PUBLIC WORKS COMMITTEE
AGENDA

Online via Zoom and In Person at Tumwater City Hall, Council Conference Room, 555 Israel Rd. SW, Tumwater, WA 98501

Thursday, January 19, 2023
8:00 AM

1. Call to Order
2. Roll Call
3. Approval of Minutes: Public Works Committee, November 17, 2022
4. Acceptance of Work with Black Hills Excavating for the Tumwater Hill Park - Crosby Connector Project (Don Carney)
5. Source Control Program Presentation (Dave Kangiser)
6. Corrosion Control Program Update (Carrie Gillum)
7. Transportation Grants Discussion (Mary Heather Ames)
8. Fuel Tax Agreement with the Transportation Improvement Board for Tumwater Boulevard Interchange (Mary Heather Ames)
9. Additional Items
10. Adjourn

Meeting Information
All committee members will be attending remotely. The public are welcome to attend in person, by telephone or online via Zoom.

Watch Online
https://us02web.zoom.us/j/87312448395?pwd=emdoK1h1WUxOTjcrT0kwWWZkZFVsZz09

Listen by Telephone
Call (253) 215-8782, listen for the prompts and enter the Webinar ID 873 1244 8395 and Passcode 324867.

Public Comment
The public may submit comments by sending an email to council@ci.tumwater.wa.us, no later than 5:00 p.m. the day before the meeting. Comments are submitted directly to the Committee members and will not be read individually into the record of the meeting.

Post Meeting
Audio of the meeting will be recorded and later available by request, please email

CityClerk@ci.tumwater.wa.us

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 CityClerk@ci.tumwater.wa.us. 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 ADACoordinator@ci.tumwater.wa.us.

CONVENE: 8:00 a.m.

PRESENT: Chair Eileen Swarthout and Councilmembers Michael Althauser and Charlie Schneider.

Staff: Community Development Director Michael Matlock, Finance Director Troy Niemeyer, Water Resources & Sustainability Director Dan Smith, Transportation Manager Mary Heather Ames, Sustainability Coordinator Alyssa Jones Wood, and Department Assistant II Bonnie Hale.

APPROVAL OF MINUTES: PUBLIC WORKS COMMITTEE, SEPTEMBER 22, 2022 & OCTOBER 20, 2022:

MOTION: **Councilmember Schneider moved, seconded by Councilmember Althauser, to approve the minutes of September 22, 2022 and October 20, 2022 as published. A voice vote approved the motion unanimously.**

RESOLUTION NO. R2022-012, 2023 FEE RESOLUTION: Director Niemeyer reported the update of the fee schedule and utility rates is an annual process. The City's fee increases are typically small and incremental to keep pace with the cost of doing business rather than implementing large increases once every five years. Some of the fees are generated by other entities, such as Olympia and Tumwater School District impact fees. The school districts determine future funding fees, which drives the cost of impact fees. One large change is the fire code fee to reflect the value of the building permit.

The fee resolution includes utility fee increases to keep pace with labor and materials, sewer and water connection charges, sewer capacity charge as determined by the LOTT Clean Water Alliance, wastewater sewer charge as determined by the LOTT Clean Water Alliance, and utility rates. Most of the increases are tied to inflation and some are longer term and have been determined as part of a planning process, such as the Capitol Lake Deschutes Estuary fee to support maintenance dredging in future years.

Director Niemeyer cited a comparison chart of similar fees charged by the cities of Olympia and Lacey reflecting Tumwater's lower fees for utilities. The City of Tumwater collects 6% in utility tax compared to 12% and 12.5% for the other two jurisdictions.

Chair Swarthout questioned whether the building and fire fee is assessed only on new construction. Director Niemeyer confirmed the fee is applied only to new construction.

Director Matlock advised that part of the discussion surrounding the regional fire authority (RFA) included the City adjusting its fees for fire reviews and fire inspections based on the fees charged by the Olympia Fire Department. However, the Olympia Fire Department intends to raise its fee effective January 1, 2023 by 5%. The committee has the option of increasing the proposed fee by another 5% or retaining the current rate assessed by the City of Olympia.

Councilmember Althauser questioned the need for Olympia to increase the fees by 5%. Director Matlock explained that it speaks to the goal of a seamless transition to the RFA because the fees are intended to cover labor costs for reviews. When and if the departments join, the intent is to ensure the fees are identical prior to the merge.

Councilmember Althauser agreed consistency would be important and that fees should be in alignment, however, the overriding policy rational dictates an increase when the need is warranted. Although not necessarily supportive of aligning the fee he asked for more information on justifying the increase rather than increasing the fee to maintain consistency with Olympia.

Director Matlock acknowledged the request explaining that the establishment of the fees without the benefit of completing a fee study creates difficulty in providing additional information. The proposal is a best estimate based on experience. Additionally, state law does not allow the City to collect more in fees than the cost of permit reviews.

Director Niemeyer added that the City's inspector assesses fire inspection fees following the issuance of building permits. The City of Olympia's process is different as staff in the fire department inspect and collect the fees. If the RFA is formed, the RFA would have an assigned inspector to complete all inspections in Olympia and Tumwater and assess fees.

Councilmember Althauser inquired as to the possibility of adding a contingency to the proposed increase in the event the RFA is not approved by voters. Director Matlock noted that the timing of the RFA performing the reviews and inspections would be delayed affording an opportunity to delay the 5% increase until next year. He noted that the City of Tumwater has not adjusted building review fees since 2014 based partly on affordable housing concerns and the tremendous amount of work necessary by staff to develop the fee structure as the fees include numerous categories that need to be assessed. Most of the increase is an attempt to increase building fees to reflect actual costs.

Councilmember Schneider concurred with the concerns especially if a delay would be encountered if the RFA is successful. He requested more clarity on the proposed increase and would prefer to delay any increase until the outcome of the RFA is determined.

Director Niemeyer confirmed the committee's request to defer the increase at this time. The proposed increase is not included within the proposed fee schedule as presented to the committee.

MOTION: **Councilmember Schneider moved, seconded by Councilmember Althauser, to recommend to the City Council approve the Fee Resolution at the December 6, 2022 City Council meeting excluding the proposed fee increase as discussed. A voice vote approved the motion unanimously.**

OLD HIGHWAY 99 CORRIDOR STUDY UPDATE:

Manager Ames presented the final Old Highway 99 Corridor Study. Adoption of the study is scheduled as part of the Comprehensive Plan Amendment update process next year.

The study is the next step in the Capitol Boulevard/Old Highway 99 planning process. From 2011 through 2014, the City worked with consultants and community members to develop a plan for the Capitol Boulevard corridor focusing on the areas between Israel Road and M Street. In 2019, the City received approximately $400,000 to perform a study of Old Highway 99 from 73rd Avenue to 93rd Avenue.

The study covered safety, mobility, land use, environmental factors, and transportation considerations. The study process included public workshops, data gathering, stakeholder outreach, and completion of a preliminary design for identifying final deliverables. A stakeholder group was formed to collaborate on a value matrix with weighted criteria to identify the preferred cross section of the highway. Based in input and data, a draft corridor plan was prepared.

Traffic counts conducted in February 2020 were unaffected by the pandemic variations in traffic. Assumptions included widening the road to five lanes between 73rd Avenue and 88th Avenue, adding roundabouts at the intersections of Henderson Boulevard, 88th Avenue and 79th Avenue, and installation of single roundabout at the intersection of Old Highway 99 and 93rd Avenue. The study includes alternatives analysis by ranking evaluation criteria from highest to lowest priority. Environmental impacts ranked equally with emergency access followed by bicycle and pedestrian functions. Aesthetics was ranked as the lowest priority.

Manager Ames reviewed an illustration of the preferred cross section reflecting a 10-foot wide shared use sidewalk on the east side of Old Highway 99 for both bicyclists and pedestrians, a bike lane for southbound traffic, future improvements by the Port of Olympia along airport frontage, and roundabouts at 79th Avenue, 88th Avenue, Henderson Boulevard, and 93rd Avenue. Thirteen elements were considered for the environment with each element evaluated at a preliminary level to inform potential considerations that might affect designs or impact potential mitigation. Some specific aspects of the project would be further evaluated to include air quality, the presence of pocket gophers, historic sites, hazardous waste material, noise impacts, and environmental justice relating to right-of-way acquisition and potential relocations if needed.

The study includes a phasing plan and cost estimates based on operational benefit, funding opportunities, and practical project size over a five-phased project.

