sustainable Forest and Fields Program; TCMP Work Program

Habitat Conservation Plan Implementation

- TCMP Action: Supports existing Action 7.3
- Description: Support aggressive implementation of habitat conservation plans that provide for preservation and restoration of prairie habitat for endangered and threatened prairie species.
- o Potential Lead: Thurston County, Tumwater, Port of Olympia
- **Partners:** HCP partners
- Estimated cost: \$4.17 million annually; \$125 million over 30 years
- **Funding source:** HCP mitigation fees, Conservation Futures

Prairie Conservation and Enhancement Carbon Credit Program

- **TCMP Action:** Supports existing Action 7.3
- Description: A prairie conservation carbon credit program could be a means to increase restoration of prairie habitat, quantify progress toward sequestration targets, and generate funding to offset administrative costs. This type of program would likely involve a partnership with an organization like Verified Carbon Standard to certify credits. Challenges to carbon credit programs include that projects expected to count toward the TCMP sequestration target should only be used to offset emissions included in the Thurston region's countywide total, and not be double counted toward some other offset measurement. Areas also may need to demonstrate a tangible threat of conversion. With this restriction, part of the program effort would need to include marketing the credits to potential local purchasers. This strategy could have three general phases:
 - Phase 1 Assess feasibility and applicability of program, including potential for connecting with HCMP strategy
 - Phase 2 Program development and set up
 - Phase 3 Ongoing program administration
- o Potential Lead: Thurston County, Center for Natural Lands Management
- **Partners:** TCMP partners, private carbon credit certification and verification company, land trusts, local businesses

- **Estimated cost:** Phase 1: \$10,000, Phase 2: \$180,000, Phase 3: \$40,000. Costs, especially for Phase 1, could be combined with other Carbon Credit Program strategies.
- o Funding source: TCMP Work Program, State or Local Grants, Private investment

Supporting Actions

These activities do not directly increase sequestration, but could help fill information gaps and better guide progress toward achieving the carbon sequestration targets.

Land Use Change Emissions Inventory

- o TCMP Action: Supports existing actions G4.1 and G4.3
- Description: A land use change emissions inventory would provide a comprehensive picture of the climate impact of land management across Thurston County, including from agriculture, forest land, and developed areas, and allow TCMP partners to track the impact of changes on local emissions. This action was recommended by Cascadia Consulting Group in their 2019 review of the countywide GHG inventory methods.

Work would include reviewing IPCC and ICLEI Guidance, working with local stakeholders to establish meaningful definitions for land categories, gathering data on land management practices, completing analysis, and developing report of results to incorporate into the monitoring and assessment program.

Alternatively, TRPC could limit initial work to reviewing and refining results for forest lands using ICLEI's LEARN tool, using a training available through the region's existing membership. Wait for additional land use change data to come available through the state or ICLEI.

- Potential Lead: TRPC
- Partners: TCMP partners, ICLEI, WSU Extension (agriculture data)
- **Estimated cost:** \$25,000 for full land use change inventory; LEARN tool review could be incorporated into existing monitoring task in 2023
- o Funding source: TCMP Annual Work Program

TCMP Action Update

- o TCMP Action: Supports existing Action G4.2
- **Description:** Update the TCMP to add priority actions to the plan that are important to the region's mitigation strategy (ex., an action related to supporting extended timber harvests).
- **Potential Lead:** TRPC
- o Partners: TCMP partners, community stakeholders
- Estimated cost: \$10,000; could be incorporated into standing tasks of TCMP work program
- Funding source: TCMP Work Program

TCMP Target Update

- TCMP Action: Supports existing Action G4.2
- Description: Update TCMP targets to incorporate information related to sequestration. This could include reviewing and updating the overall sequestration target and establishing targets and performance measures for tracking progress in areas like land cover change.

- **Potential Lead:** TRPC
- o Partners: TCMP partners, community stakeholders
- Estimated cost: \$20,000; could be incorporated into standing tasks of TCMP work program
- Funding source: TCMP Work Program

Sequestration Working Group

- o **TCMP Action:** Supports implementation of several sequestration-related actions
- Description: Convene a working group of technical experts and community stakeholders to provide guidance and momentum for implementation of sequestration activities. Such a group could help build regional capacity and partnerships for implementation of sequestration actions, and specifically be the sounding board for developing approaches to the following activities described in other actions:
 - regional sequestration targets and actions for the TCMP
 - guidance for landowner outreach programs
 - feasibility and guidance for connecting with voluntary carbon credit programs and to the state credit program under development through the Climate Commitment Act in ways that appropriately support the goals of the TCMP
- Potential Lead: TRPC
- Partners: TCMP partners, Thurston Conservation District, WSU Extension, Washington State Department of Natural Resources, USDA-NRCS, Center for Natural Lands Management, other community stakeholders
- **Estimated cost:** \$15,000, for up to 6 meetings per year.
- **Funding source:** TCMP Annual Work Program Task 1 includes funding set aside for up to 6 working group meetings per year

Blue Carbon/Tidal Restoration

- o **TCMP Action:** New Action, draws from Action A7.2 in the TCMP long list
- Description: Research and implement blue carbon programs in Thurston County aimed at sequestering carbon through the conservation and restoration of coastal and marine ecosystems.
- Potential Lead: Squaxin Island Tribe, cities, county
- **Partners:** TCMP partners
- Estimated cost: Varies depending on program scope and details. Cost to establish program and conduct restoration is likely high. Costs could be offset if paired with a carbon credit program.
- Funding source: State and federal grants

Carbon Sequestration as a Climate Mitigation Strategy

May 23, 2023

Tumwater City Council

Overview

Background

Thurston Climate Mitigation Plan Context

Sequestration Baseline & Potential

Policy Options & Conclusions



Item 8.

What is carbon sequestration?

- A process that removes carbon dioxide from the atmosphere and stores it in natural or artificial sinks, such as soil, vegetation, and the ocean.
- Other terms: carbon dioxide removal (CDR), negative emissions technologies (NETs), carbon or emissions offsets
- **IPCC:** carbon sequestration will be necessary to meet all modeled pathways to international climate targets

What is carbon sequestration?

Carbon Stock

- Stored carbon in vegetation, soil, rocks, gas, liquid, etc
- Tons C



Carbon Flux

- Movement of carbon from one pool to another
- Carbon emissions, carbon sequestration
- MTCO2e/year





What is carbon sequestration?



FIGURE 7. ILLUSTRATION OF THREE TYPES OF AGRICULTURAL BEST MANAGEMENT PRACTICES WITH CLIMATE BENEFITS HIGHLIGHTED.



Sequestration Types

- Regenerative Agriculture
- Reforestation/Afforestation
- Prairie Preservation and Restoration

Strategies

- *Strategy A2*: Support agricultural practices that sequester carbon.
- *Strategy A5-A7*: Preserve tree canopy and manage forests and prairies to sequester carbon.

Assumptions

- Sequestration will be used to offset countywide emissions
- NOT traded for emissions occurring outside Thurston County

What is the role of carbon sequestration in the TCMP?

What is the role of carbon sequestration in the TCMP?



What is the role of carbon sequestration in the TCMP?

• Target:

- Sequester 380,000 MTCO₂e/year by 2050
- Estimated
 - Agricultural soil carbon: 3,300 MTCO₂e/year
 - Afforestation/Reforestation: 376,300 MTCO₂e/year
- Not Estimated
 - Existing trees or other land covers
 - Restored prairies
 - Urban trees
 - Changes in land use

The TCMP left us with some burning questions...

- How much carbon does land in Thurston County already sequester?
 - We need a baseline in order to track change.
- How much more carbon could certain land covers (forest, agriculture lands, prairies) potentially sequester in the future under different climate mitigation strategies?
- What can regional partners do to meet the 2050 sequestration target?
 - Is it even feasible?

Baseline Sequestration

Method:

ICLEI LEARN Tool

Uses aerial images to measure change in land use type between two years

Forest → Grassland Grassland → Settlement Cropland → Forest



Open Water Perennial Ice and § Developed, Open S Developed, Low In Developed, Mediur Developed, High In Barren Land **Deciduous Forest Evergreen Forest** Mixed Forest Shrub/Scrub Grassland/Herbace Pasture/Hay Cultivated Crops Woody Wetlands Emergent Herbace Item 8.

Baseline Sequestration

How much carbon does land in Thurston County already sequester?

- Forests/trees: 926,800 MTCO₂e/year
 - Source: ICLEI LEARN tool, 2006-2016
- Agriculture: ???
- Prairies: ???
- Other land uses: ???



Baseline Sequestration: Forests and Trees



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Sequestration Potential

Literature Review: Robertson et al. (2021) Reforestation Hub NRCS COMET-PLANNER, Washington Climate Smart Estimator CARB Land Restoration Benefit Calculator Tool

What strategies could increase carbon sequestration?

- TCMP Actions
 - Regenerative agriculture (A2.1)
 - Reforestation/afforestation (A5.1)
 - Prairie preservation (A7.3)
- Other Actions
 - Extended timber harvest
 - Avoided conversion of forests
 - Tidal wetland restoration

Sequestration Potential



Policy Options

What actions could regional partners take?

- Report outlines 30 potential actions
 - Cost initial and ongoing
 - Staff requirements
 - Carbon sequestration potential
- Options
 - Technical assistance/outreach
 - Regulatory
 - Financial incentives
 - Data/Enabling

Policy Options

Support rural forest conservation and incentive programs

- State program advocacy
- Feasibility of regional incentive programs

Align existing programs with sequestration goals

- Comprehensive Plans
- HCP implementation
- TCMP target update

Fill priority data gaps

- Land use change emissions inventory
- Regional tree canopy update
- Prairie soil analysis
- Regenerative agriculture tracking

Build relationships with community partners and track state/federal programs

• Sequestration working group
Sequestration Questions

- What actions should be taken to achieve carbon sequestration targets?
- What role should carbon sequestration play in achieving our emissions targets?
 - Should we adjust our assumptions/targets?
 - Focus on offsets? Focus on co-benefits?
 - Keep within county boundary? Consider expanded markets?
- What should be the relative role of different sequestration strategies?
- What are the costs relative to the benefits of different strategies?

Who else is working on this?

State

Department of Natural Resources

- Climate Resilience Plan (2020) and Forest Action Plan (2020)
- Small Forest Landowner and Stewardship Program
- Urban and Community Forest Program
- Carbon Project includes land in Thurston County

Washington State Conservation Commission

- Voluntary Stewardship Program
- Sustainable Farms and Fields Program

Climate Commitment Act (Ecology)

- Includes carbon offsets for reforestation, avoided forest conversion, improved forest management, urban forestry, livestock management
- Offset projects located in Thurston County sold through carbon registries (including state and private programs) will not necessarily offset Thurston County emissions.

Conclusions

- Existing forests and trees sequester ~927,000 MTCO₂e/year
 - Additional info needed to get a complete baseline
- TCMP sequestration target highly ambitious, likely infeasible
- Partners have a menu of options for next steps

Thank You!

Staff Contact

Allison Osterberg, Senior Planner

www.trpc.org/climate climate@trpc.org

Rural Forests

- Half of Thurston County is forested
- •93% of forested land is in the rural county
- •**60%** of rural forested land is managed for timber harvest
 - Largely in private timber companies
 - Some state managed lands
- •37% is private, non forestry
- 3% in a designated park of preserve



Item 8.

Sequestration Potential

Sequestration Strategies	Low	High
Sequestration actions included in the TCMP		
Regenerative agriculture (A2.1)	340	6,990
Reforestation/afforestation (A5.1)	170	118,820
Prairie preservation (A7.3)	1	4,760
Other sequestration actions		
Extended timber harvest	117,600	171,180
Tidal wetland restoration	4,300	12,540
SUBTOTAL	122,411	314,290
Actions that maintain sequestration capacity		
Avoided conversion of forests ^o	11,310	56,490

° Avoiding forest conversion will not increase total sequestration. It will only reduce future net emissions.

Estimated Sequestration Potential (MTCO₂e/year)

TO:	Tree Board
FROM:	Alyssa Jones Wood, Sustainability Coordinator
DATE:	October 9, 2023
SUBJECT:	Discussion – Tumwater Public Urban Forest Inventory

1) <u>Recommended Action</u>:

Discussion item.

2) <u>Background</u>:

The City Council adopted the Urban Forestry Management Plan (UFMP) on March 2, 2021 by Ordinance No. 2020-004. On March 30, 2023, City Staff submitted a grant proposal for the Washington Department of Natural Resources (DNR) Urban & Community Forestry Grant Opportunity which was awarded.

3) <u>Alternatives</u>:

□ Schedule further discussion at the Tree Board's November 13, 2023 meeting

4) <u>Attachments</u>:

- A. Memorandum
- B. Grant Agreement
- C. Service Provider Agreement
- D. DNR Minimum Tree Inventory Data

MEMORANDUM

Date: October 9, 2023 To: Tree Board From: Alyssa Jones Wood, Sustainability Coordinator



Recommended Action

Discuss this project and the ways in which the Tree Board might like to be involved.

Fiscal Impact

The City was awarded a grant for \$40,000 of the estimated \$60,000 total project costs.

Background

The Urban Forestry Management Plan (UFMP) was adopted by the Tumwater City Council on March 2, 2021, by Ordinance No. 2020-004. The UFMP includes a myriad of goals, objectives, and actions intended to guide the City's management of the Urban Forest.

On March 30, 2023, City staff submitted a grant proposal for the Washington Department of Natural Resources (DNR) Urban & Community Forestry grant opportunity. The proposed project intends to address the following actions from the UFMP:

Objective 2.2. Develop a City street tree-trimming program.

<u>Action A.</u> Develop tree-trimming areas based on optimal equipment mobilization, priority locations, current tree inventory, and best management practices.

Objective 3.1. Promote efficient and cost-effective management of the community and urban forest by selecting, situating, and maintaining urban trees appropriately to maximize benefits and minimize hazards, nuisances, hardscape damage, and maintenance costs.

<u>Action D:</u> Prioritize and schedule City-assigned street tree maintenance activities according to inventory-documented needs.

Objective 3.2. Adopt best management practices and resource management assessment tools and data management to improve City tree maintenance to manage City-owned community and urban forest areas.



<u>Action C.</u> Develop a program to eliminate deferred maintenance while being mindful of budgetary constraints.

Objective 5.1. Develop a stable funding source and budget for activities that support the community and urban forest.

Action C. Secure funding for a four-year cycle of tree trimming.

<u>Action D.</u> Conduct, budget, and report to City staff on an inventory of trees for species, number, condition, and maintenance needs in developed landscaped areas on City property, such as City street trees and trees in City facilities and parks.

Objective 7.1. Promote collaborations between residents, neighborhood associations, governments, nonprofits, and businesses.

<u>Action H.</u> Involve volunteers in the tree inventory of all City street trees and trees in City Parks performed regularly.