Manager Ames invited questions from the committee.

Councilmember Schneider asked about the siting of a bus stop along Old Highway 99. Manager Ames affirmed the process included participation by Intercity Transit representatives as a stakeholder. Discussions included potential placement of bus stops along the corridor. The details of those sites would be identified during the design process.

Councilmember Schneider requested clarification as to the location of the lanes narrowing down to two lanes. Manager Ames explained the four lanes would narrow to two lanes at 88th Avenue with the potential to include a three-section lane for inclusion of a left turn lane.

Chair Swarthout thanked Manager Ames for providing the update.

ORDINANCE NO. O2022-019, COMPOST PROCUREMENT:

Coordinator Jones Wood presented an ordinance for compost procurement based on a recent legislative bill passed during the 2022 legislative session. House Bill 1799 directs reduction of methane emissions associated with the waste sector to achieve a reduction in emissions by 75% in statewide disposal of organic material and waste. The bill includes food rescue goals, establishment of the Washington Center for Sustainable Food Management, a requirement for organic materials management and facility siting, and product labeling of compostable materials.

The bill contains many actions required by the City to implement. The first step directs all jurisdictions with populations of over 25,000 people to adopt a Compost Procurement Ordinance effective January 1, 2024. Based on the volume of solid waste produced by City operations, collection and disposal of organic materials will begin July 1, 2024. Additionally, the City's Comprehensive Plan would need to include the siting of composting facilities. The City would also have the authority to investigate complaints regarding product labeling. By December 31, 2024, the City is required to report on compost procurement to the Department of Ecology. Reporting is due each even-numbered year. The Department of Ecology is scheduled to develop a model ordinance by 2025 addressing solid waste collection and disposal along with an optional ordinance for cities to decentivize the generation of organic materials for landfill disposal. Cities are also required to update comprehensive plans for consistency with new state requirements.

Coordinator Jones Wood reviewed some requirements of several sections within the proposed ordinance.

Coordinator Jones Wood invited questions from members.

Councilmember Schneider requested clarification of the City's volume of waste produced annually. Coordinator Jones Wood said the bill defines the measurement; however, the City produces a substantial amount of waste each year. The bill specifies volume on a weekly basis. The City's Green Team has established a reduction goal of 10% by 2030, which can be amended. The waste volume includes waste the City generates in buildings and waste collected in parks. Waste collected in parks is more difficult to control and reduce because it is dependent upon people composting properly. City efforts to reduce waste will focus on City operations with educational campaigns to assist in diverting waste in parks.

Councilmember Althauser asked whether other cities offer similar incentive programs the City currently offers, such as rain barrels and irrigation systems. He inquired about the possibility of offering incentives to the community to compost organic materials from yards or gardens. Coordinator Jones Wood said she is aware of similar programs for backyard composting or composting for dense neighborhoods lacking backyards, as well as some cities incentivizing compost pickup. She encouraged consideration of an incentive program for different housing situations to enable full participation across the City.

Chair Swarthout asked whether landscaping waste generated from City parks is included in the ordinance. Coordinator Jones Wood explained that the bill refers to all organic materials to include food and yard waste. Staff has expressed interest in the City assuming responsibility for composting materials with the likelihood the City will rely on commercial service for a year to establish a baseline of waste generated by City operations.

Chair Swarthout reviewed the requested action.

MOTION: **Councilmember Althauser moved, seconded by Councilmember Schneider, to recommend the City Council adopt and authorize the Mayor to sign Ordinance No. O2022-019. A voice vote approved the motion unanimously.**

ADJOURNMENT: **With there being no further business, Chair Swarthout adjourned the meeting at 8:54 a.m.**

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

TO: Public Works Committee

FROM: Don Carney, Senior Capital Projects Manager

DATE: January 19, 2023

SUBJECT: Acceptance of Work with Black Hills Excavating for the Tumwater Hill Park - Crosby Connector Project

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1) Recommended Action:

Staff requests the Public Works Committee recommend the City Council accept the Tumwater Hill Park – Crosby Connector project as complete and authorize the release of the performance bond as soon as the laws of the state of Washington allow.

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2) Background:

The Tumwater Hill Park - Crosby Connector is a trail construction project that joins Crosby Road with the existing Tumwater Hill Park trail system. The new trail is approximately 1,200 feet long with several switch backs to navigate around trees and help make the trail not too steep. The trail is 5 feet wide at the top, with a landing and resting stop constructed approximately half way up the trail.

The Public Works contract with the low bidder, Black Hills Excavating, was signed on June 21, 2022, for $152,120.70. Work on this project is now complete; the final contract total is $150,170.64.

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3) Policy Support:

Strategic Priorities and Goals 2021-2026:

B. Build a Community Recognized for Quality, Compassion and Humanity
C. Create and Maintain a Transportation System Safe for All Modes of Travel

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4) Alternatives:

- ❑ Do not accept the project as complete and direct staff to pursue alternative actions(s).

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5) Fiscal Notes:

Funding for the project came from Park Impact Fees.

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6) Attachments:

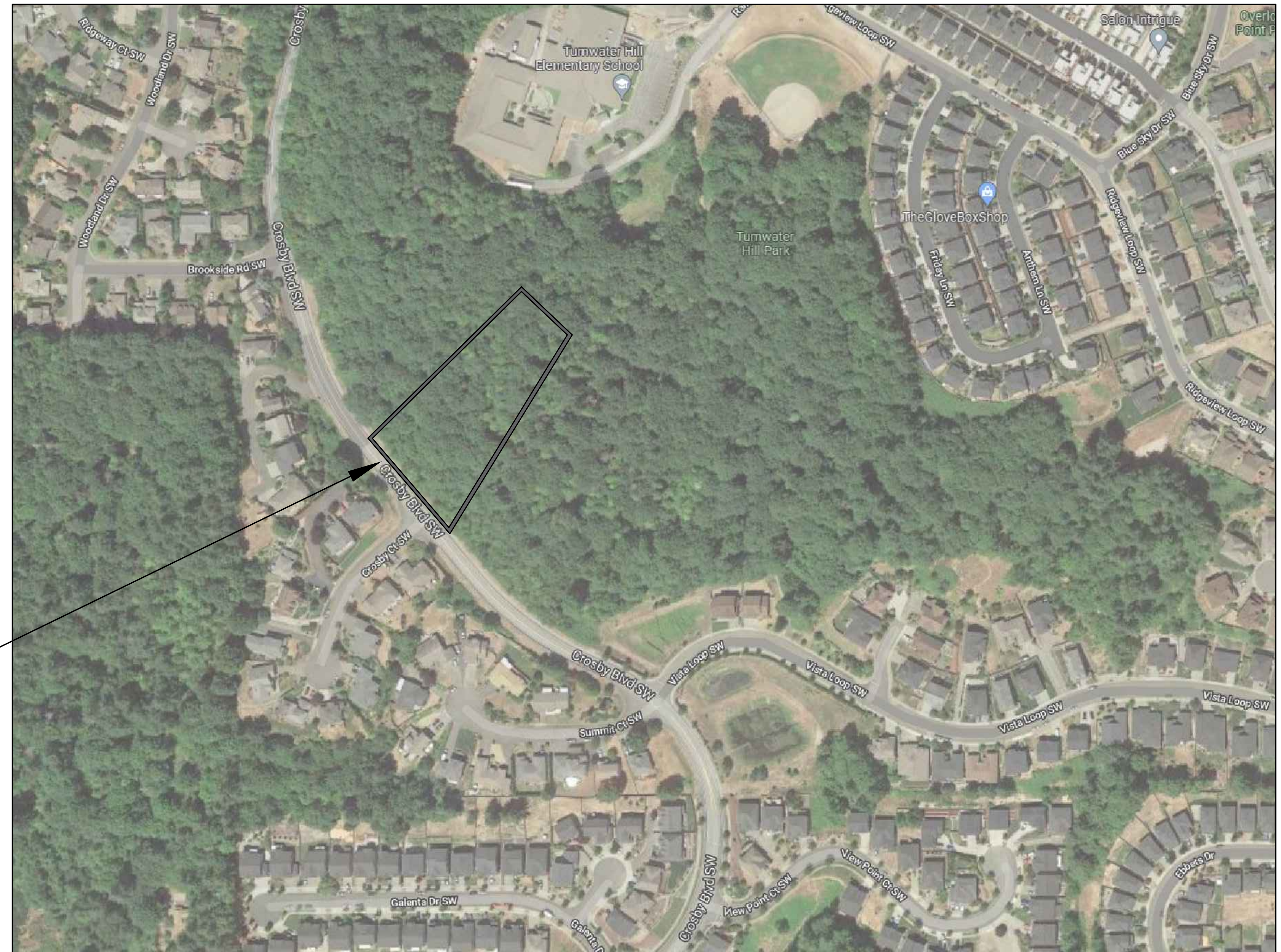
A. Vicinity Map

Attachment A

TUMWATER HILL PARK TRAIL - CROSBY CONNECTOR

CITY PROJECT No. 2020036
CITY OF TUMWATER
SECTION 27, TOWNSHIP 18N, RANGE 2W., W.M.