The proposal was selected by DNR and a grant agreement between the City and DNR was fully executed on July 7, 2023. To carry out much of the work related to this Project, the City has entered into a service provider agreement with Davey Resource Group, Inc. The project was kicked off on September 13, 2023.

Activity 1: Tree Inventory		
Task	Tentative Timeline	Notes
Task 1A: Consultant updates	October 10 – December 9,	In line with UFMP Objective
existing street tree inventory data	2023	7.1 Action H, the City will recruit and coordinate volunteers to review 2018 Street Tree data and update it utilizing a tool the consultant will provide.
Task 1B: Consultants collect new	October 10 – December 9,	
point-based tree inventory data	2023	
and performs data analysis		
Task 1C: Consultant collects new	October 10 – December 9,	
inventory using a sample-based	2023	
approach		
Activity 2: Community and Urban For	est Maintenance Report	
Task 2A: Consultant writes	December 9, 2023 – February	
summary of methodology and	24, 2024	
inventory results		
Task 2B: Consultant reports on the	December 9, 2023 – February	City staff plan to utilize this
results of the iTree analysis	24, 2024	data to create a GIS StoryMap

The Scope of Work and estimated timeline for this Project is as follows:

		after the project is completed to visualize the ecosystem services provided by trees by property.
Task 2C: Consultant develops	December 9, 2023 – February	
maintenance prioritization and	24, 2024	
strategy		
Task 2D: Consultant provides cost	December 9, 2023 – February	This will be utilized to
estimates for maintenance work	24, 2024	formulate budget requests for
		the 2025/2026 Budget.
Task 2E: Consultant develops	December 9, 2023 – February	This task will utilize the WA
planning strategy for improving	24, 2024	Department of Health
tree canopy equity		Environmental Health
		Disparities Map, the Trust for
		Public Land Heat Island data,
		and City data.

The Consultant has requested that one or more members of the Tree Board visit field data collection as well as review data collected for quality assurance purposes early in the project.

Staff requests input from the Tree Board regarding the ways in which they would like to be involved in this project.

Funds for this project were provided by the USDA Forest Service Urban and Community Forestry Program, administered through the State of Washington Department of Natural Resources Urban and Community Forestry Program. The USDA is an equal opportunity provider and employer.

Item 9.



GRANT AGREEMENT STATE OF WASHINGTON DEPARTMENT OF NATURAL RESOURCES (DNR) CONTRACT NO. 93-105343

PI: 244, OKF Funding Source: Federal Grant Funded: ⊠ Yes □ No OMWBE: □ Small Business □ Veteran Owned ⊠ Not Applicable Procurement method: ⊠ Solicitation (RFA 23-39)

This Grant Agreement is made and entered into by and between the state of Washington, Department of Natural Resources, hereinafter referred to as "AGENCY/DNR", and the below named firm, hereinafter referred to as "GRANTEE."

City of Tumwater 555 Israel Road SW Tumwater, WA 98501 Phone: 360-754-4140 Email: ajoneswood@ci.tumwater.wa.us WA State UBI Number: 344000001 Federal Taxpayer Identification Number: 91-6001520 Statewide Vendor # (SWV): SWV0007172

1. PURPOSE

The intent of the 2023 Community Forestry Assistance grant program is to assist communities in developing urban forest planning, programming tools, and activities that may not otherwise receive local funding. Projects are to improve management, care, and public engagement with

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trees growing in parks, natural areas, and along public rights-of-way. These projects address social and environmental disparities in Washington communities by investing in community-identified urban forestry needs advancing environmental, social, or public health outcomes.

The purpose of this grant agreement is to complete an inventory of the City-owned urban forest, update the city's 2018 Street Tree inventory to include DNR required fields, and produce a Community and Urban Forest Maintenance Report to guide future maintenance.

2. SCOPE OF WORK

- A. Exhibit A, attached hereto and incorporated by reference, contains the *General Terms and Conditions* governing work to be performed under this grant agreement, the nature of the working relationship between DNR and the GRANTEE, and specific obligations of both parties.
- B. Exhibit B, attached hereto and incorporated by reference, contains the Scope of Work. The GRANTEE will provide services and staff, and otherwise do all things necessary for or incidental to the performance of work as included in the Scope of Work.

Projects must be located on public property, or be open to public access. Grant funds may not be used to meet ordinary maintenance and operating expenses.

- C. The GRANTEE shall produce the following written reports by the dates indicated below.
 - Midterm Report: December 29, 2023
 - Final Report: May 31, 2024

The GRANTEE must fill out a report template that includes the following information:

- Summary of the project status
- Achievements or setbacks (if any) to date
- Progress by activity, task, and deliverable
- Line item report of expenditures from the grant funding

The final report must be submitted with the final invoice at the conclusion of the project. The final report must include the following information in addition to the report template:

- Activities undertaken,
- Barriers and lessons learned,
- Any maps and other relevant graphics related to the deliverables,
- Outcomes achieved,
- Minimum Match Requirements Report (page 3, AWARD), and
- 400-500 word article telling the story of the project including references to DNR (and the USDA Forest Service if federally funded), local project partners, location, purpose, and outcomes as well as two high quality images

3. PERIOD OF PERFORMANCE

The period of performance under this grant agreement will be from the date of execution through April 20, 2024 unless terminated sooner as provided herein. Amendments to extend the period of performance are not allowed.

4. AWARD

The total grant award payable to GRANTEE for satisfactory performance of the work under this grant agreement shall not exceed Forty Thousand Dollars (\$40,000). GRANTEE's compensation for services rendered shall be based on Exhibit C – Budget.

Unless otherwise determined, funding for this agreement is provided by USDA Forest Service grant, Grant No: 2019-DG-11062765-729 DNR Program Index 244, Project Code OKF.

Minimum Match Requirements Report

The minimum required amount of matching dollars for this grant award is \$20,000.

The GRANTEE must provide a report recording the source and amount of matching dollars (e.g. grantee, in-kind, donated cash match) that equals, or exceeds, the match requirement. This record must be submitted along with the Final Grant Report. The GRANTEE must also provide a list of any deliverables associated with the recorded match as well as a copy of created materials or data, if applicable. DNR reserves the right to withhold payment of the final invoice until the GRANTEE provides both the match record, and evidence of associated deliverables.

5. BILLING PROCEDURES

DNR will pay GRANTEE upon satisfactory acceptance of each fully completed activity and affiliated tasks outlined in the scope of work documented by associated deliverables as approved by the DNR Grant Manager. Invoices may only be submitted to the DNR Grant Manager along with the midterm report and final report. Invoices and the required supporting documentation must be submitted as one PDF document.

Each invoice submitted to DNR shall include information needed by DNR to determine the exact nature of all expenditures and completed work. At a minimum, each invoice shall specify the following:

- 1. Agreement number 93-105343
- 2. Invoice date
- 3. Organization name and contact information
- 4. Primary contact phone number and email address
- 5. Narrative description of the work performed towards completing the activities, tasks, and deliverables
- 6. Detail of the expenses being billed for each activity and task
 - a. The detail format must reflect Exhibit B, Scope of Work; include the task and deliverable descriptions, and the amount
- 7. Supporting documentation for all expenses being billed
- 8. Total invoice amount

No payments in advance or in anticipation of services or goods to be provided under this contract shall be made by DNR.

Payment will be made by check, warrant, or account transfer within 30 days of receipt of the invoice. Upon expiration of the Agreement, final invoices shall be paid, if received within 30 days after the expiration date. However, invoices for all work done within a fiscal year must be submitted within 30 days after the end of the fiscal year. Each invoice submitted to DNR shall include information needed by DNR to determine the exact nature of all expenditures and completed work.

Special Budget Provisions

Transfer of funds between line items is allowed and shall not exceed 10% of the total budget. Such transfer needs to have prior approval with the DNR Grant Manager. If the cumulative amount of these transfers exceeds or is expected to exceed 10% of the total budget, this is subject to justification and a contract amendment.

Fiscal Year Closures

Under fiscal year closing procedures, the GRANTEE must submit all invoices and/or billings for services or material supplied under this Agreement through June 30, to DNR no later than July 14 of a given year. If DNR does not receive invoices and bills by July 14 of the year of the closing biennium, a considerable delay in payment may result.

DNR may, in its sole discretion, terminate the grant agreement or withhold payments claimed by the GRANTEE for services rendered if the GRANTEE fails to satisfactorily comply with any term or condition of this grant agreement.

Final payment will be withheld until satisfactory acceptance of the final report (page 2, SCOPE OF WORK) and Minimum Match Requirements Report (page 3, AWARD).

6. OUTREACH AND PRINTED MATERIALS

All printed materials, signs, and other products including websites resulting from this agreement must be reviewed by DNR prior to publishing. All projects must include an acknowledgement of funding sources, and may be recognized as follows:

"Funds for this project were provided by the USDA Forest Service Urban and Community Forestry Program, administered through the State of Washington Department of Natural Resources Urban and Community Forestry Program."

USDA Equal Opportunity statement must be included in all publications: "*The USDA is an equal opportunity provider and employer*."

Appropriate agency logos may be used in addition to the above statement, and will be supplied to the GRANTEE. Use of agency logos must be reviewed and approved by the funding agencies prior to publishing.

7. GRANT MANAGEMENT

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The Grant Manager for each of the parties shall be the contact person for all communications and billings regarding the performance of this grant agreement.

GRANTEE Grant Manager Information	AGENCY Grant Manager Information
Bonnie Hale	Sajjadullah Alokozai
City of Tumwater	Department of Natural Resources
555 Israel Road SW	1111 Washington Street SE
Tumwater, WA 98501	Olympia, WA 98504-7037
Phone: 360-754-4140	Phone: 360-915-3944
Email address: bhale@ci.tumwater.wa.us	Email address: sajjadullah.alokozai@dnr.wa.gov
GRANTEE Project Manager Information	AGENCY Project Manager Information
Alyssa Jones Wood	Ben Thompson
City of Tumwater	Department of Natural Resources
555 Israel Road SW	1111 Washington Street SE
	TITT washington Street SE
Tumwater, WA 98501	Olympia, WA 98504-7037
Tumwater, WA 98501 Phone: 360-754-4140	Olympia, WA 98504-7037 <i>Phone:</i> 360-485-8651

8. INSURANCE

Before using any of said rights granted herein and at its own expense, GRANTEE shall purchase and maintain, or require its agent(s)/subcontractor to purchase and maintain, the insurance described below for the entire duration of this Agreement. Failure to purchase and maintain the required insurance may result in the termination of the Agreement at DNR's option.

All insurance provided in compliance with this Agreement shall be primary as to any other insurance or self-insurance programs afforded to, or maintained by, the State of Washington, Department of Natural Resources.

GRANTEE shall provide DNR with certificates of insurance, executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements specified in this Agreement before using any of said rights granted herein. The description section of the certificate shall contain the Grant Agreement Number and the name of the DNR Project Manager. GRANTEE shall also provide renewal certificates as appropriate during the term of this Agreement.

GRANTEE shall include all subcontractors and agents as insured under all required insurance policies or shall provide separate certificates of insurance for each subcontractor or agent. Failure of GRANTEE to have its subcontractors and agents comply with the insurance requirements contained herein does not limit GRANTEE's liability or responsibility.

INSURANCE TYPES & LIMITS: The limits of insurance, which may be increased by State, as deemed necessary, shall not be less than as follows:

<u>Commercial General Liability (CGL) Insurance</u>: GRANTEE shall purchase and maintain commercial general liability insurance with a limit of not less than \$1,000,000 per each occurrence. If such CGL insurance contains aggregate limits, the general aggregate limits shall be at least twice the "each occurrence" limit, and the products-completed operations aggregate limit shall be at least twice the "each occurrence" limit. All insurance must cover liability arising out of premises, operations, independent GRANTEEs, products completed operations, personal injury and advertising injury, and liability assumed under an insured contract (including the tort liability of another party assumed in a business contract) and contain separation of insured (cross-liability) condition.

<u>Employer's liability ("Stop Gap") Insurance</u>: GRANTEE shall purchase and maintain employer's liability insurance and if necessary, commercial umbrella liability insurance with limits not less than \$1,000,000 each accident for bodily injury by accident or \$1,000,000 each employee for bodily injury by disease.

<u>Business Auto Policy (BAP) Insurance</u>: GRANTEE shall purchase and maintain business auto insurance and if necessary, commercial umbrella liability insurance with a limit of not less than \$1,000,000 per accident, with such insurance covering liability arising out of "Any Auto". The policy shall be endorsed to provide contractual liability coverage and cover a "covered pollution cost or expense." GRANTEE waives all rights of subrogation against State for the recovery of damages to the extent they are covered by business auto liability or commercial umbrella liability insurance.

<u>Industrial Insurance (Workers Compensation)</u>: GRANTEE shall comply with Title 51 RCW by maintaining workers compensation insurance for its employees. GRANTEE waives all rights of subrogation against State for recovery of damages to the extent they are covered by Industrial Insurance, employer's liability, general liability, excess, or umbrella insurance. GRANTEE waives its Title 51 RCW immunity to the extent it is required by its indemnity obligation under this Agreement.

ADDITIONAL PROVISIONS:

<u>Additional Insured</u>: The State of Washington, Department of Natural Resources, its officials, agents, and employees shall be named as additional insured by endorsement on all general liability, excess, and umbrella insurance policies.

<u>Cancellation</u>: DNR shall be provided written notice before cancellation or non-renewal of any insurance referred to therein, in accord with the following specifications.

- 1. Insurers subject to Chapter 48.18 RCW (Admitted and Regulated by the Insurance Commissioner): The insurer shall give the State 45 days advance notice of cancellation or nonrenewal. If cancellation is due to non-payment of premium, the State shall be given 10 days advance notice of cancellation.
- 2. Insurers subject to Chapter 48.15 RCW (Surplus Lines): The State shall be given 20 days advance notice of cancellation. If cancellation is due to non-payment of premium, the State shall be given 10 days advance notice of cancellation.

<u>Insurance Carrier Rating</u>: All insurance shall be issued by companies admitted to do business in the State of Washington and have a rating of A-, Class VII, or better. Any exception must be reviewed and approved by the DNR Risk Manager or the DNR Contracts Manager, in the Risk Manager's absence. If an insurer is not admitted to do business in the State of Washington, all insurance policies and procedures for issuing the insurance policies must comply with Chapters 48.15 RCW and 284-15 WAC.

<u>Self-Insurance</u>: If GRANTEE is self-insured, evidence of its status as a self-insured entity shall be provided to State. The evidence should demonstrate that GRANTEE's self-insurance meets all of the required insurance coverage of this Agreement to the satisfaction of State including the description of the funding mechanism and its financial condition. If the funding mechanism or financial condition of the self-insurance program of GRANTEE is inadequate, then State may require the purchase of additional commercial insurance to comply with this Agreement.

<u>Waiver</u>: GRANTEE waives all rights of subrogation against State for recovery of damages to the extent these damages are covered by general liability, excess, or umbrella insurance maintained pursuant to this Agreement.