CITY OF TUMWATER ©



TUMWATER HILL PARK TRAIL
CROSBY CONNECTOR

City of Tumwater
Public Works Department
Engineering Division
555 Israel Road SW, Tumwater, WA 98501
(360) 754-4140 Voice, 754-4142 Fax

DESIGNED:	JO/DJC
DRAWN:	JO
CHECKED:	DJC
APPROVED:	WHL
JOB NUMBER	2020036
DATE	MAY 2021

PAGE
COVER SHEET

PROJECT
TUMWATER HILL PARK TRAIL
CROSBY CONNECTOR

DRAWING NUMBER
C-1

File: CrosbyTrail_Design 2.dwg Path: S:\Projects - Active\Tumwater Hill Trails - Crosby Connector\2. Design\2. Plans\ Plotted by: dcorney Date: 14-Dec-21 12:02:59pm

TO: Public Works Committee

FROM: Dave Kangiser, Water Resources Specialist

DATE: January 19, 2023

SUBJECT: Source Control Program Presentation

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1) Recommended Action:

None. Item is for discussion only.

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2) Background:

The City's National Pollutant Discharge Elimination System (NPDES) Permit issued by the Department of Ecology requires the City to administer a Pollution Source Control Inspection Program for businesses, also known as the Business Inspection Program. The goal of the new program is to help businesses implement best management practices when conducting pollution generating activities as part of the routine business practices. Inspection items include proper chemical storage and handling, spill preparedness, and vehicle and equipment maintenance and storage. Water Resources and Sustainability Staff will be focusing on the Trosper Lake sub-basin and the Mottman Industrial area in 2023.

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3) Policy Support:

- NPDES Permit Section S5.C.6 compliance.
- Environment: We act to preserve and enhance the natural environment and the social fabric of our community.
- Partnership: We work collaboratively with residents, businesses and community organizations.

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4) Alternatives:

- ❑ None. Lack of action would result in non-compliance with NPDES Permit.

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5) Fiscal Notes:

Significant staff time to conduct inspections and carry out customer consultations.

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6) Attachments:

None.

TO: Public Works Committee

FROM: Carrie Gillum, Water Resources Specialist

DATE: January 19, 2023

SUBJECT: Corrosion Control Program Update

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1) Recommended Action:

None. Staff will provide an update of the Corrosion Control Study and results from the 2022 lead and copper sampling program.

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2) Background:

Every three years, the City of Tumwater is required by the federal “Lead and Copper Rule” (LCR) to sample 30 “Tier 1” taps served by the water utility for lead and copper. Tier 1 includes homes constructed between 1983 and 1987, as they are more susceptible to metal degradation from the water. In the summer of 2022, the City broadened its sampling campaign to include investigative samples for homes outside of the required Tier 1 samples. This year, the City had 142 volunteer participants, the largest number to successfully submit water samples for testing. This additional data helped the City better understand its water quality throughout the distribution system and was used to support work for the 2021-22 Corrosion Control Study. In 2019, Tumwater’s residential and non-transient populations exceeded 50,000 requiring the City’s water system to demonstrate optimal corrosion control. Under the LCR, all water systems with residential and non-transient populations over 50,000 must demonstrate this. In November of 2022, a Corrosion Control Study was completed by HDR Engineering Inc. and submitted to Washington Department of Health for review.

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3) Policy Support:

- 40 CFR Part 141: Lead and Copper Rule (LCR) Subpart I
- WAC 246-290-300

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4) Alternatives:

❑ None

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5) Fiscal Notes:

- City of Tumwater Corrosion Control Study, completed by HDR Engineering Inc. - $86,127.62
- 2022 Residential Lead and Copper Tap Sampling Lab Costs - $4,965.00

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6) Attachments:

A. Corrosion Control Study Department of Health Project Report

A

City of Tumwater Corrosion Control Study

PWS #89700Q

DOH Project Report

Tumwater, Washington
November 22, 2022

Contents

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Abbreviations

µg	microgram(s)
$CaCO_3$	calcium carbonate
CFR	Code of Federal Regulations
CSMR	Chloride-Sulfate Mass Ratio
DIC	Dissolved Inorganic Carbon
DOH	Washington State Department of Health
gpm	gallon(s) per minute
HDR	HDR Engineering, Inc.
L	liter(s)
LCR	Lead and Copper Rule
MDD	maximum day demand
mg	milligram(s)
ND	not detected
project report	Washington State Department of Health Project Report
SCADA	supervisory control and data acquisition
State	Washington State
TCE	trichlorethylene
WAC	Washington Administrative Code
WSP	Water System Plan
WTP	Water Treatment Plant
USEPA	U.S. Environmental Protection Agency

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Certification

City of Tumwater, Washington

PWS# 89700Q

Corrosion Control Study

This Project Report for the corrosion control study for the City of Tumwater's water system has been prepared under the direction of the following Registered Professional Engineer:

Pierre K. Kwan
HDR Engineering, Inc.
(206) 826-4735

11/22/2022

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1 Introduction and Purpose

The City of Tumwater (City) (Public Water System ID - 89700Q) retained HDR Engineering, Inc. to prepare an Engineering Report documenting that the City has optimal corrosion control per 40 CFR 141.81(b)(2). The main sources of lead and copper in drinking water stem from utility service lines and customer premise plumbing materials. These materials can include lead and copper pipe, lead goosenecks, lead/tin solder, and leaded brass materials used in faucets and fittings.

Water quality can affect the rate of corrosion of lead and copper materials, the formation and characteristics of scales that form on these materials, and ultimately, the release of metals into drinking water. Understanding the water quality conditions that impact the release of lead and copper in drinking water provides a foundation for establishing an optimal corrosion control treatment.

This report summarizes the City's water quality data and findings.

1.1 Prior Studies

The last known corrosion control study for the City was prepared three decades ago. This study, City of Tumwater Corrosion Control Study: Final Report (Norton Corrosion Limited, 1994), indicates it was prepared to comply with the then newly promulgated Lead and Copper Rule (LCR). However, the review focused on water storage reservoirs, the wells, sewage lift stations, fuel storage tanks, and soil samples. As such, the report devoted lengthy recommendations to repairing exterior water tank coatings, adding galvanic cathodic protection to submerged well piping and underground fuel storage tanks, and adding liners over exposed concrete within sewage lift stations.

The report did indicate that four homes had water quality samples taken and found to have copper concentrations greater than the 1.3 mg/L action level. However, there is no indication if the samples were stagnant samples or flowing water samples. In addition, three of the home samples were obtained at interior locations other than the kitchen tap.

A test was performed to raise the water pH using lime and soda ash. The control water pH was 6.8 and raised to as high as 11.6, though the test methodology is not described. The report indicated that raising the water pH reduced water corrosion, and that using lime was preferable to soda ash. The basis of this evaluation was based on open-circuit potentials (in units of millivolts) and induced corrosion currents (in units of microamps). No water chemistry results were provided.

Overall, the methodology and measurements of the 1994 report are those commonly used to study soil/pipe interface impacts on metal corrosion and not part of accepted LCR corrosion control studies today. As such, this prior document is not relied upon for the remainder of this report.

2 Water System Background

The City is located in Thurston County at the southern end of Puget Sound. In general, the City supplies drinking water to customers within the City's incorporated limits and the surrounding areas within the City's urban growth area. The City's existing service area serves a population of over 28,000, which is primarily composed of residential services. Figure 1 shows the City's historical service connection distribution by customer type from 2007 through 2016 (the last year of data in the City's 2020 Water System Plan). The City has a total of 12,641 service connections per the City's current Water Facilities Inventory (last updated March 14, 2022 per Washington Department of Health [DOH] Sentry database).

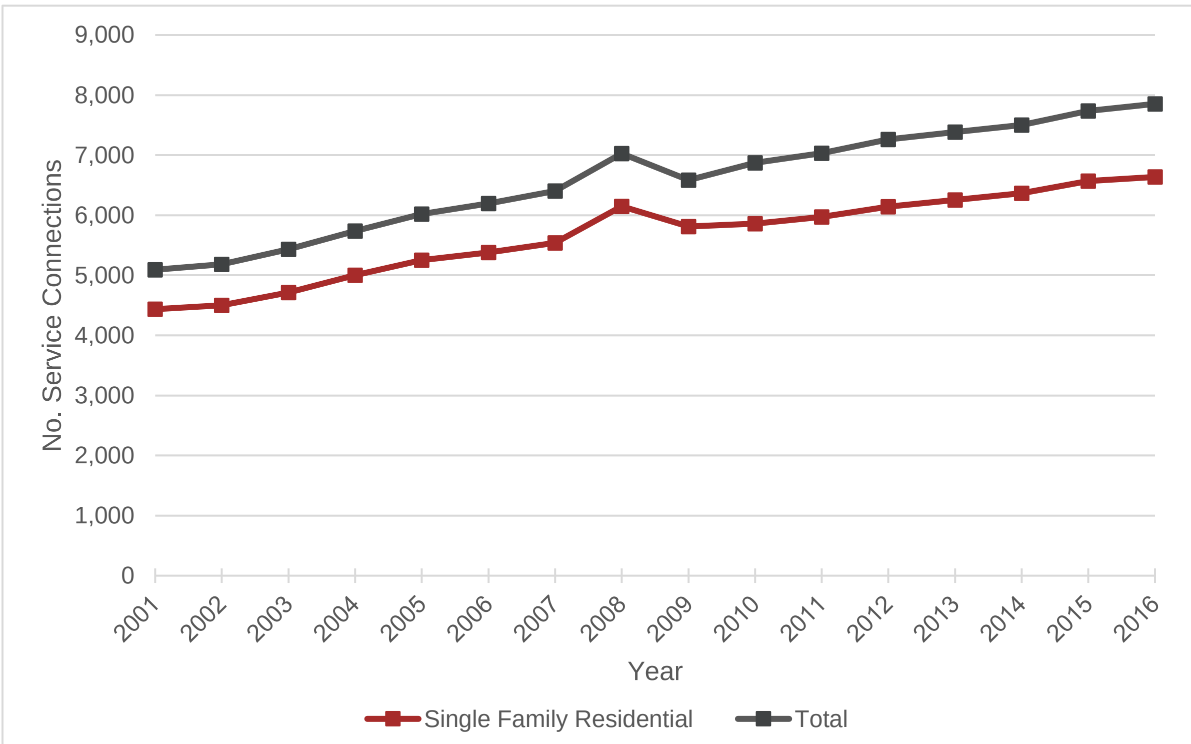


Figure 1. Historical Service Connections Distribution by Customer Type

The City observed a large growth in its housing stock since the late 1990s, or after the time lead/tin solder was banned for plumbing. The City has historically used galvanized iron or copper services. Additionally, there has been no history of installing or encountering either lead service lines or lead goosenecks based on discussions with the City's staff. Due to these factors, it is expected that few, if any, pure lead metals are in place currently within the City's service area. The principal sources of any lead in drinking water would be from leaded brass fixtures, valves, meters, and other appurtenances.

Copper is the predominant customer premise material in the City's service area. Pure copper usage extends from the service lines into building plumbing while mixed copper alloys are present in various brass and bronze appurtenances.

The City continues to grow, with new customers being added to the system each year. The projected service populations are listed in Table 1.

Table 1. Service Population Projections

Year	2017	2020	2025	2030	2035	2040	Average Annual Growth Rate
Service Population	28,443	32,555	37,057	41,319	43,904	47,159	2.3%

(Source: 2020 Comprehensive WSP Update)

2.1 Water Supply Overview

The City's existing water supply is three active wellfields and one emergency well. These supplies are summarized in Table 2, with greater description following afterwards.

Table 2. Water Supply Summary

Water Supply	Pumping Capacity	Treatment Processes	Discharge Location
Palermo Wellfield (Well Nos. 3, 4, 6, 8, 16, 18)	Rated: 2,190 gpm Current: 1,914 gpm Limited [a]: 1,520 gpm	Aeration, Chlorination	350 Pressure Zone
Bush Wellfield (Well Nos. 12, 14)	Rated: 3,025 gpm Current: 2,938 gpm	Aeration, Chlorination	350 Pressure Zone
Airport Wellfield (Well Nos. 9, 10, 11, 15)	Rated: 1,530 gpm Current: 1,540 gpm	Chlorination Only	350 Pressure Zone
Emergency Standby Well No. 24 [b]	Rated: 500 gpm Current: N/A	Chlorination Only	350 Pressure Zone

(Source: 2021 Comprehensive WSP Update, Table 1.2)
[a] Palermo Wellfield capacity is limited/restricted to less than the rated capacity to manage groundwater levels.
[b] In August 2019, Well 24 was taken offline and disconnected from the water system.

Figure 2 shows the City's water system facilities while Figure 3 presents a schematic of how the City's supplies are tied together, and each well's capacity. The City largely relies on the Palermo and Bush Wellfields to supply the majority of its demand. The Airport Wellfield is used less than the other two wellfields. The Airport Wells are typically used seasonally during the summer to meet higher system demands. The wellfields and wells discharge into the 350 Zone at different locations and there is no water system mixing unless different waters reach the 350 Reservoir, at which time a blended water leaves the reservoir outlet. As such, customers are typically supplied alternating water qualities based on what wells are in use at the time.

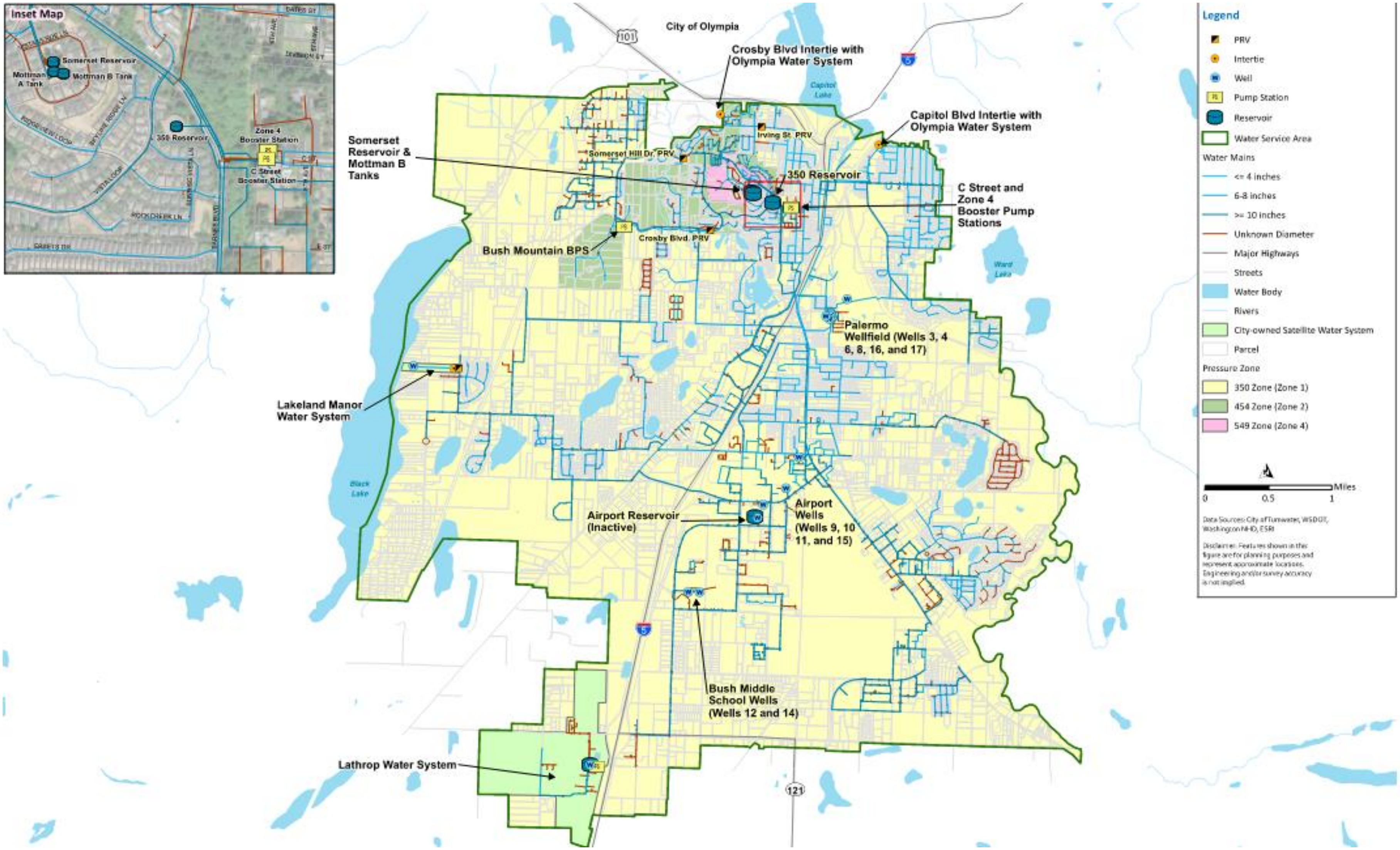


Figure 2. Water System
(Source: 2021 Water System Plan Update, Figure 1.4)