9. ASSURANCES

AGENCY and the GRANTEE agree that all activity pursuant to this grant agreement will be in accordance with all the applicable current federal, state, and local laws, rules, and regulations.

10. ORDER OF PRECEDENCE

Each of the exhibits listed below is by this reference hereby incorporated into this grant agreement. In the event of an inconsistency in this grant agreement, the inconsistency shall be resolved by giving precedence in the following order:

- 1. Applicable federal statutes and regulations.
- 2. Terms and conditions of a grant awarded to the state from the federal government, attached as Exhibit D.
- 3. Washington state statutes and regulations.
- 4. Special terms and conditions as contained in this basic contract instrument.
- 5. Exhibit A WA State Department of Natural Resources General Terms and Conditions.
- 6. Exhibit B Scope of Work.
- 7. Exhibit C Budget.
- 8. Any other provision, term or material incorporated herein by reference or otherwise incorporated.

11. ENTIRE AGREEMENT

This grant agreement, including referenced exhibits, represents all the terms and conditions agreed upon by the parties. No other statements or representations, written or oral, shall be deemed a part hereof.

12. CONFORMANCE

If any provision of this grant agreement violates any statute or rule of law of the state of Washington, it is considered modified to conform to that statute or rule of law.

13. APPROVAL

By signature below, the Parties certify that the individuals listed in this document, as representatives of the Parties, are authorized to act in their respective areas for matters related to this instrument.

IN WITNESS WHEREOF, the parties have executed this Agreement.

CITY OF TUMWATER

STATE OF WASHINGTON DEPARTMENT OF NATURAL

DocuSigned by:	RESOURCES
Dephie Sullivan 7/6/2023	DocuSigned by: 7/7/2023
Signature Date	Signature Date
0	0
Debbie Sullivan	Andy Tate
Name	Name
	Community & Landowner Assistance
Mayor	Assistant Division Manager
Title	Title
555 Israel Road SW	1111 Washington Street SE
Tumwater, WA 98501	Olympia, WA 98504-7037
Address	Address
(360) 754-4120	(360) 902-1798
Telephone	Telephone
-	-

EXHIBIT A

WA STATE DEPARTMENT OF NATURAL RESOURCES GENERAL TERMS AND CONDITIONS

1. ACCESS TO DATA

The Contractor shall provide access to data generated under this contract to the Agency, the Joint Legislative Audit and Review Committee, and the State Auditor at no additional cost. This includes access to all information that supports the findings, conclusions, and recommendations of the Contractor's reports, including computer models and methodology for those models.

2. ADVANCE PAYMENTS PROHIBITED

No payments in advance of or in anticipation of goods or services to be provided under this contract shall be made by the Agency.

3. AMENDMENTS

This contract may be amended by mutual agreement of the parties. Such amendments shall not be binding unless they are in writing and signed by personnel authorized to bind each of the parties.

4. AMERICANS WITH DISABILITIES ACT (ADA) OF 1990, PUBLIC LAW 101-336, also referred to as the "ADA" 28 CFR Part 35

The Contractor must comply with the ADA, which provides comprehensive civil rights protection to individuals with disabilities in the areas of employment, public accommodations, state and local government services, and telecommunications.

5. ANTITRUST

The Contractor hereby assigns to Agency any and all of its claims for price fixing or overcharges, which arise under federal or state law relating to the goods, products, or services purchased under this contract.

6. ASSIGNMENT

Neither this contract, nor any claim arising under this contract, shall be transferred or assigned by the Contractor without prior written consent of the Agency.

Contractor may not assign its rights under this Agreement without Department of Natural Resources (DNR) prior written consent and DNR may consider any attempted assignment without such consent to be void; *Provided*, however, that, if Contractor provides written notice to DNR within thirty (30) calendar days, Contractor may assign its rights under this Agreement in full to any parent, subsidiary, or affiliate of the Contractor that controls or is controlled by or under common control with the Contractor, is merged or consolidated with the Contractor, or purchases a majority or controlling interest in the ownership or assets of the Contractor. Unless otherwise

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agreed, the Contractor guarantees prompt performance of all obligations under this Agreement notwithstanding any prior assignment of its rights.

7. ATTORNEYS' FEES

In the event of litigation or other action brought to enforce contract terms, each party agrees to bear its own attorney fees and costs.

8. COMPLIANCE WITH APPLICABLE LAW

At all times during the term of the contract, the Contractor shall comply with all applicable laws.

9. CONFIDENTIALITY/SAFEGUARDING OF INFORMATION

The Contractor shall not use or disclose any information concerning the Agency, or information that may be classified as confidential, for any purpose not directly connected with the administration of this contract, except with prior written consent of the Agency, or as may be required by law.

10. CONFLICT OF INTEREST

Notwithstanding any determination by the Executive Ethics Board or other tribunal, the Agency may, in its sole discretion, by written notice to the Contractor terminate this contract if it is found after due notice and examination by the Agent that there is a violation of the Ethics in Public Service Act, Chapter 42.52 RCW; or any similar statute involving the Contractor in the procurement of, or performance under this contract.

In the event this contract is terminated as provided above, the Agency shall be entitled to pursue the same remedies against the Contractor as it could pursue in the event of a breach of the contract by the Contractor. The rights and remedies of the Agency provided for in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law. The existence of facts upon which the Agent makes any determination under this clause shall be an issue and may be reviewed as provided in the "Disputes" clause of this contract.

11. COPYRIGHT PROVISIONS

Unless otherwise provided, all materials produced under this contract shall be considered "works for hire" as defined by the U.S. Copyright Act and shall be owned by the Agency. The Agency shall be considered the author of such materials. In the event the materials are not considered "works for hire" under the U.S. Copyright laws, Contractor hereby irrevocably assigns all right, title, and interest in materials, including all intellectual property rights, to the Agency effective from the moment of creation of such materials.

Materials means all items in any format and includes, but is not limited to, data, reports, documents, pamphlets, advertisements, books, magazines, surveys, studies, computer programs,

films, tapes, and/or sound reproductions. Ownership includes the right to copyright, patent, register and the ability to transfer these rights.

For materials that are delivered under the contract, but that incorporate pre-existing materials not produced under the contract, Contractor hereby grants to the Agency a nonexclusive, royalty-free, irrevocable license (with rights to sublicense others) in such materials to translate, reproduce, distribute, prepare derivative works, publicly perform, and publicly display. The Contractor warrants and represents that Contractor has all rights and permissions, including intellectual property rights, moral rights and rights of publicity, necessary to grant such a license to the Agency.

The Contractor shall exert all reasonable effort to advise the Agency, at the time of delivery of materials furnished under this contract, of all known or potential invasions of privacy contained therein and of any portion of such document that was not produced in the performance of this contract.

The Agency shall receive prompt written notice of each notice or claim of infringement received by the Contractor with respect to any data delivered under this contract. The Agency shall have the right to modify or remove any restrictive markings placed upon the data by the Contractor.

12. COVENANT AGAINST CONTINGENT FEES

The Contractor warrants that no person or selling Agent has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, excepting bona fide employees or bona fide established Agents maintained by the Contractor for securing business.

The Agency shall have the right, in the event of breach of this clause by the Contractor, to annul this contract without liability or, in its discretion, to deduct from the contract price or consideration or recover by other means the full amount of such commission, percentage, brokerage or contingent fee.

13. DEFAULT

Contractor shall be in default if it is in material breach of any term or condition of the contract. The time of default shall begin when the material breach occurs or after any applicable opportunity to cure period lapses, whichever is later.

14. DELIVERY, INSPECTION, REJECTION, CURE:

1. TIME OF THE ESSENCE: Time is of the essence in the performance of the contract.

- SHIPPING & RISK OF LOSS. All goods subject to the Contract shall be shipped F.O.B. destination. Risk of loss of the goods shall pass to the Agency at the time the goods are accepted by the Agency.
- 3. INSPECTION: The Agency's inspection of all goods upon delivery is for the sole purpose of identification. Such inspection shall not be construed as acceptance of the goods.
- 4. REJECTION: The Agency may reject any nonconforming Deliverables by reasonably notifying the Contractor in writing.
- 5. OPPORTUNITY TO CURE: Contractor shall have the right to cure the materiality of any breach prior to the time for performance under the Contract. This right to cure terminates upon the time for performance.

15. DEFINITIONS

Definitions for the purposes of this solicitation include:

AGENCY – any state office or activity of the executive and judicial branches of state government, including state agencies, departments, offices, divisions, boards, commissions, institutions of higher education as defined in RCW 28B.10.016, and correctional and other types of institutions.

AGENT – Personnel authorized to act on behalf of the Agency for matters contained within.

APPARENT SUCCESSFUL CONTRACTOR – Bidder whose bid, quotation and/or proposal provides the best value in meeting AGENCY needs and is selected to contract with DNR for the proposed solution, subject to completion of contract negations and execution of contract.

AWARD DATE – the announcement date of the Apparent Successful Contractor.

BID, QUOTATION and/or PROPOSAL - a formal offer, submitted by an individual or entity, in response to a solicitation issued for goods or services by the Agency.

BIDDER – an individual or entity who submits a bid, quotation and/or proposal in response to a solicitation issued for goods or services by the Agency.

BUSINESS DAYS – Monday through Friday, 8AM to 5PM, Pacific Standard Time, or, Pacific Daylight Time, Olympia, Washington, USA.

CALENDAR DAY – Midnight to midnight, any day of the week.

CONTRACT – an agreement between DNR and Contractor that includes terms and conditions, the solicitation, the bid, quotation and/or proposal, all appendices, and exhibits, associated Statements of Work (e.g. Services Contract or Purchase Order), and all amendments awarded pursuant to this solicitation.

CONTRACTOR – an individual or entity whose bid, quotation and/or proposal has been accepted and is awarded a contract with the Agency, and who is solely responsible to provide a good or perform a service.

DNR – Washington State Department of Natural Resources, an Agency of the State of Washington, and any division, section, office, unit or other entity of, or any of the officers or other officials lawfully representing the department.

GOODS – products, materials, supplies, or equipment provided by a Contractor.

PURCHASE – the acquisition of goods or services, including the leasing or renting of goods.

SERVICES – labor, work, analysis, or similar activities provided by a Contractor to accomplish a specific scope of work.

SOLICITATION – a documented formal process providing an equal and open opportunity to BIDDERS and culminating in a selection based on predetermined criteria.

SUBCONTRACTOR – one not in the employment of the Contractor, who is performing all or part of the business activities related to this solicitation under a separate contract with the Contractor. The terms "Subcontractor" and "Subcontractors" means Subcontractor(s) in any solicitation tier.

VENDOR – individual, firm, organization, company or other entity offering products and/or services.

WEBS – Washington's Electronic Business Solution System.

WORKING DAYS – Midnight to midnight, Monday through Friday, excluding weekends and state legal holidays.

16. DISALLOWED COSTS

The Contractor is responsible for any audit exceptions or disallowed costs incurred by its own organization or that of its Subcontractors.

17. DISPUTES

Except as otherwise provided in this contract, when a dispute arises between the parties and it cannot be resolved by direct negotiation, either party may request a dispute hearing with the Agent.

- 1. The request for a dispute hearing must:
 - Be in writing;
 - State the disputed issue(s);
 - State the relative positions of the parties;
 - State the Contractor's name, address, and contract number; and

- Be mailed to the Agent and the other party's (respondent's) contract manager within three
 (3) working days after the parties agree that they cannot resolve the dispute.
- 2. The respondent shall send a written answer to the requester's statement to both the Agent and the requester within five 5 working days.
- 3. The Agent shall review the written statements and reply in writing to both parties within 10 working days. The Agent may extend this period if necessary by notifying the parties.
- 4. The parties agree that this dispute process shall precede any action in a judicial or quasi-judicial tribunal.

Nothing in this contract shall be construed to limit the parties' choice of a mutually acceptable alternate dispute resolution method in addition to the dispute resolution procedure outlined above.

18. DUPLICATE PAYMENT

The Agency shall not pay the Contractor, if the Contractor has charged or will charge the State of Washington or any other party under any other contract or agreement, for the same goods delivered or services rendered.

19. ENVIRONMENTAL CONSIDERATIONS

ELECTRONIC PRODUCTS

The State of Washington encourages the purchase of products that meet environmental performance standards relating to the reduction and elimination of hazardous materials. The database of all products that currently meet EPEAT criteria are viewable at <u>www.greenelectronicscouncil.org</u>. Only products listed as Active in the online EPEAT Registry are considered to have met the EPEAT criteria.

Contractor represents and warrants that, during the term of this contract, for any product(s) for which Contractor sought and was awarded an environmental purchasing preference pursuant to RCW 39.26.265 and Washington State Procurement Policy POL-DES-265-00, such product(s) shall have achieved EPEAT Silver or Gold registration that enabled Contractor to be awarded such preference.

NON-HYDROFLUOROCARBONS (HFCs)

Hydrofluorocarbons (HFCs) contribute to climate change and so have an adverse effect on human health and the environment. Accordingly, the State of Washington, through its procurement of goods is trying to minimize the purchase of products that contain HFCs or contain HFCs with a comparatively low global warming potential and to incentivize its vendors to sell products without HFCs.

Contractor represents and warrants that, during the term of this Contract, for any product(s) for which Contractor sought and was awarded a purchasing preference pursuant to RCW 39.26.310 and Washington State Procurement Policy DES-POL-310-00, such product(s) shall meet or have less than the HFC level(s) that enabled Contractor to be awarded such preference.

NON-MERCURY ADDED PRODUCTS

Mercury has an adverse effect on human health and the environment. Accordingly, the State of Washington, through its procurements of goods is trying to minimize the purchase of products with mercury and to incentivize its vendors to sell products without mercury.

Contractor represents and warrants that, during the term of this Contract, for any product(s) for which Contractor sought and was awarded a purchasing preference pursuant to RCW 70.95M.060 and Washington State Procurement Policy DES-POL-70.95M.060-00, such product(s) shall meet or have less than the lowest amount of mercury that enabled Contractor to be awarded such preference.

POLYCHLORINATED BIPHENYLS (PCBs)

Polychlorinated biphenyls, commonly known as PCBs, have adverse effects on human health and the environment. Accordingly, the State of Washington, through its procurements of goods, is trying to minimize the purchase of products with PCBs and to incentivize its vendors to sell products in packaging without them.

Contractor represents and warrants that, during the term of this contract, for any product(s) and/or product packaging for which Contractor sought and was awarded a purchasing preference pursuant to RCW 39.26.280 and Washington State Procurement Policy POL-DES-280-00, such product(s) and/or packaging shall meet or exceed the testing limitations that enabled Contractor to be awarded such preference.