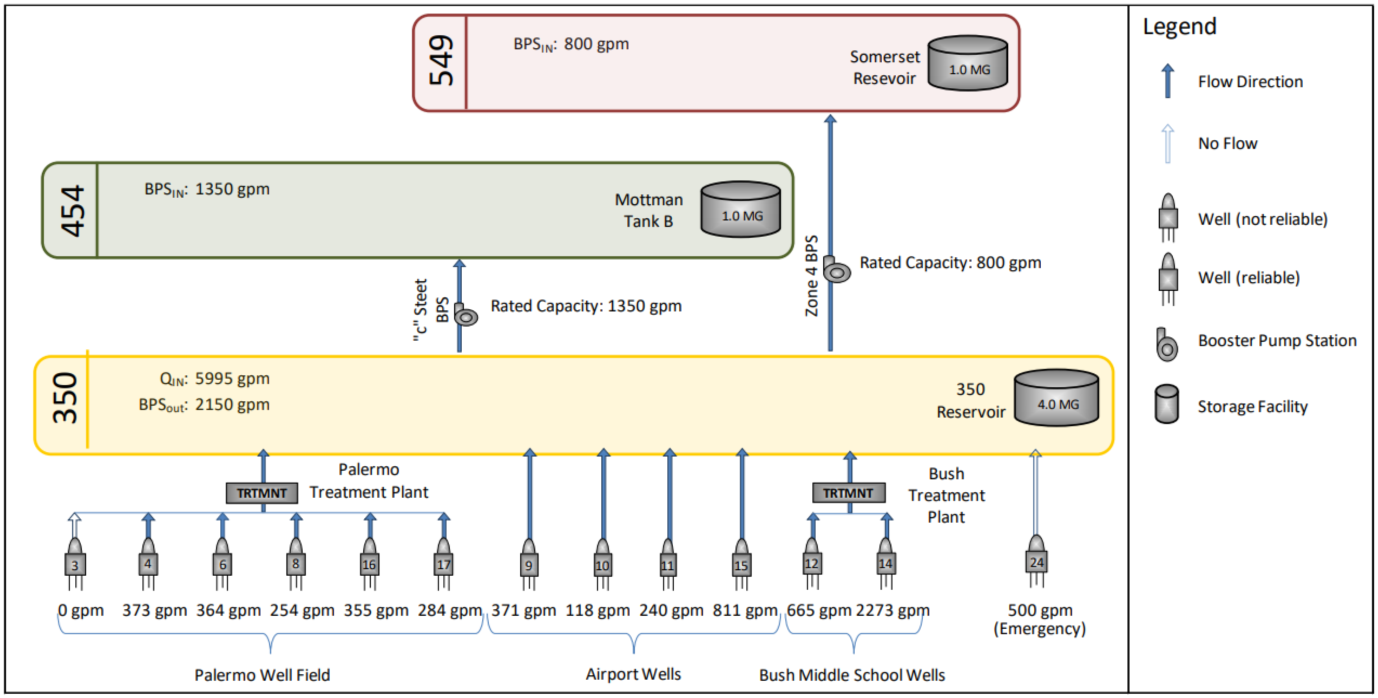


Figure 3. Existing Supply, Pumping, and Storage Configuration (Source: 2021 Comprehensive WSP Update, Figure 5.1)

2.1.1 Palermo Wellfield and Palermo Treatment Plant

The Palermo Wellfield consists of six wells: Wells Nos. 3, 4, 6, 8, 16 and 17. Well 3 is currently not in use due to interference with the other Palermo wells. The groundwater from these wells discharge into the Palermo Water Treatment Plant (WTP), which is equipped with two packed aeration towers to remove trichlorethylene (TCE). Through this process, aeration also removes dissolved carbon dioxide in the water and raises the pH to 7.8 to 8.0. Following aeration, sodium hypochlorite is added to impart a chlorine residual and to inhibit biological growth within the towers. The Palermo WTP became operational in 1999.

2.1.2 Bush Wellfield and Bush Treatment Plant

The Bush Wellfield consists of Well Nos. 12 and 14. These two wells have low pH groundwater, similar to the wells in the Palermo wellfield, but no VOCs. The water is first passed through a single packed aeration tower (installed in 2000) to raise the water pH and then is chlorinated using sodium hypochlorite prior to pumping to the 350 pressure zone.

2.1.3 Airport Wells

There are four wells by the Olympia Regional Airport. Well Nos. 9 and 10 discharge into a common entry point into the distribution system while Well Nos. 11 and 15 have their own entry points to the distribution system. Unlike the Palermo and Bush Wellfields, the Airport Wells lack aeration facilities and the groundwater is only chlorinated.

3 Water Quality Parameters Impacting Corrosion

Corrosion in utility water systems and customer premise plumbing is defined as the electrochemical interaction between a metal surface, such as a pipe wall or solder, and water. During this interaction, metal ions are released from the pipe and transferred to the water. The extent of this interaction in terms of magnitude and speed of release is governed by various water quality parameters described in the following sections.

3.1.1 Water pH

Water pH exerts an effect on the solubility, reaction rates, and the surface chemistry of all corroding metals. Low pH levels potentially increase the solubility of copper and lead from premise plumbing and fixtures, iron from old unlined iron/steel mains, and galvanized iron services. At lower pH values, typically below 7, uniform corrosion of cold water piping dramatically increases. At higher pH values, there is a lower tendency for metal surfaces in contact with drinking water to dissolve and enter the water. In addition, pH stability is important to developing and maintaining protective metals scales in piping. Intermittent shifts between lower pH water and a higher pH water can be as detrimental to corrosion control as constantly maintaining a lower pH water throughout a distribution system.

pH is also a critical factor defining the carbonate balance because it impacts buffer capacity and dissolved inorganic carbon (DIC) concentrations. This water quality parameter is one of the predominant factors in controlling corrosion rates.

Maintaining a consistent pH throughout the distribution system is critical to minimizing lead and copper levels at the tap, even if other corrosion protection methods are employed. Fluctuations in pH can exert a similar, or sometimes larger, effect on metal corrosion and release than under continuous exposure to low pH. Distribution system pH for Western Washington utilities is typically maintained between 7.5 and 8.3.

3.1.2 Alkalinity, DIC, and Buffering Intensity

Alkalinity, DIC, and buffering intensity are three inter-related water quality parameters that significantly govern the extent of corrosion control in water systems. Alkalinity is a commonly analyzed water quality parameter that provides an indirect measure of a given water’s ability to resist changes in pH. Waters with high alkalinities tend to have higher buffering capacities than waters with lower alkalinities, allowing for better control and stable water pH throughout a distribution system and into customer premise plumbing systems.

DIC is the calculated sum of all of the carbonate species and is a factor for controlling corrosion. Direct analysis of DIC is not typically conducted by water quality laboratories due to expense. Instead, most water quality professionals estimate DIC by comparing pH, alkalinity, and water temperature data with published graphs produced by the U.S. Environmental Protection Agency (USEPA). DIC is primarily used as an indicator of lead corrosion as a higher concentration indicates the potential formation of strong, insoluble lead carbonate scales. DIC is also used as an indicator of potential copper corrosion.

Buffer intensity is the calculated resistance to changes in pH in water and is a function of pH and DIC. For water with a pH between 7.0 and 9.0, buffer intensity will increase as the water alkalinity increases. While buffer intensity is the most precise definition of a water's ability to resist pH changes, this term is rarely used as it involves a second mathematical calculation (the first being to calculate DIC) that requires specialized computer programs. This term is used in scientific articles on corrosion control; most industry corrosion studies use pH/alkalinity (two directly measured parameters) or pH/alkalinity/DIC (two measured parameters and one simple calculation).

3.1.3 Total Dissolved Solids (TDS) and Conductivity

TDS can have an impact on corrosion. High TDS concentrations, such as greater than 500 milligrams per liter (mg/L) TDS, increase the conductivity of water, which in turn provides an electrochemical driving force to pull metal ions from the pipe/plumbing surface and into the water. Conversely, very low TDS (less than 20 mg/L TDS) is also highly corrosive to metals as a different electrochemical force dissolves metals.

3.1.4 Temperature

Temperature plays a role in corrosion in that it impacts many parameters critical to corrosion including dissolved oxygen levels and biological activity. In general, colder temperatures result in less metal corrosion.

3.1.5 Oxidation-Reduction Potential (ORP), Dissolved Oxygen, and Chlorine

These parameters are various measures of water's capability to oxidize metals. ORP depends on a number of water quality parameters but is primarily driven by the concentrations of disinfectant (chlorine) and dissolved oxygen in the water. Low measures of any of these three parameters are often an indicator that copper, iron, and lead release could be occurring within premise plumbing.

3.1.6 Chloride and Sulfate

These two anions are key parameters in the calculation of the Chloride-Sulfate Mass Ratio (CSMR). CSMR has been identified in several published water quality papers as the key parameter to explain high lead corrosion rates when pH/alkalinity/DIC values would otherwise indicate optimized corrosion control treatment. In addition, high chloride concentrations (greater than 100 mg/L) alone have been found to cause increased copper corrosion rates from plumbing.

3.1.7 Microbial activity

Corrosion can also be caused by microbial activity in the water. Microbes can regrow in waters that are warm, absent of chlorine, and in the presence of food. Such food can be organic carbon, iron (for iron bacteria), and/or sulfur (for sulfur bacteria). Review of the City's data does not indicate any strong tendencies for microbial growth due to the maintenance of free chlorine residuals throughout the distribution system, the generally colder water temperatures, and the lack of coliform detections in routine monitoring.

However, this situation could occur in stagnant customer premise plumbing, such as an unused but heated guest restroom.

4 Water Quality Data

The following sections describe the historical corrosion-related treated and distribution system water quality data collected by the City, along with results of quarterly sampling conducted by the City starting in 2021.

4.1 Treated Water pH SCADA data

The City monitors pH through a Supervisory Control and Data Acquisition (SCADA) system at the Bush WTP and the Airport Wells. pH is not monitored by SCADA at the Palermo WTP.

Figure 4 shows the pH SCADA data for the Bush WTP starting on January 1, 2019. The City has recorded Bush WTP pH data since 2013 but data prior to 2019 is inaccurate due to infrequent instrumentation calibration procedures. For example, some results show extended periods of pH 2 water along with a spike in water pH up to 14. If accurate, such conditions would have generated considerable human health impacts, significant impacts to premise plumbing, negative damage to dental and healthcare equipment, hot water boilers, and household and commercial/industrial appliances. No such issues occurred. As such, this is not presented nor used in this analysis. The City indicates that procedures were updated in 2019 and the instruments are checked and calibrated on a more frequent basis now.

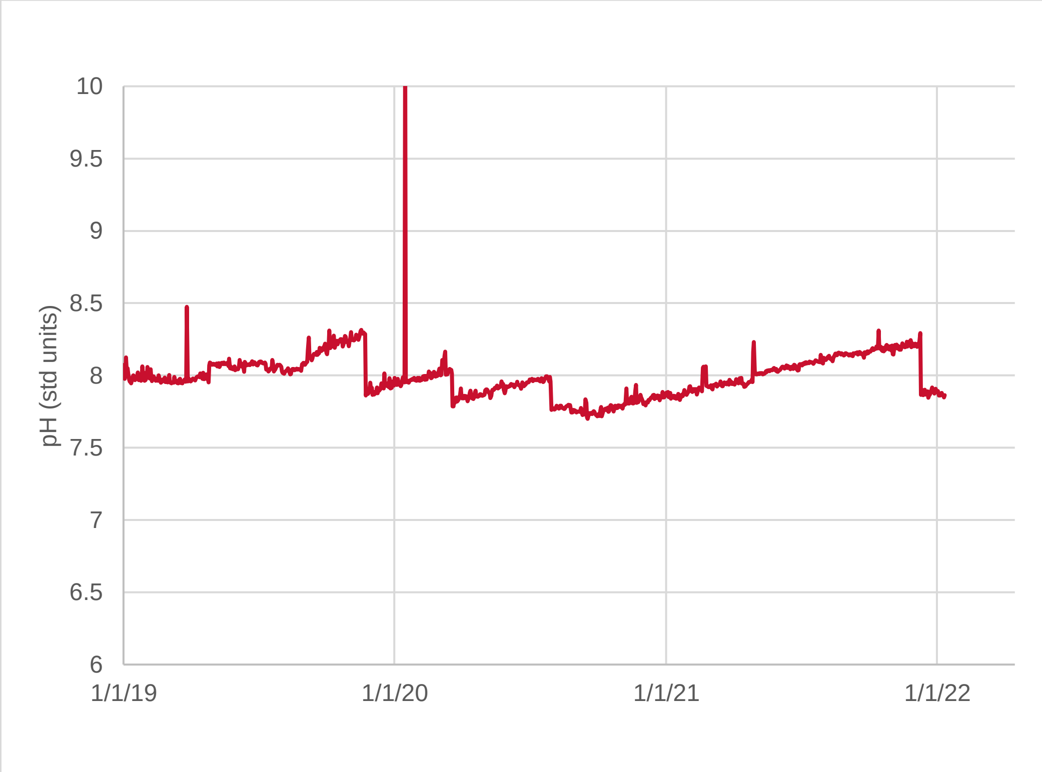


Figure 4. Bush Clearwell SCADA Data – pH (January 2019 to January 2022)

The SCADA-recorded online water pH data for the various Airport Wells is shown in Figure 5. As with the Bush WTP, the historical pH monitoring shows considerable variability atypical to Western Washington groundwaters. pH levels typically range above 7.0 but can be as high as 9.0 for several months or over 10.0 on a daily basis. Communications with City staff indicate that much of the pH changes are likely due to instrument drift and lack of calibration when the wells are offline during the winter. The City indicates the groundwater pH is relatively stable at 6.8 to 7.0.

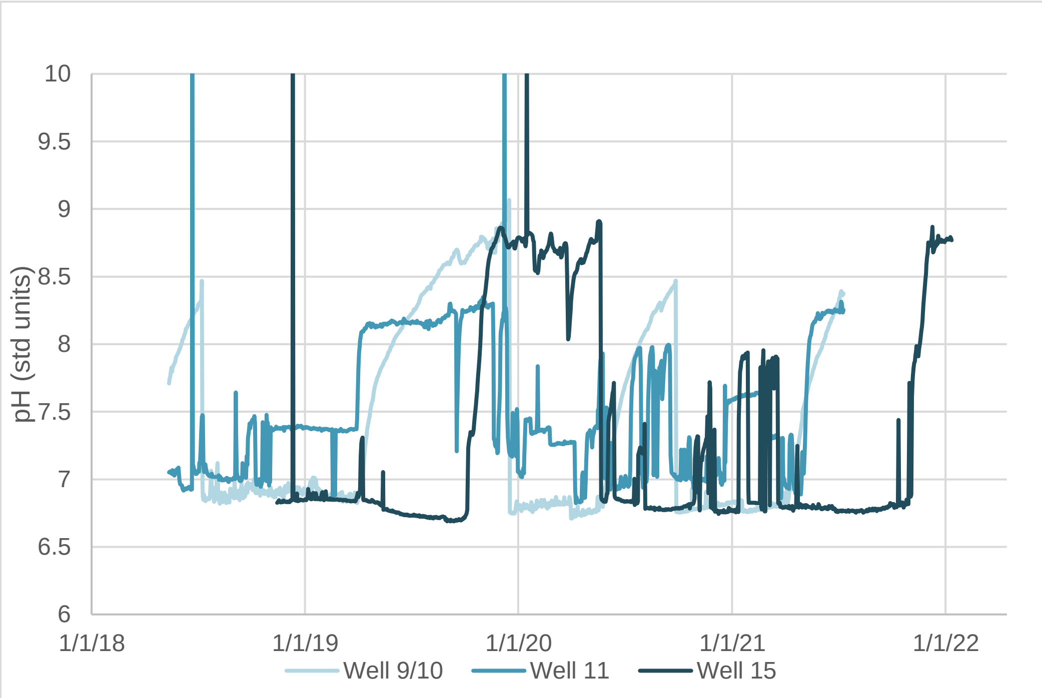


Figure 5. Airport Wells SCADA Data – pH (April 2018 to January 2022)