RECYCLED CONTENT PRODUCTS

Buying products made from recycled content creates markets for materials collected in residential & business recycling programs. Recycling does not work without end-markets. In addition buying recycled products supports the development of green technologies, creates jobs and strengthens the local economy, and promotes and supports a more sustainable lifestyle. When manufacturers use recycled material vs. virgin materials to make new products, air and water pollution is reduced, natural resources are conserved, energy is saved, less water is used, and emissions of greenhouse gases that contribute to global climate change are reduced. Accordingly, the State of Washington through its procurements of goods is trying to maximize the purchase of products made from recycled content and to incentivize its vendors to sell products and products in packaging made with recycled content.

Contractor represents and warrants that, during the term of this Contract, for any product(s) for which Contractor sought and was awarded an environmental purchasing preference pursuant to RCW 39.26.255 and Washington State Procurement Policy POL-DES-255-00, such product(s) shall exceed the minimum post-consumer or total recycled content that enabled Contractor to be awarded such preference.

Notwithstanding any provision to the contrary, upon breach of warranty and Contractor's failure to provide satisfactory evidence of compliance within thirty (30) days, Agency may suspend or terminate this Contract. The rights and remedies of the parties under this warranty are in addition to any other rights and remedies of the parties provided by law or equity, including, without limitation, actual damages, and, as applicable and awarded under law, to a prevailing party, reasonable attorneys' fees and costs.

20. EXECUTIVE ORDER 18-03 – WORKERS' RIGHTS

MANDATORY INDIVIDUAL ARBITRATION. If Bidder returned Contractor Certification – Executive Order 18-03 Worker's Rights, and Contractor represents and warrants, as previously certified in Contractor's bid, quotation and/or proposal submission, that Contractor does NOT require its employees, as a condition of employment, to sign or agree to mandatory individual arbitration clauses or class or collective action waivers. Contractor further represents and warrants that, during the term of this contract, Contractor shall not, as a condition of employment, require its employees to sign or agree to mandatory individual arbitration clauses or class or collective action waivers.

21. FUNDING SOURCE

At all times during the course of this contract, the Contractor must comply with applicable laws, rules, policy and regulations required by the source of funding for the contract. If this contract is funded by a grant, the terms and conditions required by the granting entity are attached as Exhibit D – Federal Grant Terms and Conditions.

22. GOVERNING LAW

This contract shall be construed and interpreted in accordance with the laws of the State of Washington, and the venue of any action brought hereunder shall be in the Superior Court for Thurston County.

23. HARASSMENT

Per <u>RCW 43.01.135</u>, Sexual harassment in the workplace, Agency Contractors hereby have access to DNR Policy PO01-037 Harassment Prevention:

https://www.dnr.wa.gov/publications/em_PO01-037_harassment_prevention.pdf.

24. INDEMNIFICATION

To the fullest extent permitted by law, Contractor shall indemnify, defend, and hold harmless the State, agencies of State and all officials, Agents and employees of the State, from and against all claims for injuries or death arising out of or resulting from the performance of the contract. "Claim," as used in this contract, means any financial loss, claim, suit, action, damage, or expense, including but not limited to attorney's fees, attributable for bodily injury, sickness, disease, or death, or injury to or destruction of tangible property including loss of use resulting therefrom.

Contractor's obligations to indemnify, defend, and hold harmless includes any claim by Contractors' Agents, employees, representatives, or any Subcontractor or its employees.

Contractor expressly agrees to indemnify, defend, and hold harmless the State for any claim arising out of or incidental to Contractor's or any Subcontractor's performance or failure to perform the contract. Contractor's obligation to indemnify, defend, and hold harmless the State shall not be eliminated or reduced by any actual or alleged concurrent negligence of State or its Agents, agencies, employees and officials.

Contractor waives its immunity under Title 51 RCW to the extent it is required to indemnify, defend and hold harmless State and its agencies, officials, Agents or employees.

25. INDEPENDENT CAPACITY OF THE CONTRACTOR

The parties intend that an independent Contractor relationship will be created by this contract. The Contractor and his or her employees or Agents performing under this contract are not employees or Agents of the Agency. The Contractor will not hold himself/herself out as or claim to be an officer or employee of the Agency or of the State of Washington by reason hereof, nor will the Contractor make any claim of right, privilege or benefit that would accrue to such employee under law. Conduct and control of the work will be solely with the Contractor.

26. INDUSTRIAL INSURANCE COVERAGE

The Contractor shall comply with the provisions of Title 51 RCW, Industrial Insurance. If the Contractor fails to provide industrial insurance coverage or fails to pay premiums or penalties on behalf of its employees, as may be required by law, Agency may collect from the Contractor the full amount payable to the Industrial Insurance accident fund. The Agency may deduct the amount owed by the Contractor to the accident fund from the amount payable to the Contractor by the Agency under this contract, and transmit the deducted amount to the Department of Labor and Industries (L&I), Division of Insurance Services. This provision does not waive any of L&I's rights to collect from the Contractor.

27. INTERGRATION

The contract contains all the terms and conditions agreed upon by the parties. No other understandings, oral or otherwise, regarding the subject matter of the contract shall be deemed to exist or to bind any of the parties hereto.

28. LICENSING, ACCREDITATION AND REGISTRATION

The Contractor shall comply with all applicable local, state, and federal licensing, accreditation and registration requirements/standards necessary for the performance of this contract.

29. LIMITATION OF AUTHORITY

Only the Agent or Agent's delegate by writing (delegation to be made prior to action) shall have the express, implied, or apparent authority to alter, amend, modify, or waive any clause or condition of this contract. Furthermore, any alteration, amendment, modification, or waiver or any clause or condition of this contract is not effective or binding unless made in writing and signed by the Agent.

30. NONCOMPLIANCE WITH NONDISCRIMINATION LAWS

In the event of the Contractor's non-compliance or refusal to comply with any nondiscrimination law, regulation, or policy, this contract may be rescinded, canceled or terminated in whole or in part, and the Contractor may be declared ineligible for further contracts with the Agency. The Contractor shall, however, be given a reasonable time in which to cure this noncompliance. Any dispute may be resolved in accordance with the "Disputes" procedure set forth herein.

31. NONDISCRIMINATION

During the performance of this contract, the Contractor shall comply with all federal and state nondiscrimination laws, regulations and policies.

32. PRIVACY

Personal information including, but not limited to, "Protected Health Information," collected, used, or acquired in connection with this contract shall be protected against unauthorized use, disclosure, modification or loss. Contractor shall ensure its directors, officers, employees, Subcontractors or Agents use personal information solely for the purposes of accomplishing the delivery of goods or rendering of services as set forth herein. Contractor and its Subcontractors agree not to release, divulge, publish, transfer, sell or otherwise make known to unauthorized persons personal information without the express written consent of the Agency or as otherwise required by law.

Any breach of this provision may result in termination of the contract and the demand for return of all personal information. The Contractor agrees to indemnify and hold harmless the Agency for any damages related to the Contractor's unauthorized use of personal information.

33. PUBLICITY

The Contractor agrees to submit to the Agency all advertising and publicity matters relating to this contract wherein the Agency's name is mentioned or language used from which the connection of the Agency's name may, in the Agency's judgment, be inferred or implied. The Contractor agrees not to publish or use such advertising and publicity matters without the prior written consent of the Agency.

34. RECORDS MAINTENANCE

The Contractor shall maintain books, records, documents, data and other evidence relating to this contract and performance of services rendered and/or delivery of goods as described herein, including but not limited to accounting procedures and practices that sufficiently and properly reflect all direct and indirect costs of any nature expended in the performance of this contract.

Contractor shall retain such records for a period of six years following the date of final payment. At no additional cost, these records, including materials generated under the contract, shall be subject at all reasonable times to inspection, review or audit by the Agency, personnel duly authorized by the Agency, the Office of the State Auditor, and federal and state officials so authorized by law, regulation or agreement.

If any litigation, claim or audit is started before the expiration of the six (6) year period, the records shall be retained until all litigation, claims, or audit findings involving the records have been resolved.

35. REGISTRATION WITH DEPARTMENT OF REVENUE

The Contractor shall complete registration with the Washington State Department of Revenue and be responsible for payment of all taxes due on payments made under this contract.

36. REMEDIES:

- 1. With respect to any nonconforming Deliverables, the Agency may elect to do one or more of the following:
 - a. SPECIFIC PERFORMANCE: If the Deliverables are unique, sole sourced, or otherwise deemed by the Agency to be unavailable elsewhere, the Agency may demand specific performance.
 - b. COVER: The Agency may obtain substitute Deliverables and charge the Contractor the difference between the cost of the substitute Deliverables and the contracted for price.
 - c. PRICE REDUCTION: The Agency may retain nonconforming Deliverables and equitably reduce the price of the contract based on the difference between the contracted for price and the fair market value of the nonconforming Deliverables.
 - d. RETURN: The Agency may return or set aside for pickup by the Contractor any nonconforming goods and terminate the contract for cause.

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- 2. The Contractor shall be liable for all compensatory, incidental and consequential damages caused by any breach of the contract. At the sole option of the Agency, such damages may be recovered, in whole or in part, by price reduction or credit against any amounts that may be owed to the Contractor under the contract.
- 3. The agency's total liability for all damages arising out of or related to the contract shall in no event exceed the purchase price of the contract. Furthermore, in the event of a termination of the contract, the agency's total liability for all damages arising out of or related to the contract shall not exceed the purchase price of goods delivered or services rendered prior to the effective date of the termination.
- 4. The rights and remedies provided by the contract are cumulative and are not exclusive of any other or additional rights or remedies available at law and in equity.

37. RIGHT OF INSPECTION

The Contractor shall provide right of access to its facilities to the Agency, or any of its officers, or to any other authorized Agent or official of the State of Washington or the federal government, at all reasonable times, in order to monitor and evaluate performance, compliance, and/or quality assurance under this contract.

38. SAVINGS

In the event funding from state, federal, or other sources is withdrawn, reduced, or limited in any way after the effective date of this contract and prior to normal completion, the Agency may terminate the contract under the "Termination for Convenience" clause, without the ten-day notice requirement, subject to renegotiation at the Agency's discretion under those new funding limitations and conditions.

39. SEVERABILITY

The provisions of this contract are intended to be severable. If any term or provision is illegal or invalid for any reason whatsoever, such illegality or invalidity shall not affect the validity of the remainder of the contract.

40. SITE SECURITY

While on Agency premises, Contractor, its Agents, employees, or Subcontractors shall conform in all respects with physical, fire or other security policies or regulations.

41. SUBCONTRACTING

Neither the Contractor nor any Subcontractor shall enter into subcontracts for any of the work contemplated under this contract without obtaining prior written approval of the Agency. In no event shall the existence of the subcontract operate to release or reduce the liability of the Contractor to the Agency for any breach in the performance of the Contractor's duties. This clause

does not include contracts of employment between the Contractor and personnel assigned to work under this contract.

Additionally, the Contractor is responsible for ensuring that all terms, conditions, assurances and certifications set forth in this agreement are carried forward to any subcontracts. Contractor and its Subcontractors agree not to release, divulge, publish, transfer, sell or otherwise make known to unauthorized persons personal information without the express written consent of the Agency or as provided by law.

42. TAXES

All payments accrued because of payroll taxes, unemployment contributions, any other taxes, insurance or other expenses for the Contractor or its staff shall be the sole responsibility of the Contractor.

43. TERMINATION FOR CAUSE

In the event the Agency determines the Contractor has failed to comply with the conditions of this contract in a timely manner, the Agency has the right to suspend or terminate this contract. Before suspending or terminating the contract, the Agency shall notify the Contractor in writing (including email) of the need to take corrective action. If corrective action is not taken within 30 calendar days, the contract may be terminated or suspended.

In the event of termination or suspension, the Contractor shall be liable for damages as authorized by law including, but not limited to, any cost difference between the original contract and the replacement or cover contract and all administrative costs directly related to the replacement contract, e.g., cost of the competitive bidding, mailing, advertising and staff time.

The Agency reserves the right to suspend all or part of the contract, withhold further payments, or prohibit the Contractor from incurring additional obligations of funds during investigation of the alleged compliance breach and pending corrective action by the Contractor or a decision by the Agency to terminate the contract. A termination shall be deemed a "Termination for Convenience" if it is determined that the Contractor: (1) was not in default; or (2) failure to perform was outside of his or her control, fault or negligence.

The rights and remedies of the Agency provided in this contract are not exclusive and are, in addition to any other rights and remedies, provided by law.

44. TERMINATION FOR CONVENIENCE

Except as otherwise provided in this contract, the Agency may, by 10 calendar days written notice (including email), beginning on the second calendar day after the notice is sent, terminate this contract, in whole or in part. If this contract is so terminated, the Agency shall be liable only for

payment required under the terms of this contract for goods delivered or services rendered prior to the effective date of termination.

45. TERMINATION PROCEDURES

Upon termination of this contract, the Agency, in addition to any other rights provided in this contract, may require the Contractor to deliver to the Agency any property specifically produced or acquired for the performance of such part of this contract as has been terminated. The provisions of the "Treatment of Assets" clause shall apply in such property transfer.

The Agency shall pay to the Contractor the agreed upon price, if separately stated, for goods or services accepted by the Agency, and the amount agreed upon by the Contractor and the Agency for (i) goods delivered or services rendered for which no separate price is stated, (ii) partially completed goods delivered or services rendered, (iii) other goods delivered or services rendered that are accepted by the Agency, and (iv) the protection and preservation of property, unless the termination is for default, in which case the Agent shall determine the extent of the liability of the Agency. Failure to agree with such determination shall be a dispute within the meaning of the "Disputes" clause of this contract. The Agency may withhold from any amounts due the Contractor such sum as the Agent determines to be necessary to protect the Agency against potential loss or liability.

The rights and remedies of the Agency provided in this section shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

After receipt of a notice of termination, and except as otherwise directed by the Agent, the Contractor shall:

- 1. Stop work under the contract on the date, and to the extent specified, in the notice;
- Place no further orders or subcontracts for materials, services, or facilities except as may be necessary for completion of such portion of the work under the contract that is not terminated;
- 3. Assign to the Agency, in the manner, at the times, and to the extent directed by the Agent, all of the rights, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case the Agency has the right, at its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;
- 4. Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the Agent to the extent Agent may require, which approval or ratification shall be final for all the purposes of this clause;
- 5. Transfer title to the Agency and deliver in the manner, at the times, and to the extent directed by the Agent any property which, if the contract had been completed, would have been required to be furnished to the Agency;

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- 6. Complete performance of such part of the work as shall not have been terminated by the Agent; and
- 7. Take such action as may be necessary, or as the Agent may direct, for the protection and preservation of the property related to this contract, which is in the possession of the Contractor and in which the Agency has or may acquire an interest.