4.2 Additional Monitoring

The DOH directed the City to conduct additional water quality monitoring as part of the corrosion control investigation. In the request from August 19, 2019, the DOH required the following parameters be measured quarterly at each entry point to the distribution system and a minimum of ten locations throughout the distribution system:

- pH
- Alkalinity
- Calcium
- Conductivity
- Water temperature

Sampling was started in July 2021 and will conclude in July 2022. Sampling sites were selected from existing routine monitoring locations shown in Figure 6. Note that the site numbering was prepared for this report to replace use of personal home or business addresses.

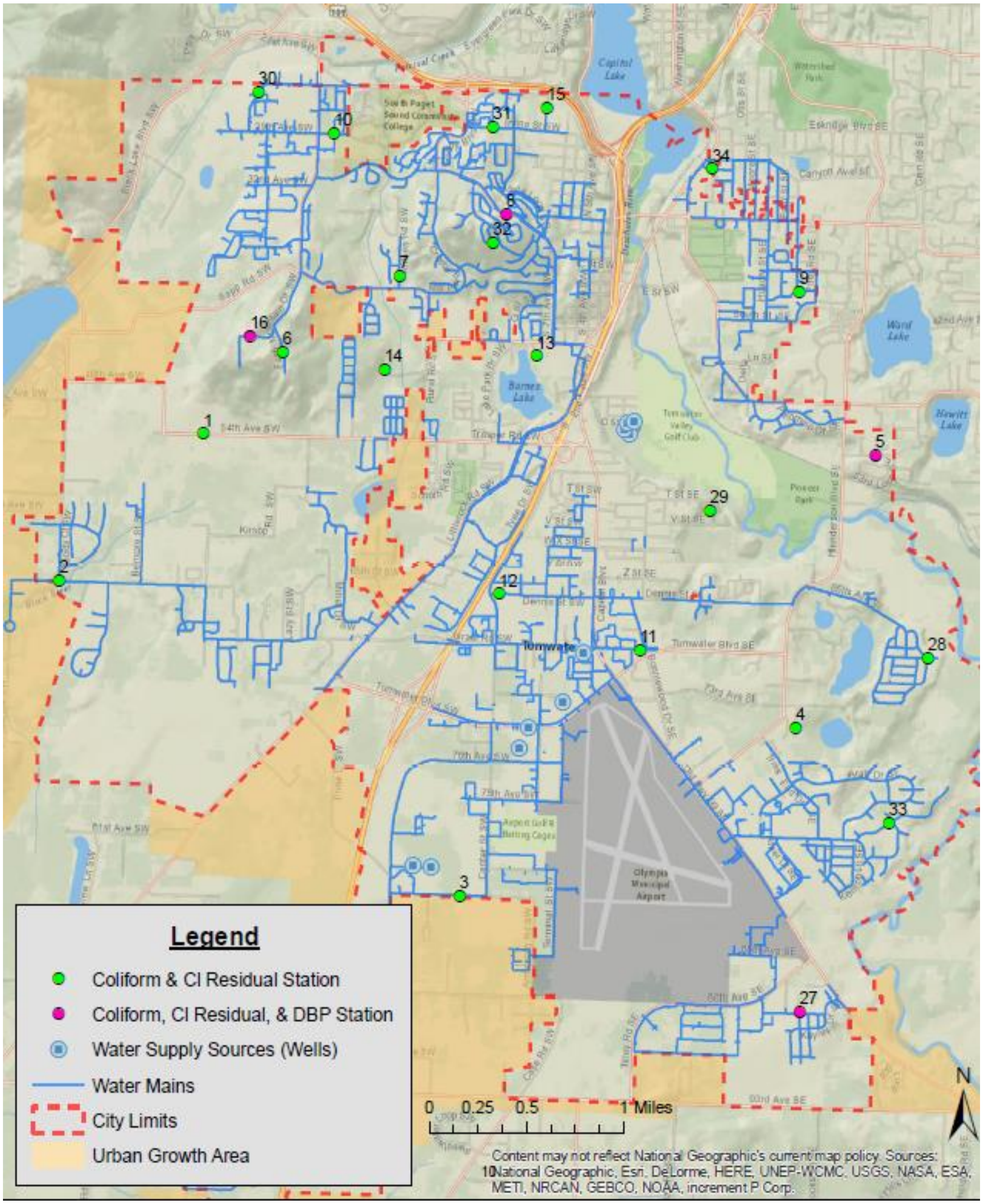


Figure 6. Sampling Stations in the City's Distribution System (Source: provided with sampling data)

4.2.1 Entry Point Water Quality Data

Samples collected at each entry point that inform the results of the corrosion control investigation are summarized in Table 3. The number of samples collected varies across each entry point since samples were only collected if the well was operating at the time of sampling. Therefore, the number of samples collected at the Airport Wells is lower than the number of samples collected at the Palermo and Bush WTPs. Water quality results are provided in Table 4, along with selected historic water quality data of parameters that have potential to impact corrosion.

In general, there is a distinct difference in the water quality between the Palermo and Bush Wellfields and the Airport Wells. The difference is due to the implementation of aeration at the two wellfields, whereas the individuals Airport Wells lack such treatment. Specifically, water from the Airport Wells have considerably lower pH and higher DIC and alkalinity than the Palermo and Bush waters as shown in Figure 7, Figure 9 and Figure 10. Figure 8 illustrates that temperatures are stable and typical of those of shallow western Washington aquifers, which are conducive to minimizing corrosion. As noted earlier, pH and DIC are key indicators of increased corrosion potential. As such, this increased potential occurs whenever one or more of the Airport Wells are operate and displaces the higher pH Palermo and Bush water from service area surrounding the Airport Wells. Since the Airport Wells are infrequently used, this displacement causes swings in water pH between ~7.0 and ~8.0, which can be detrimental to the formation and preservation of protective corrosion scales.

In addition, the higher alkalinities of the Airport Wells water than the other two waters means that the water is more buffered and resists pH changes. This fact is important if the water from the City's wells blend as the blended water will be considerably closer in pH to the Airport Wells, and therefore more corrosive, than either aerated Palermo or Bush water.

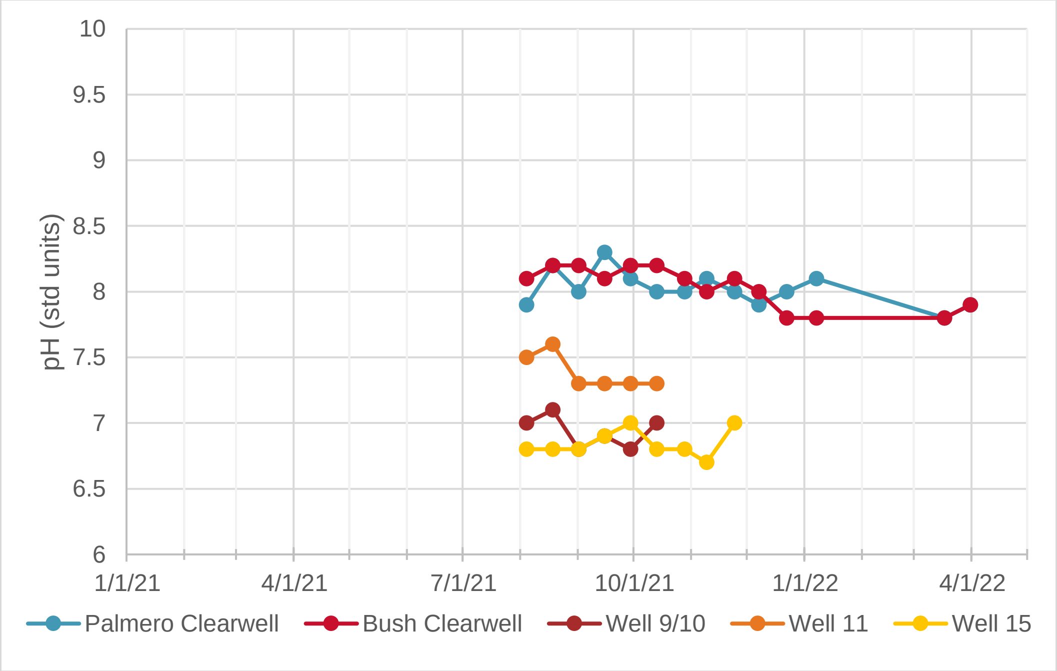


Figure 7. Measured pH, Distribution Entry Points When in Use (August 2021 to March 2022)