46. TREATMENT OF ASSETS

- 1. Title to all property furnished by the Agency shall remain in the Agency. Title to all property furnished by the Contractor, for the cost of which the Contractor is entitled to be reimbursed as a direct item of cost under this contract, shall pass to and vest in the Agency upon delivery of such property by the Contractor. Title to other property, the cost of which is reimbursable to the Contractor under this contract, shall pass to and vest in the Agency upon (i) issuance for use of such property in the performance of this contract, or (ii) commencement of use of such property in the performance of this contract, or (iii) reimbursement of the cost thereof by the Agency in whole or in part, whichever first occurs.
- 2. Any property of the Agency furnished to the Contractor shall, unless otherwise provided herein or approved by the Agency, be used only for the performance of this contract.
- 3. The Contractor shall be responsible for any loss or damage to property of the Agency that results from the negligence of the Contractor or which results from the failure on the part of the Contractor to maintain and administer that property in accordance with sound management practices.
- 4. If any Agency property is lost, destroyed or damaged, the Contractor shall immediately notify the Agency and shall take all reasonable steps to protect the property from further damage.
- 5. The Contractor shall surrender to the Agency all property of the Agency prior to settlement upon completion, termination or cancellation of this contract.
- 6. All reference to the Contractor under this clause shall also include Contractor's employees, Agents or Subcontractors.

47. U.S. DEPARTMENT OF TREASURY, OFFICE OF FOREIGN ASSETS CONTROL

The Agency complies with U.S. Department of the Treasury, Office of Foreign Assets Control (OFAC) payment rules. OFAC prohibits financial transactions with individuals or organizations, which have been placed on the OFAC Specially Designated Nationals (SDN) and Blocked Persons sanctions list located at <u>U.S. Treasury Specially Designated Nationals And Blocked Persons List</u>. Compliance with OFAC payment rules ensures that the Agency does not conduct business with individuals or organizations that have been determined to be supporters of terrorism and international drug dealing or that pose other dangers to the United States.

Prior to making payment to individuals or organizations, the Agency will download the current OFAC SDN file and compare it to Agency and statewide vendor files. In the event of a positive match, the Agency reserves the right to: (1) make a determination of "reasonability" before taking the positive match to a higher authority, (2) seek assistance from the Washington State Office of the State Treasurer (OST) for advanced assistance in resolving the positive match, (3) comply with an OFAC investigation, if required, and/or (4) if the positive match is substantiated, notify the Contractor in writing and terminate the contract according to the Termination for Convenience provision without making payment. The Agency will not be liable for any late payment fees or missed discounts that are the result of time required to address the issue of an OFAC match.

48. WAIVER

Waiver of any default or breach shall not be deemed a waiver of any subsequent default or breach. Any waiver shall not be construed to be a modification of the terms of this contract unless stated to be such in writing and signed by authorized representative of the Agency.

49. WARRANTIES

Contractor warrants that all Deliverables provided under this contract shall be fit for the purpose(s) for which intended, are merchantable, and shall conform to the requirements and specifications herein.

EXHIBIT B - SCOPE OF WORK

Costs per task are best estimates based on the Grantee's application; transfer of funds between tasks is allowable with written approval from DNR Project Manager

Activity 1: Tree Inventory

Contractor will update existing inventory data and collect new data throughout the city.

Task	Deliverable	Completion Date	Estimated Cost
1A. Consultant updates existing tree inventory data	GIS data and excel export of updated tree inventory	April 20, 2024	\$9,000
1B. Consultants collect new point- based tree inventory data and performs data analysis	GIS data and excel export of new inventory data; results of analysis	April 20, 2024	\$12,000
1C. Consultant collects new inventory data using a sample- based approach	GIS data and excel export; results of analysis	April 20, 2024	\$10,000
		Activity 1 Total	\$31,000

Activity 2: Community and Urban Forest Maintenance Report

Consultant provides summaries of data analysis, maintenance recommendations, and costs estimates for maintenance work, etc.

Task	Deliverable	Completion Date	Estimated Cost
2A. Consultant writes summary of methodology and inventory results	Narrative summary (may be a component part of larger report)	April 20, 2024	\$2,000
2B. Consultants reports on the results of iTree analysis	Narrative summary of analysis results and findings (may be a component part of larger report)	April 20, 2024	\$1,000
2C. Consultant develops maintenance prioritization and strategy	Narrative summary of maintenance prioritization and strategy; GIS data set showing priority areas for maintenance	April 20, 2024	\$2,000
2D. Consultant provides cost estimates for maintenance work	Narrative summary of estimated costs (may be a component part of larger report)	April 20, 2024	\$2,000
2E. Consultant develops planting strategy for improving tree canopy equity	Narrative summary of planting strategy (may be a component part of larger report)	April 20, 2024	\$2,000
		Activity 1 Total	\$9,000

EXHIBIT C

BUDGET

The total budget is **\$40,000**. See the Scope of Work for activity and task descriptions.

Table 1. Cost by Activity

Activities	Personnel and Benefits	Travel	Supplies	Contractual	Total
Activity 1	0	0	0	\$31,000	\$31,000
Activity 2	0	0	0	\$9,000	\$9,000
Total				\$40,000	\$40,000

Table 2. Cost by Line Item

Contractual	
Consultant specializing in urban forestry	
A consultant will be hired to implement tasks 1A-1C and 2A-2E and provide the	
associated deliverables. In general these tasks involve scrubbing existing data,	\$40,000
collecting new data, analyzing data, and providing data analysis results in a report	
along with management recommendations and cost estimates.	
Total	\$40,000
EXHIBIT D – FEDERAL GRANT TERMS AND CONDITIONS

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ATTACHMENT A: FOREST SERVICE AWARD PROVISIONS

- A. <u>COLLABORATIVE ARRANGEMENTS</u>. Where permitted by terms of the award and Federal law, WDNR may enter into collaborative arrangements with other organizations to jointly carry out activities with Forest Service funds available under this award.
- B. <u>FOREST SERVICE LIABILITY TO THE RECIPIENT</u>. The United States shall not be liable to WDNR for any costs, damages, claims, liabilities, and judgments that arise in connection with the performance of work under this award, including damage to any property owned by WDNR or any third party.
- C. <u>NOTICES</u>. Any notice given by the Forest Service or WDNR will be sufficient only if in writing and delivered in person, mailed, or transmitted electronically by e-mail or fax, as follows:

To the Forest Service Program Manager, at the address specified in the award.

To WDNR, at the address shown in the award or such other address designated within the award.

Notices will be effective when delivered in accordance with this provision, or on the effective date of the notice, whichever is later.

- D. <u>SUBAWARDS.</u> WDNR shall notify Subrecipients under this award that they are subject to the OMB guidance in subparts A through F of 2 CFR Part 200, as adopted and supplemented by the USDA in 2 CFR Part 400. Any sub-award must follow the regulations found in 2 CFR 200.330 through .332.
- E. <u>USE OF FOREST SERVICE INSIGNIA</u>. In order for WDNR to use the Forest Service insignia on any published media, such as a Web page, printed publication, or audiovisual production, permission must be granted by the Forest Service's Office of Communications (Washington Office). A written request will be submitted by Forest Service, Program Manager, to the Office of Communications Assistant Director, Visual Information and Publishing Services prior to use of the insignia. The Forest Service Program Manager will notify WDNR when permission is granted.
- F. <u>MEMBERS OF CONGRESS</u>. Pursuant to 41 U.S.C. 22, no member of, or delegate to, Congress shall be admitted to any share or part of this award, or benefits that may arise therefrom, either directly or indirectly.

G. TRAFFICKING IN PERSONS.

- 1. Provisions applicable to a Recipient that is a private entity.
 - You as the Recipient, your employees, Subrecipients under this award, and Subrecipients' employees may not:

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- Engage in severe forms of trafficking in persons during the period of time that the award is in effect;
- (2) Procure a commercial sex act during the period of time that the award is in effect; or
- (3) Use forced labor in the performance of the award or subawards under the award.
- b. We as the Federal awarding agency may unilaterally terminate this award, without penalty, if you or a Subrecipient that is a private entity:
 - (1) Is determined to have violated a prohibition in paragraph a.1 of this award term; or
 - (2) Has an employee who is determined by the agency official authorized to terminate the award to have violated a prohibition in paragraph a.1 of this award term through conduct that is either:
 - i. Associated with performance under this award; or
 - ii. Imputed to you or the subrecipient using the standards and due process for imputing the conduct of an individual to an organization that are provided in 2 CFR part 180, "OMB Guidelines to Agencies on Government wide Debarment and Suspension (Nonprocurement),".
- 2. Provision applicable to a Recipient other than a private entity. We as the Federal awarding agency may unilaterally terminate this award, without penalty, if a subrecipient that is a private entity:
 - a. Is determined to have violated an applicable prohibition in paragraph a.1 of this award term; or
 - b. Has an employee who is determined by the agency official authorized to terminate the award to have violated an applicable prohibition in paragraph a.1 of this award term through conduct that is either—
 - (1) Associated with performance under this award; or
 - (2) Imputed to the subrecipient using the standards and due process for imputing the conduct of an individual to an organization that are provided in 2 CFR part 180, "OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement),"
- 3. Provisions applicable to any recipient.
 - a. You must inform us immediately of any information you receive from any source alleging a violation of a prohibition in paragraph a.1 of this award term.
 - b. Our right to terminate unilaterally that is described in paragraph a.2 or b of this section:
 - (1) Implements section 106(g) of the Trafficking Victims Protection Act of 2000 (TVPA), as amended (22 U.S.C. 7104(g)), and
 - (2) Is in addition to all other remedies for noncompliance that are available to us under this award.
 - c. You must include the requirements of paragraph a.1 of this award term in any subaward you make to a private entity.

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- 4. Definitions. For purposes of this award term:
 - a. "Employee" means either:
 - (1) An individual employed by you or a subrecipient who is engaged in the performance of the project or program under this award; or
 - (2) Another person engaged in the performance of the project or program under this award and not compensated by you including, but not limited to, a volunteer or individual whose services are contributed by a third party as an in-kind contribution toward cost sharing or matching requirements.
 - b. "Forced labor" means labor obtained by any of the following methods: the recruitment, harboring, transportation, provision, or obtaining of a person for labor or services, through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage, or slavery.
 - c. "Private entity":
 - (1) Means any entity other than a State, local government, Indian tribe, or foreign public entity, as those terms are defined in 2 CFR 175.25.
 - (2) Includes:
 - A nonprofit organization, including any nonprofit institution of i. . higher education, hospital, or tribal organization other than one included in the definition of Indian tribe at 2 CFR 175.25(b). ii. A for-profit organization.
 - d. "Severe forms of trafficking in persons," "commercial sex act," and "coercion" have the meanings given at section 103 of the TVPA, as amended (22 U.S.C. 7102).

DRUG-FREE WORKPLACE. H.

- 1. WDNR agree(s) that it will publish a drug-free workplace statement and provide a copy to each employee who will be engaged in the performance of any project/program that receives federal funding. The statement must
 - a. Tell the employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in its workplace;
 - b. Specify the actions WDNR will take against employees for violating that prohibition; and
 - c. Let each employee know that, as a condition of employment under any award, the employee:
 - (1) Shall abide by the terms of the statement, and
 - (2) Shall notify WDNR in writing if they are convicted for a violation of a criminal drug statute occurring in the workplace, and shall do so no more than 5 calendar days after the conviction.
- 2. WDNR agree(s) that it will establish an ongoing drug-free awareness program to inform employees about
 - a. The dangers of drug abuse in the workplace;
 - b. The established policy of maintaining a drug-free workplace;

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- c. Any available drug counseling, rehabilitation and employee assistance programs; and
- d. The penalties that you may impose upon them for drug abuse violations occurring in the workplace.
- 3. Without the Program Manager's expressed written approval, the policy statement and program must be in place as soon as possible, no later than the 30 days after the effective date of this instrument, or the completion date of this award, whichever occurs first.
- 4. WDNR agrees to immediately notify the Program Manager if an employee is convicted of a drug violation in the workplace. The notification must be in writing, identify the employee's position title, the award number of each award on which the employee worked. The notification must be sent to the Program Manager within 10 calendar days after WDNR learns of the conviction.
- 5. Within 30 calendar days of learning about an employee's conviction, WDNR must either
 - a. Take appropriate personnel action against the employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973 (29 USC 794), as amended, or
 - b. Require the employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for these purposes by a Federal, State or local health, law enforcement, or other appropriate agency.

I. <u>PROHIBITION AGAINST USING FUNDS WITH ENTITIES THAT REQUIRE</u> <u>CERTAIN INTERNAL CONFIDENTIALITY AGREEMENTS.</u>

- 1. The recipient may not require its employees, contractors, or subrecipients seeking to report fraud, waste, or abuse to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting them from lawfully reporting that waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.
- 2. The recipient must notify its employees, contractors, or subrecipients that the prohibitions and restrictions of any internal confidentiality agreements inconsistent with paragraph (1) of this award provision are no longer in effect.
- 3. The prohibition in paragraph (1) of this award provision does not contravene requirements applicable to any other form issued by a Federal department or agency governing the nondisclosure of classified information.
- If the Government determines that the recipient is not in compliance with this award provision, it;
 - a. Will prohibit the recipient's use of funds under this award in accordance with sections 743, 744 of Division E of the Consolidated Appropriations Act, 2016, (Pub. L. 114-113) or any successor provision of law; and

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- b. May pursue other remedies available for the recipient's material failure to comply with award terms and conditions.
- J. <u>ELIGIBLE WORKERS</u>. WDNR shall ensure that all employees complete the I-9 form to certify that they are eligible for lawful employment under the Immigration and Nationality Act (8 USC 1324a). WDNR shall comply with regulations regarding certification and retention of the completed forms. These requirements also apply to any contract or supplemental instruments awarded under this award.
- K. <u>FINANCIAL STATUS REPORTING</u>. A Federal Financial Report, Standard Form SF-425 (and Federal Financial Report Attachment, SF-425A, if required for reporting multiple awards), must be submitted annually. These reports are due 90 days after the reporting period ending December 31. The final SF-425 (and SF-425A, if applicable) must be submitted either with the final payment request or no later than 90 days from the expiration date of the award. These forms may be found at www.whitehouse.gov/omb/grants forms.
- L. <u>PROGRAM PERFORMANCE REPORTS</u>. The recipient shall perform all actions identified and funded in application/modification narratives within the performance period identified in award.

In accordance with 2 CFR 200 301, reports must relate financial data to performance accomplishments of the federal award.

WDNR shall submit annual performance reports. These reports are due 90 days after the reporting period. The final performance report shall be submitted either with WDNR's final payment request, or separately, but not later than 90 days from the expiration date of the award.

- M. <u>NOTIFICATION</u>. WDNR shall immediately notify the Forest Service of developments that have a significant impact on the activities supported under this award. Also, notification must be given in case of problems, delays or adverse conditions that materially impair the ability to meet the objectives of the award. This notification must include a statement of the action taken or contemplated, and any assistance needed to resolve the situation.
- N. <u>FREEDOM OF INFORMATION ACT (FOIA)</u>. Public access to award or agreement records must not be limited, except when such records must be kept confidential and would have been exempted from disclosure pursuant to Freedom of Information regulations (5 U.S.C. 552). Requests for research data are subject to 2 CFR 315(e).

Public access to culturally sensitive data and information of Federally-recognized Tribes may also be explicitly limited by P.L. 110-234, Title VIII Subtitle B §8106 (2009 Farm Bill).

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Award Number: 19-DG-11062765-729

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- O. <u>TEXT MESSAGING WHILE DRIVING</u>. In accordance with Executive Order (EO) 13513, "Federal Leadership on Reducing Text Messaging While Driving," any and all text messaging by Federal employees is banned: a) while driving a Government owned vehicle (GOV) or driving a privately owned vehicle (POV) while on official Government business; or b) using any electronic equipment supplied by the Government when driving any vehicle at any time. All Cooperatives, their Employees, Volunteers, and Contractors are encouraged to adopt and enforce policies that ban text messaging when driving company owned, leased or rented vehicles, POVs or GOVs when driving while on official Government business or when performing any work for or on behalf of the Government.
- P. <u>FUNDING EQUIPMENT</u>. Federal funding under this award is not available for reimbursement of WDNR's purchase of equipment. Equipment is defined as having a fair market value of \$5,000 or more per unit and a useful life of over one year. Supplies are those items that are not equipment.
- Q. <u>FOREST SERVICE ACKNOWLEDGED IN PUBLICATIONS, AUDIOVISUALS,</u> <u>AND ELECTRONIC MEDIA</u>. WDNR shall acknowledge Forest Service support in any publications, audiovisuals, and electronic media developed as a result of this award. Follow direction in USDA Supplemental 2 CFR 415.2.
- R. <u>COPYRIGHTING.</u> WDNR is/are granted sole and exclusive right to copyright any publications developed as a result of this award. This includes the right to publish and vend throughout the world in any language and in all media and forms, in whole or in part, for the full term of copyright and all renewals thereof in accordance with this award.

No original text or graphics produced and submitted by the Forest Service shall be copyrighted. The Forest Service reserves a royalty-free, nonexclusive, and irrevocable right to reproduce, publish, or otherwise use, and to authorize others to use the work for federal government purposes. This right shall be transferred to any sub-awards, subawards or subcontracts.

This provision includes:

- The copyright in any work developed by WDNR under this award.
- Any right of copyright to which WDNR purchase(s) ownership with any federal contributions.
- S. <u>NONDISCRIMINATION STATEMENT PRINTED, ELECTRONIC, OR</u> <u>AUDIOVISUAL MATERIAL</u>. WDNR shall include the following statement, in full, in any printed, audiovisual material, or electronic media for public distribution developed or printed with any Federal funding.

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In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, or disability. (Not all prohibited bases apply to all programs.)

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

If the material is too small to permit the full statement to be included, the material must, at minimum, include the following statement, in print size no smaller than the text:

"This institution is an equal opportunity provider."

T. <u>AWARD CLOSEOUT.</u> The Recipient must submit, no later than 90 calendar days after the end date of the period of performance, all financial, performance, and other reports as required by the terms and conditions of the Federal award.

Any unobligated balance of cash advanced to WDNR must be immediately refunded to the Forest Service, including any interest earned in accordance with 2 CFR 200.343(d).

If this award is closed without audit, the Forest Service reserves the right to disallow and recover an appropriate amount after fully considering any recommended disallowances resulting from an audit which may be conducted later.

- U. <u>TERMINATION.</u> This award may be terminated, in whole or part pursuant to 2 CFR 200.339.
- V. DISPUTES.
 - 1. Any dispute under this award shall be decided by the Signatory Official. The Signatory Official shall furnish WDNR a written copy of the decision.
 - 2. Decisions of the Signatory Official shall be final unless, within 30 days of receipt of the decision of the Signatory Official, WDNR appeal(s) the decision to the Forest Service's Director, Acquisition Management (AQM). Any appeal made under this provision shall be in writing and addressed to the Director, AQM, USDA, Forest Service, Washington, DC 20024. A copy of the appeal shall be concurrently furnished to the Signatory Official.
 - 3. In order to facilitate review on the record by the Director, AQM, WDNR shall be given an opportunity to submit written evidence in support of its appeal. No hearing will be provided.
 - 4. A decision under this provision by the Director, AQM is final.

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OMB 0596-0217 Expiration Date: 11/30/2017 Rev. (12-13)

- 5. The final decision by the Director, AQM does not preclude WDNR from pursuing remedies available under the law.
- W. <u>DEBARMENT AND SUSPENSION</u>. WDNR shall immediately inform the Forest Service if they or any of their principals are presently excluded, debarred, or suspended from entering into covered transactions with the federal government according to the terms of 2 CFR Part 180. Additionally, should WDNR or any of their principals receive a transmittal letter or other official federal notice of debarment or suspension, then they shall notify the Forest Service without undue delay. This applies whether the exclusion, debarment, or suspension is voluntary or involuntary. The Recipient shall adhere to 2 CFR Part 180 Subpart C in regards to review of sub-recipients or contracts for debarment and suspension.

All subrecipients and contractors must complete the form AD-1048, Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion, Lower Tier Covered Transactions. Blank forms are available electronically. Completed forms must be kept on file with the primary recipient.

X. <u>INTERNATIONAL TRAVEL</u>. When Forest Service funds are used, and no Federal, statutory exceptions apply, WDNR shall ensure that any air transportation of passengers and property is provided by a carrier holding a United States government issued certificate in compliance with the International Air Transportation Fair Competitive Practices Act of 1974, 49 U.S.C. 40118 (Fly American Act).

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Item 9

CITY OF TUMWATER SERVICE PROVIDER AGREEMENT

TUMWATER TREE INVENTORY & MAINTENANCE PLAN

THIS AGREEMENT is made and entered into in duplicate this <u>29th</u> day

of August _____, 2023, by and between the CITY OF TUMWATER, a

Washington municipal corporation, hereinafter referred to as the "CITY", and

DAVEY RESOURCE GROUP, a Delaware corporation, hereinafter referred to as

the "SERVICE PROVIDER".

WITNESSETH:

WHEREAS, the CITY desires to have certain services and/or tasks performed as set forth below requiring specialized skills and other supportive capabilities; and

WHEREAS, sufficient CITY resources are not available to provide such services; and

WHEREAS, the SERVICE PROVIDER represents that the SERVICE PROVIDER is qualified and possesses sufficient skills and the necessary capabilities, including technical expertise, where required, to perform the services and/or tasks set forth in this Agreement.

NOW, THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein, the parties hereto agree as follows:

1. <u>SCOPE OF SERVICES</u>.

The SERVICE PROVIDER shall perform such services and accomplish such tasks, including the furnishing of all materials and equipment necessary for full performance thereof, as are identified and designated as SERVICE PROVIDER responsibilities throughout this Agreement and as detailed in Exhibit "A" Scope of Services attached hereto and incorporated herein (the "Project").

2. <u>TERM</u>.

The Project shall begin no earlier than July 20, 2023, and shall be completed no later than June 30, 2024. This Agreement may be extended for additional periods of time upon mutual written agreement of the parties.

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 1 of 11

3. TERMINATION.

Prior to the expiration of the Term, this Agreement may be terminated immediately, with or without cause, by the CITY.

4. COMPENSATION AND METHOD OF PAYMENT.

A. Payments for services provided hereunder shall be made following the performance of such services, unless otherwise permitted by law and approved in writing by the CITY.

B. No payment shall be made for any service rendered by the SERVICE PROVIDER except for services identified and set forth in this Agreement.

C. The CITY shall pay the SERVICE PROVIDER for work performed under this Agreement a total sum not to SIXTY THOUSAND AND 00/100 DOLLARS (\$60,000.00) as reflected in Exhibit "A", Scope of Services.

D. Upon execution of this Agreement, the SERVICE PROVIDER must submit IRS Form W-9 Request for Taxpayer Identification Number (TIN) and Certification unless a current Form W-9 is already on file with the CITY.

E. The SERVICE PROVIDER shall submit an invoice to the CITY for the percentage of services rendered during the billing period. The CITY shall initiate authorization for payment after receipt of said invoice and shall make payment to the SERVICE PROVIDER within approximately thirty (30) days thereafter.

F. When subcontracting services or purchasing goods from third parties, as identified and approved in this Agreement, the SERVICE PROVIDER must submit written documentation establishing that the goods and/or services have been provided and the third party has been paid in order to receive payment for such goods and/or services.

G. Invoices may be submitted immediately following performance of services, but in no event shall an invoice be submitted more than twenty (20) business days following the end of the contract term or the end of the calendar year, whichever is earlier.

5. INDEPENDENT CONTRACTOR RELATIONSHIP.

A. The parties intend that an independent contractor relationship will be created by this Agreement. Subject to paragraphs herein, the

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 2 of 11

implementation of services pursuant to this Agreement will lie solely within the discretion of the SERVICE PROVIDER. No agent, employee, servant or representative of the SERVICE PROVIDER shall be deemed to be an employee, agent, servant or representative of the CITY for any purpose, and the employees of the SERVICE PROVIDER are not entitled to any of the benefits the CITY provides for its employees. The SERVICE PROVIDER will be solely and entirely responsible for its acts and for the acts of its agents, employees, servants, subcontractors or representatives during the performance of this Agreement.

B. In the performance of the services herein contemplated the SERVICE PROVIDER is an independent contractor with the authority to control and direct the performance of the details of the work; however, the results of the work contemplated herein must meet the approval of the CITY and shall be subject to the CITY'S general rights of inspection and review to secure the satisfactory completion thereof.

C. As an independent contractor, the SERVICE PROVIDER shall be responsible for the reporting and payment of all applicable local, state, and federal taxes.

D. It is recognized that the SERVICE PROVIDER may or will be performing services during the Term for other parties; provided, however, that such performance of other services shall not conflict with or interfere with the SERVICE PROVIDER'S ability to perform the services. The SERVICE PROVIDER agrees to resolve any such conflicts of interest in favor of the CITY.

E. <u>2008 Early Retirement Factor Retirees</u>. Washington State law requires reporting of any contractor, independent contractor or personal service contractor that has retired from the State of Washington using the 2008 Early Retirement Factor (ERF). Stricter return-to-work restrictions apply to a retiree under the 2008 ERF. The SERVICE PROVIDER must verify retirement status by completing a Service Provider Retirement Status Form, attached as Exhibit "B", for each of the SERVICE PROVIDER'S owners and for each person providing service under this Agreement.

6. <u>SERVICE PROVIDER EMPLOYEES/AGENTS</u>.

The CITY may at its sole discretion require the SERVICE PROVIDER to remove an employee, agent or servant from employment on this Project. The SERVICE PROVIDER may however employ that individual on other non-CITY related projects.

HOLD HARMLESS INDEMNIFICATION.

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 3 of 11

SERVICE PROVIDER Indemnification. The SERVICE Α. PROVIDER agrees to indemnify, defend and hold the CITY, its elected officials, officers, employees, agents, and volunteers harmless from any and all claims, demands, losses, actions and liabilities (including costs and all reasonable attorney fees) to or by any and all persons or entities, including, without limitation, their respective agents, licensees, or representatives, arising from, resulting from, or connected with this Agreement to the extent caused by the negligent acts, errors or omissions of the SERVICE PROVIDER, its partners, shareholders, agents, employees, or by the SERVICE PROVIDER'S breach of this Agreement. The SERVICE PROVIDER expressly waives any immunity that may be granted to it under the Washington State Industrial Insurance Act, Title 51 RCW. The SERVICE PROVIDER'S indemnification shall not be limited in any way by any limitation on the amount of damages, compensation or benefits payable to or by any third party under workers' compensation acts, disability benefit acts or any other benefit acts or programs. This waiver has been mutually negotiated by the parties.

B. <u>CITY Indemnification</u>. The CITY agrees to indemnify, defend and hold the SERVICE PROVIDER, its officers, directors, shareholders, partners, employees, and agents harmless from any and all claims, demands, losses, actions and liabilities (including costs and attorney fees) to or by any and all persons or entities, including without limitation, their respective agents, licensees, or representatives, arising from, resulting from or connected with this Agreement to the extent caused by the negligent acts, errors, or omissions of the CITY, its employees or agents. No liability shall attach to the CITY by reason of entering into this Agreement except as expressly provided herein.

C. <u>Survival</u>. The provisions of this Section shall survive the expiration or termination of this Agreement with respect to any event occurring prior to such expiration or termination.

8. INSURANCE.

A. The SERVICE PROVIDER shall procure and maintain for the duration of the Agreement, insurance against claims for injuries to persons or damage to property which may arise from or in connection with the performance of the work hereunder by the SERVICE PROVIDER, their agents, representatives, employees or subcontractors.

B. The SERVICE PROVIDER shall provide a <u>Certificate of</u> <u>Insurance</u> evidencing:

1. <u>Automobile Liability</u> insurance with limits of \$1,000,000 combined single limit per accident for bodily injury and property damage.

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 4 of 11

Item 9.

2. <u>Commercial General Liability</u> insurance written on an occurrence basis with limits of \$2,000,000 combined single limit per occurrence and \$2,000,000 aggregate for personal injury, bodily injury and property damage. Coverage shall include but not be limited to: blanket contractual; products/completed operations; broad form property damage; explosion, collapse and underground (XCU) if applicable; and employer's liability.

3. <u>Professional Liability</u> insurance written on a claims made basis with limits of \$2,000,000 per claim, and \$2,000,000 policy aggregate limit.

C. The CITY shall be included as an additional insured on the insurance policy, as respect to work performed by or on behalf of the SERVICE PROVIDER and a copy of the endorsement naming the CITY as additional insured shall be attached to the <u>Certificate of Insurance</u>. The CITY reserves the right to request certified copies of any required policies.

D. The SERVICE PROVIDER'S insurance shall contain a clause stating that coverage shall apply separately to each insured against whom claim is made or suit is brought, except with respects to the limits of the insurer's liability.

E. Any payment of deductible or self-insured retention shall be the sole responsibility of the SERVICE PROVIDER.

F. The SERVICE PROVIDER'S insurance shall be primary insurance as respect to the CITY and the CITY shall be given written notice of any cancellation, suspension or material change in coverage within two (2) business days of SERVICE PROVIDER'S receipt of such notice.

9. TREATMENT OF ASSETS.

Title to all property furnished by the CITY shall remain in the name of the CITY and the CITY shall become the owner of the work product and other documents, if any, prepared by the SERVICE PROVIDER pursuant to this Agreement.

10. COMPLIANCE WITH LAWS.

A. The SERVICE PROVIDER, in the performance of this Agreement, shall comply with all applicable federal, state or local laws and ordinances, including being licensed to do business in the City of Tumwater by obtaining a Tumwater business license and any additional regulations for licensing, certification and operation of facilities, programs and accreditation, and licensing of individuals, and any other standards or criteria as described in this Agreement to assure quality of services.

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 5 of 11

Item 9

B. The SERVICE PROVIDER specifically agrees to pay any applicable CITY business and occupation (B&O) taxes which may be due on account of this Agreement.

11. NONDISCRIMINATION.

A. The CITY is an equal opportunity employer.

B. Nondiscrimination in Employment. In the performance of this Agreement, the SERVICE PROVIDER will not discriminate against any employee or applicant for employment on the grounds of race, creed, religion, color, national origin, citizenship or immigration status, families with children status, sex, marital status, honorably discharged veteran or military status, the presence of any sensory, mental, or physical disability or the use of a trained dog guide or service animal by a person with a disability, sexual orientation, genetic information, age or other basis prohibited by state or federal law; provided that the prohibition against discrimination in employment because of disability shall not apply if the particular disability prevents the proper performance of the particular worker involved. Such action shall include, but not be limited to: employment, upgrading, demotion or transfers, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and programs for training including apprenticeships. "Race" is inclusive of traits historically associated or perceived to be associated with race including, but not limited to, hair texture and protective hairstyles. For purposes of this subsection, "protective hairstyles" includes, but is not limited to, such hairstyles as afros, braids, locks, and twists. It is not an unfair practice when a distinction or differential treatment on the basis of citizenship or immigration status is authorized by federal or state law, regulation, rule or government contract.

C. Nondiscrimination in Services. The SERVICE PROVIDER will not discriminate against any recipient of any services or benefits provided for in this Agreement on the grounds of race, creed, religion, color, national origin, citizenship or immigration status, families with children status, sex, marital status, honorably discharged veteran or military status, the presence of any sensory, mental or physical disability or the use of a trained dog guide or service animal by a person with a disability, sexual orientation, genetic information, age or other basis prohibited by state or federal law. "Race" is inclusive of traits historically associated or perceived to be associated with race including, but not limited to, hair texture and protective hairstyles. For purposes of this subsection, "protective hairstyles" includes, but is not limited to, such hairstyles as afros, braids, locks, and twists. It is not an unfair practice when a distinction or differential treatment on the basis of citizenship or immigration status is authorized by federal or state law, regulation, rule or government contract.

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 6 of 11

Item 9.

D. If any assignment and/or subcontract have been authorized by the CITY, said assignment or subcontract shall include appropriate safeguards against discrimination. The SERVICE PROVIDER shall take such action as may be required to ensure full compliance with the provisions in the immediately preceding paragraphs herein.

E. <u>Nondiscrimination in Benefits</u>. Pursuant to Tumwater Municipal Code (TMC) Chapter 3.46, the SERVICE PROVIDER shall provide employee benefits or an equivalent sum to the domestic partners of their employees involved in the SERVICE PROVIDER'S operations applicable to this Agreement if such benefits are provided to employees' spouses as more particularly set forth in Chapter 3.46 of the TMC, a copy of which is attached hereto as Exhibit "B".

12. ASSIGNMENT/SUBCONTRACTING.

A. The SERVICE PROVIDER shall not assign its performance under this Agreement or any portion of this Agreement without the written consent of the CITY, and it is further agreed that said consent must be sought in writing by the SERVICE PROVIDER not less than thirty (30) days prior to the date of any proposed assignment. The CITY reserves the right to reject without cause any such assignment.

B. Any work or services assigned hereunder shall be subject to each provision of this Agreement and proper bidding procedures where applicable as set forth in local, state and/or federal statutes, ordinances and guidelines.

C. Any technical service subcontract not listed in this Agreement, must have express advance approval by the CITY.

13. NON-APPROPRIATION OF FUNDS.

If sufficient funds are not appropriated or allocated for payment under this Agreement for any future fiscal period, the CITY will not be obligated to make payments for services or amounts incurred after the end of the current fiscal period, and this Agreement will terminate upon the completion of all remaining services for which funds are allocated. No penalty or expense shall accrue to the CITY in the event this provision applies.

14. CHANGES.

Either party may request changes to the Scope of Services and performance to be provided hereunder, however, no change or addition to this Agreement shall be valid or binding upon either party unless such change or addition be in writing and signed by both parties. Such amendments shall be attached to and made part

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 7 of 11

of this Agreement.

15. MAINTENANCE AND INSPECTION OF RECORDS.

A. The SERVICE PROVIDER at such times and in such forms as the CITY may require, shall furnish to the CITY such statements, records, reports, data, and information as the CITY may request pertaining to matters covered by this Agreement.

B. The SERVICE PROVIDER shall maintain books, records and documents, which sufficiently and properly reflect all direct and indirect costs related to the performance of this Agreement and shall maintain such accounting procedures and practices as may be necessary to assure proper accounting of all funds paid pursuant to this Agreement. These records shall be subject at all reasonable times to inspection, review, or audit, by the CITY, its authorized representative, the State Auditor, or other governmental officials authorized by law to monitor this Agreement.

C. To ensure the CITY'S compliance with the Public Records Act, RCW 42.56, the SERVICE PROVIDER shall retain all books, records, documents and other material relevant to this agreement, for six (6) years after its expiration. The SERVICE PROVIDER agrees that the CITY or its designee shall have full access and right to examine any of said materials at all reasonable times during said period.

16. POLITICAL ACTIVITY PROHIBITED.

None of the funds, materials, property or services provided directly or indirectly under the Agreement shall be used for any partisan political activity, or to further the election or defeat of any candidate for public office.

17. PROHIBITED INTEREST.

No member, officer, or employee of the CITY shall have any interest, direct or indirect, in this Agreement or the proceeds thereof.

18. NOTICE.

Notice provided for in this Agreement shall be sent by certified mail to the addresses designated for the parties on the signature page of this Agreement.

19. ATTORNEYS FEES AND COSTS.

If any legal proceeding is brought for the enforcement of this Agreement, or

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 8 of 11

because of a dispute, breach, default, or misrepresentation in connection with any of the provisions of this Agreement, the prevailing party shall be entitled to recover from the other party, in addition to any other relief to which such party may be entitled, reasonable attorney's fees and other costs incurred in that action or proceeding.

20. JURISDICTION AND VENUE.

A. This Agreement has been and shall be construed as having been made and delivered within the State of Washington. It is agreed by each party hereto that this Agreement shall be governed by laws of the State of Washington, both as to interpretation and performance.

B. Any action of law, suit in equity, or judicial proceeding for the enforcement of this Agreement or any provisions thereof shall be instituted and maintained in the superior court of Thurston County, Washington.

21. SEVERABILITY.

A. If, for any reason, any part, term or provision of this Agreement is held by a court of the United States to be illegal, void or unenforceable, the validity of the remaining provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Agreement did not contain the particular provision held to be invalid.

B. If it should appear that any provision hereof is in conflict with any statutory provision of the State of Washington, said provision which may conflict therewith shall be deemed inoperative and null and void insofar as it may be in conflict therewith, and shall be deemed modified to conform to such statutory provisions.

22. FORCE MAJEURE.

Notwithstanding anything to the contrary in this Agreement, Service Provider shall not be liable or responsible to the City, nor be deemed to have defaulted under or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement, if Service Provider's failure or delay is caused by or results from any of the following events: acts of God, flood, fire, earthquake, hurricane, epidemic, explosion, war, invasion, hostilities, terrorist threats or acts, riot, government order or law, embargoes, blockades, or other similar events beyond the reasonable control of Service Provider.

23. ENTIRE AGREEMENT.

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 9 of 11

The parties agree that this Agreement is the complete expression of the terms hereto and any oral representations or understandings not incorporated herein are excluded. Further, any modification of this Agreement shall be in writing and signed by both parties. Failure to comply with any of the provisions stated herein shall constitute material breach of contract and cause for termination. Both parties recognize time is of the essence in the performance of the provisions of this Agreement. It is also agreed by the parties that the forgiveness of the nonperformance of any provision of this Agreement does not constitute a waiver of the provisions of this Agreement. This Agreement may be executed in any number of counterparts, which counterparts shall collectively constitute the entire Agreement.

***Signatures on the following page**

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 10 of 11

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed the day and year first hereinabove written.

<u>CITY:</u> CITY OF TUMWATER 555 Israel Road SW Tumwater, WA 98501

— DocuSigned by:

lisa Parks

Lisa Parks, City Administrator

SERVICE PROVIDER:

Davey Resource Group, Inc 18809 10th Ave. NE Shoreline, WA 98155 UBI #: 604-179-754 Phone Number: 206-536-2977.

Signature (Notarized - see below) Printed Name: Im Scott Title: Aren Manager

APPROVED AS TO FORM:

DocuSigned by:

Karen Kirkpatrick, City Attorney

Notary Required for Service Provider Only STATE OF WASHINGTON

COUNTY OF THURSTON King DEL

I certify that I know or have satisfactory evidence that $\underline{\Box_{ah}}$ $\underline{Sc_{aff}}$ (name) is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the $\underline{\Delta tes}$ $\underline{\Delta tes}$ (title) of $\underline{\Delta tes}$ (title) of $\underline{\Delta tes}$ $\underline{\Delta tes}$ (title) of the uses and purposes mentioned in the instrument.

DANIFL F LOWELL Notary Public State of Washington Commission # 182035 Comm. Expires Dec 1, 2023

Dated: \$ 8 (28 (2013

Notary Public in and for the State of Washington, My appointment expires: 12/01/2223

SERVICE PROVIDER AGREEMENT - Tree Inventory & Maintenance Plan - Page 11 of 11

Exhibit A



Scope Of Services

Tumwater Tree Inventory and Maintenance Plan

Prepared For:

City of Tumwater, WA

% Alyssa Jones Wood Sustainability Coordinator 55 Israel Rd SW, Tumwater, WA 98501

Prepared By:

Ian Scott Area Manager

Davey Resource Group, Inc. 18809 10th Ave. NE Shoreline, WA, 98155

Phone: 206-536-2977 E-mail: lan.Scott@Davey.Com



Scope of Services -Overview

The project has the following activity components identified:

Activity 1 - City Owned Urban Forest Field Inventory

Task 1.1.1 Cleanup and Update Existing Street Tree Inventory Data: Working with the City, DRG will setup our TreeKeeper software with existing data and perform a desktop review at the beginning of the project to identify missing data fields (required by DNR) and other opportunities to improve the database and prioritize fieldwork. This effort will allow the City to prioritize our tree inventory efforts.

Task 1.1.2 Incorporate Data from Volunteers: DRG anticipates that the City will be using volunteers to make updates to the tree inventory database where trees have been removed or replanted. During this Task, DRG will provide the City Staff and volunteers with access to our TreeKeeper software for both field and office use during this task. This approach will benefit the City as we can introduce automated quality control elements to your volunteer's data.

Task 1.2 Tree Inventory in Parks, Wells, Stormwater Facilities, and at City buildings. DRG will inspect and inventory trees in assigned areas to further improve the city's tree inventory database.

Task 1.3 Complete a Sample-Based Inventory on Other City Properties. DRG will inspect and inventory trees in assigned areas to further improve the city's tree inventory database.

Activity 2: Community and Urban Forest Maintenance Report

DRG will draft a summary report with the following sections

Task 2.1 Summary Methodology and inventory results DRG uses Tumwater's inventory data and industry standards and best management practices to develop a management plan upon completion of the inventory.

Task 2.2 i-Tree Analysis and Results DRG analyses the tree inventory to evaluate the environmental benefits provided by the inventory.

Task 2.3 Maintenance Strategy on a 4-year cycle with prioritized areas for tree maintenance. DRG offers a free, one-time, one-year trial of our TreeKeeper® Software. DRG delivers the city's inventory data in TreeKeeper® and as ESRI® shapefiles and an Excel[™] spreadsheet.

Task 2.4 Estimate costs of maintenance for existing urban and community forests. DRG will work with our parent company, The Davey Tree Expert Company to develop estimated costs for maintenance and help the City resolve the costs of maintaining public trees.

Task 2.5 Strategy for future planting areas to develop canopy cover more equitably throughout the city. DRG will perform an enhanced analysis of the 2017 urban tree canopy assessment and develop priority planting areas in the City based on weighted criteria for environmental or social equity.

Scope of Services Activity 1. City-Owned Urban Forest Inventory

To ensure that the tree inventory meets Tumwater's goals and deadlines, DRG uses the following work plan.

Project Marshalling and Kickoff (Task 0)

From project beginning to end, DRG staff keep open lines of communication with the City of Tumwater via telephone, e-mail, and, as needed, in-person meetings. DRG answers any questions Tumwater has as well as keeps the city apprised of the project's progress. Once awarded the project, DRG executes a contract and supplies insurance per project specifications.

DRG staff will contact the city after contract execution to schedule a kick-off meeting. During the kick-off meeting, Tumwater's staff and the DRG project team discuss inventory safety and communication procedures and confirm project expectations and milestones.

Following the meeting, DRG will proceed to draft a project-specific data collection handbook (Field Guide). This handbook will standardize data collection procedures and serve as a reference for the City of Tumwater and volunteers to help ensure consistency and clarity with data collection efforts.

Software Programming (TreeKeeper) (Task 0)

The next step in the inventory process is to obtain the GIS data and imagery needed to set up the field computers used for data collection. DRG's urban foresters typically work with the city's GIS or planning department to complete this step. If necessary, we can get imagery from other public sources. DRG uses the data fields defined in this proposal and the imagery, maps, and data files obtained from the city and various sources to program the data collection software and field computers.

Data Cleanup and Community Volunteers (Task 1.1.1 & Task 1.1.2)

Once our software is set up, we will perform a desktop review and update new data fields such as site type, species code, recommended maintenance, and the number of stems. With our web-based TreeKeeper software, we will also provide access for city-assigned volunteers to contribute to the database by updating removed trees and adding new tree planting.

Tree Inventory (Task 1.2, Task 1.3)

DRG will begin data collection soon after the kick-off meeting. Our experienced, qualified urban foresters locate trees in assigned public parks and city properties according to staff priority assignments. DRG anticipates conducting efforts on 37 city parcels (estimated ~79 acres, up to 3,480 trees). At each location, they evaluate those trees and record the data specified by the city.

Accessing Inventory Data

DRG supplies access to the tree inventory data during data collection. To access tree records, utilize TreeKeeper® to view and field check data and even to route and plan for tree work.

Individual Tree Inspection Process

July 3, 2023

During data collection, DRG's urban foresters walk by each tree and inspect the tree from the ground. Based on the conditions at the time of the inspection, DRG's staff identify the tree's species and its location, measure tree diameter, and rate its health. DRG's urban foresters also suggest the specific maintenance involved. When data collection for an individual tree is complete, DRG's urban foresters walk to the next tree and follow the same steps, in the same order, to ensure consistent data collection.

DRG formally routes the collection of inventory data to ensure that staff collects all the sites in the project area in a systematic manner. Throughout the inventory process, DRG maps the streets, parks, and properties inventoried and shares that information with the City. DRG also informs the city where staff intends to collect data next. DRG's urban foresters collect data Monday through Friday and often on weekends with our client's permission.

Data Fields

For Tumwater's inventory, DRG anticipates collecting the following data fields:

- 1. Location (X/Y coordinates, Lat/Long)
- 2. Site Typ
- 3. Species (Botanical and Common)
- 4. Location/Land Use
- 5. DBH (Diameter at Breast Height)
- 6. Condition
- 7. Creator (data point creator)

- 8. Date
- 9. Recommended Maintenance (priority maintenance)
- 10. Number of Stems
- 11. Notes
- 12. Optional: Observations/Defect

The data fields listed above give Tumwater ample information to manage their trees and stumps proactively.

Sample Plots

Trees growing in naturalized areas will be assessed using random sample methodology. DRG anticipates collecting up to 40 sample plots (1/10th Acre plots) within 7 parcels (~165 acres). Trees within sampled plots will be identified, measured, and evaluated. Sampled data from each naturalized area will be extrapolated to identify trends in the known data. The information will be summarized in the 'Community and Urban Forest Maintenance Report'.

To evaluate trees in Tumwaters's naturalized areas, DRG will obtain digital files of each area with boundaries clarified as digital polygons. DRG's GIS technicians will generate sitemaps with randomized location plots for each naturalized area using ArcGIS. Each randomized plot within the naturalized area will represent 1/10th acre. DRG arborists will visit each plot to inventory and assess trees six inches (6") in diameter or greater (DBH) size.

Tree Inventory Data Delivery

For this project, Tumwater is eligible to receive tree inventory data in DRG's TreeKeeper® software. As part of our one-time software trial, DRG provides a one-year subscription to TreeKeeper® software to Tumwater free of charge. The city also receives one year of telephone software support, also free of charge for the first one-year period.

To access TreeKeeper®, use Safari® on an iOS device or via Google Chrome" on a Windows® or Android device; the secure login information DRG provides to the city.

Once using TreeKeeper®, the city can view and use the inventory data and **download** the data in a variety of formats, including CSV/Excel[™] and ESRI® shapefile formats.

DRG offers custom software training for an added fee; and welcomes further discussion to learn more about our training programs, which can earn attendees up to eight (8) ISA continuing education units (CEUs).

Other Formats

If the City of Tumwater needs the inventory data in different formats, such as Google Earth's KML, AutoCAD®, or i-Tree, or for a particular asset management software program like CityWorks, Hansen, or Cartegraph, DRG can supply the inventory data in those formats for an added charge. Please contact DRG for more information about data formatting options and fees.

Subject Areas

The following public properties are included in the project for either the inventory of trees or through plot sampling efforts.

Site Location	Type	Area (sq ft)	Scope of Effort
215 N 2ND AVE SW	City Building	74178	Inventory
420 DESCHUTES WAY SW	Park	31518	Inventory
Capitol Blvd SE & E St SW	Storm site	150437	Inventory
V St SW (park)	Park	25886	Inventory
7th Ave Open Space	Park	293893	Inventory
Union Pioneer Calvary Cemetary	Park (Cemetery)	195506	Inventory
1500 79TH AVE SE	Park	288878	Inventory
1500 79TH AVE SE	City Building (future)	689001	Inventory
3288 VISTA VERDE LN SW	City Building (Water reservoir)	34572	Inventory
C St Pump Station A	City Building (Pump station)	12851	Inventory
1205 BARNES BLVD SW	Park	56628	Inventory
C St SW Pump Station B	City Building (Pump station)	7016	Inventory
6135 BLACK LAKE BELMORE RD SW	City Building (Sewer Pump Station)	2879	Inventory
7007 CAPITOL BLVD SW	City building	29840	Inventory
Angle Park	Park	7791	Inventory
2000 79TH AVE SE	City Building (Sewer Pump Station)	2492	Inventory

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2131 69TH CT SE	City Building (Sewer Pump Station)	5253	Inventory
Site Location	Туре	Area (sq ft)	Scope of Effort
2401 SW TROSPER RD	City Building (Sewer Pump Station)	3968	Inventory
309 O ST SE	Park/Water pump station	40716	Inventory
Middle St SE (storm site)	Storm site	15808	Inventory
9168 ASTER ST SE	Park	22328	Inventory
9191 VIOLA ST SE	Storm site	126867	Inventory
1008 LINWOOD AVE SW	City Building (Sewer Pump Station)	2042	Inventory
77th Way SW (pump Station)	City Building (Pump station)	4277	Inventory
2501 CRITES ST SW	Storm site	37004	Inventory
2352 SW SAPP RD	City Building (Sewer Pump Station)	8185	Inventory
Barnes Blvd Water Reservoir	City Building (Water reservoir)	75830	Inventory
3201 BOSTON ST SW	City Building (old Brewery)	7868	Inventory
703 DESCHUTES WAY SW	Park	317090	Inventory
215 2ND AVE SW	City building	30675	Inventory
535 BATES ST SW	Park	57120	Inventory
5th and Grant Pocket Park	Park	12637	Inventory
Barclift Park	Park	133712	Inventory
311 ISRAEL RD SW	City Building/Well site	148553	Inventory
555 ISRAEL RD SW	City Building	156710	Inventory
7200 NEW MARKET ST SW	City Building	198835	Inventory
7023 NEW MARKET ST SW	City Building (Library)	114452	Inventory
5801 HENDERSON BLVD SE	Park	3795196	Sampling
Trosper Lake Natural Area	Park	795772	Sampling
305 O ST SE	Well Site	891824	Sampling
1436 LINWOOD AVE SW	Park/Storm	850960	Sampling
12th Ave SW (Storm Site)	Storm site	269898	Sampling
2332 SW SAPP DR	Park	512233	Sampling
N 4th Ave SW	Park	90154	Sampling

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Activity 2. Tree Inventory Report and Management Plan

The City of Tumwater will benefit from our report that helps your community recognize priority and proactive tree management tasks, know the value of community trees, and project realistic multi-year budgets. To develop a tree management plan, our experienced urban foresters analyze the tree inventory data, assessing the data to determine the composition, structure, and function of the tree population. Then, DRG uses the findings from the data analysis, along with industry standards, risk management goals, and best management practices, to report on the status of the urban forest and prioritize tree maintenance needs.

Plan Sections

Task 2.1 Summary Methodology and Inventory Results

Executive Summary: Provides an overview of the project and its findings.

Introduction: Describes the assignment, methods, and other relevant information.

Task 2.2 i-Tree Analysis and Results

Structure, Composition, and Benefits of Tree Resource: Using charts, tables, and insight from DRG's experienced urban foresters, this section describes the composition, function, and structure of the urban forest, including its species diversity, diameter size class distribution, general health, priority maintenance, and potential pest-related threats to trees. DRG also analyses the data within i-Tree to understand the benefits and services provided by the urban forest.

Task 2.3 Strategy for Maintenance

Recommended Management of the Tree Resource: Focuses on the tree maintenance tasks that will help the city mitigate risk within its urban forest and complete proactive four-year maintenance cycles. Based on the inventory data, DRG's experienced urban foresters classify the type of maintenance work needed, present the number of trees needing each specific type of care, and lay out a plan for carrying out the tree work over a multi-year period.

Task 2.4 Estimate of Costs

Inferences from the entire process about what has been found, or decided, and the financial impact of those findings or decisions with regards to a 4-year tree management cycle.

Task 2.5 Strategy for Future Planting

DRG's GIS-IT specialists will perform a priority planting analysis using the urban tree canopy results obtained by the city in 2018. DRG will locate "priority planting areas". The identification of priority planting areas (in acres) considers land use and other factors such

as approved community master planning that limit where trees may be planted. The planting area analysis can be completed for the entire project area prioritized based on maximizing canopy benefits for environmental equity or social equity. In particular, DRG will provide planting analysis to reduce urban heat island and benefit overburdened communities by comparing available planting spaces against map layers available through Washington State Department of Health "Environmental Health Disparities V2.0", and "heat severity 2019 (ImageServer) (tplgis.org)"

About i-Tree

With a completed up-to-date comprehensive tree inventory, Davey Resource Group will complete an i-Tree Analysis of the tree inventory^{*}. The analysis will enable Tumwater to make informed decisions about their urban forest as it relates to environmental services. Davey Resource Group uses i-Tree software to determine the overall structure of a tree population and calculate the benefits of that resource. The data from i-Tree is distilled and analyzed in conjunction with information obtained from Tumwater, including budget and program resources and management policies and procedures. The resulting information is provided in a comprehensive report using full-color charts and tables, along with a complete explanation of the data. The report includes information on how Tumwater's trees provide energy savings, carbon dioxide sequestration, air quality improvement, stormwater runoff reduction, aesthetics, property value, and socioeconomic benefits. The report will present the monetary value of the urban forest. The Analysis and Report will be a valuable resource for not only the District operations but also for the Faculty as educational resources. Details about the structure of the inventory will be described as follows:

- Frequency of Species. A percentage breakdown of the number of trees in each species.
- Relative Age Distribution. A description of the overall age distribution and analysis of the age distribution for the top ten most common species in the inventory.
- Condition. A description of the overall condition.
- Relative Performance Index. Analysis of how each species in the inventory is performing
 against the others, and identification of underused species that are performing above
 average in the inventory.
- CO₂ Sequestered. The amount and value of carbon dioxide that has been sequestered to date.
 - Replacement Value. The cost of replacing the tree resource with trees of a similar size, species, and condition.
 - Electricity and Natural Gas. The amount and value of electricity and natural gas are both saved and avoided.
 - CO2 Sequestered and Avoided. The amount and value of atmospheric carbon dioxide benefit both sequestered and avoided annually.
 - Stormwater Runoff Reduction. The amount and value of stormwater intercepted by tree canopy.
 - Air Quality Improvements. The amount and value of air quality improvements, including the absorption of gaseous pollutants (O3 and NO2), interception of particulate matter, reduced emissions, increased oxygen levels, and reduced temperatures.
 - Cost analysis of overall annual investment versus the return on benefits.

- Current, detailed management expenditures for caring for the tree resource and critical baseline information for evaluating program efficiency.
- A quantified value of the environmental benefits provided by the tree resource.

DRG can provide the i-Tree project file upon request

Schedule

This scope of work will be completed March 1st, 2024.

Project Budget

Tas	k 0. Project Kick-Off and Marshalling	\$5,160.00
	Project Marshalling, Kick-Off Meeting, Project Field Guide	
	Software Setup for City, Volunteers, and Production Team	

Task 1. City Owned Urban Forest Field Inventory \$40,962.00

□ 1.1.1 Cleanup and Update Existing Street Tree Inventory Data (Anticipated review and edits to 1,896 trees)

- 1.1.2 Incorporate Data from Volunteers
- 1.2 Tree Inventory on Assigned City Properties

(Anticipated tree inventory of 37 Parcels, ~79 acres, up to 3480 Trees)

□ 1.3 Complete Sample-Based Inventory on Other City Properties (Anticipated up to 40 sample plots, 1/10th Acre size, representing 7 Parcels @ ~165 Acres)

Task 2. Community and Urban Forest Maintenance Report \$13,680.00

- 2.1 Summary Methodology and Inventory Results
- 2.2 i-Tree Analysis and Results
- 2.3 Maintenance Strategy for 4-year Cycle
- 2.5 Strategy for Future Planting Areas

Task 3. (Optional) Tree Management Software (Free Trial)

One-year subscription

During data collection, tree inventory data will be available for clients to view with compatible computer systems via our TreeKeeper® software. Clients agreeing to receive our promotional offer receive one free year of TreeKeeper® service beginning on the last day of the month of the inventory data release and ending 365 days later. DRG also supplies one year of telephone software support. DRG offers no discounts if Tumwater declines the promotional software service offer.

Total Cost \$59,802.00





Minimum Required Data Collection Attributes for WA Urban Tree Inventories

IMPORTANT NOTE: it is required that a shapefile or .csv is provided to the Washington DNR Urban and Community Forestry Program at the close of the awarded period of performance.

Field Name	Description	Field format; example
Latitude	Each data point should be located using GIS and/or GPS equipment	Decimal degrees; 46.5645
Longitude	Each data point should be located using GIS and/or GPS equipment	Decimal degrees; -122.3221
SiteType	Identify if the data point is a Tree, Stump, Planting Site, or Removal Site	text; Tree
Botanical*	Fully spelled out scientific name of tree species	text; Picea abies
CommonName	Fully spelled out common name of tree species. CommonName should be a reference to the iTree species list and can be obtained from the Washington State DNR Urban & Community Forestry Program	text; Norway spruce
SpeciesCode*	*In lieu of the Botanical field an FIA, PLANTS, or iTree species code can be used. A coded species list can be obtained from the Washington State DNR Urban & Community Forestry Program	text or numeric; ACPL or 0320
Location/Landuse	The physical location of the data point should be recorded, at a bare minimum as: street tree, park tree, parking lot, boulevard tree, vacant lot, cemetery, private, other	text; street tree
DBH (Diameter at Breast Height)	The tree trunk diameter should be recorded at 4.5' above grade to the nearest 1-inch. For multi-stemmed trees, record up to the 5 largest stems.	numeric; 12
Condition	In general, the condition of each tree should be recorded in one of the following categories adapted from the rating system established by the International Society of Arboriculture: Excellent, Good, Fair, Poor, Critical, Dead	text; Good
Creator	User information of individual adding data to this dataset	text; dgosztyla
Date	Autofilled date of tree measurement	date; mm/dd/yyyy

Optional (Recommended) Data Collection Attributes for WA Urban Tree Inventories

Field Name	Description	Field format; example
RecommendedMaintenance	Recording of maintenance needs. The	text; Training Prune
	following categories, or expanded	
	adaptations should be utilized: Tree Removal,	
	Priority Prune, Routine Prune, Clearance,	
	Training Prune, Stump Removal, Plant Tree	
NumberStems	If the tree is multistemmed, record the total	numeric; 4
	number of stems	
Notes	Additional information regarding disease,	text; sunscald
	insect, mechanical damage, etc. can be	
	included in this field.	



Washington State Department of Natural Resources Community Forestry Assistance Grant Tree Inventory Guiding Document. Please contact <u>urban_forestry@dnr.wa.gov</u> with questions relating to tree inventories.

DRAFT TUMWATER TREE BOARD - 2023 MEETING SCHEDULE

Note: Schedule is tentative and subject to change

<u>MEETINGS</u>	<u>JOINT</u> <u>MEETING?</u>	AGENDA ITEMS
October 9, 2023	No	<u>Briefing:</u> Carbon Sequestration White Paper – TRPC <u>Briefing:</u> Tree Inventory Project – Alyssa <u>Discussion:</u> 2024 Meeting Schedule – Alyssa
November 13, 2023	No	<u>Briefing:</u> Intern Street Tree Review Project – Amita Devarajan <u>Briefing:</u> Tree Inventory Project - Alyssa <u>Discussion:</u> Proposed Non-Regulatory Programs and Incentives - Alyssa
December 11, 2023	No	<u>Discussion</u> : Annual Meeting with Department Directors regarding UFMP Implementation Status- Alyssa <u>Briefing:</u> Tree Inventory Project - Alyssa