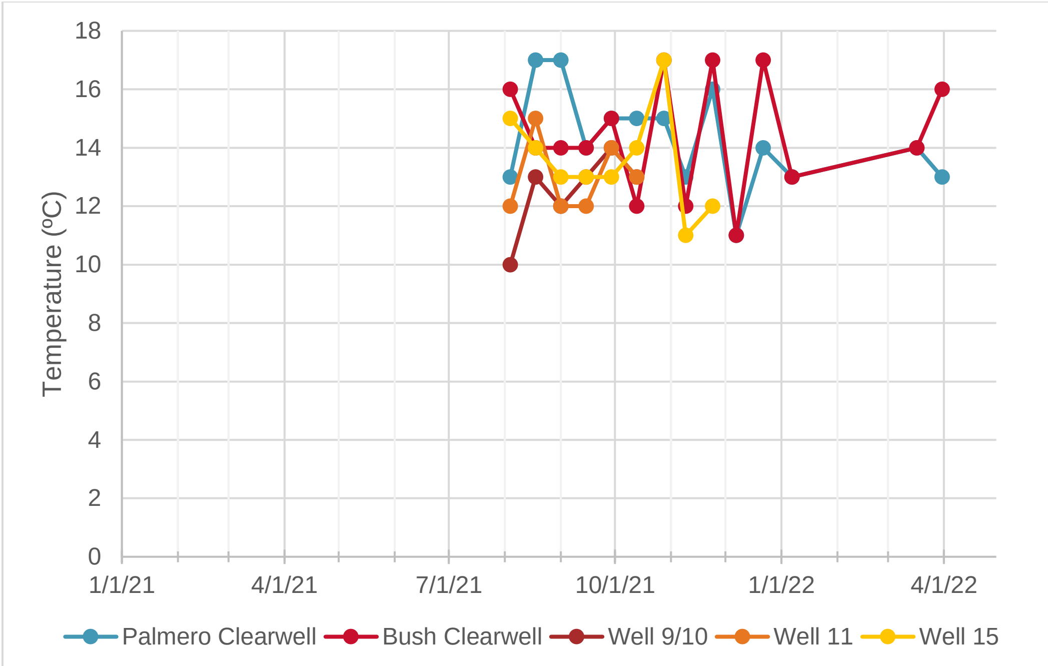


Figure 8. Measured Temperature, Distribution Entry Points When in Use (August 2021 to March 2022)

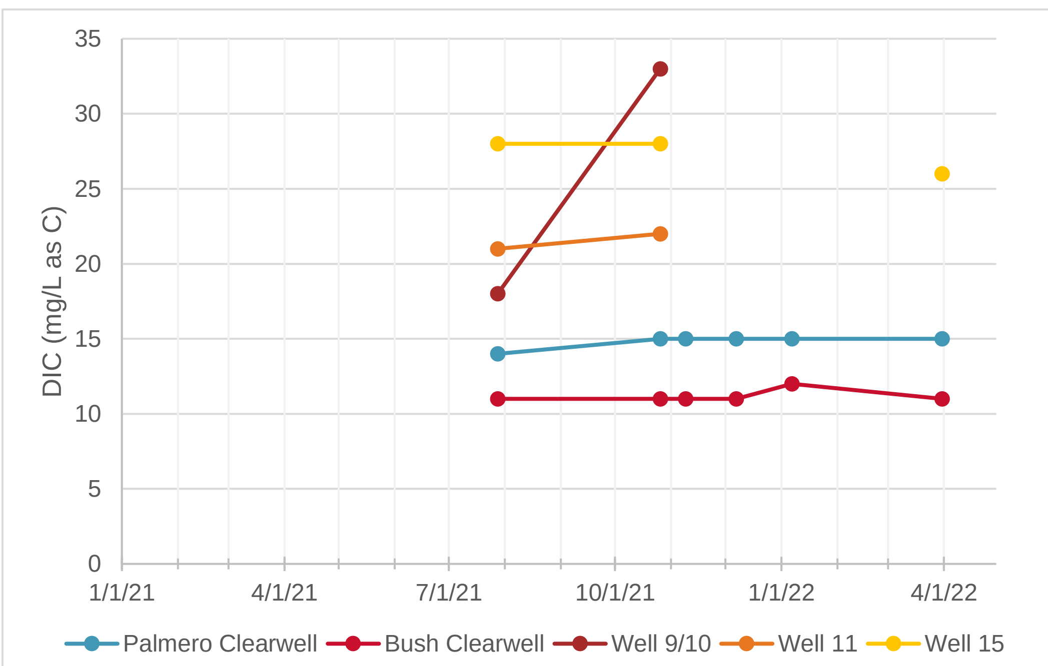


Figure 9. Calculated DIC, Distribution Entry Points When in Use (July 2021 to March 2022)

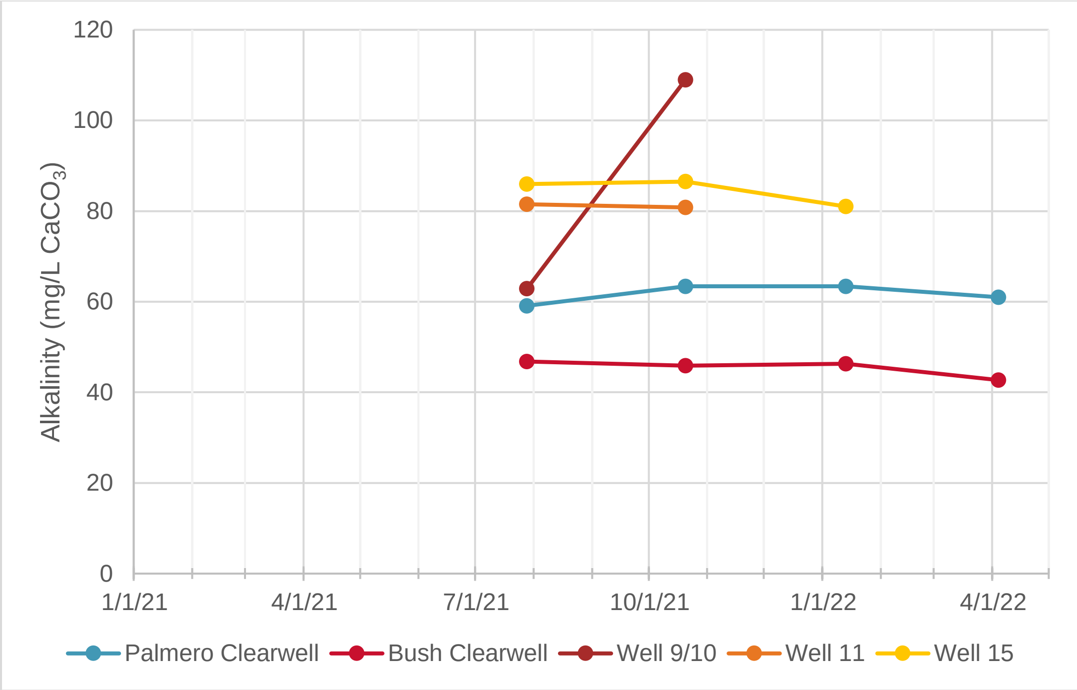


Figure 10. Measured Alkalinity, Distribution Entry Points When in Use (August 2021 to April 2022)

Table 3. Select Water Quality Parameters of the City's Water Supplies – Entry Point Number of Samples Collected

Parameter	Palermo Clearwell	Bush Clearwell	Wells 9/10	Well 11	Well 15
pH [a, b]	14	14	6	6	9
Temperature [a, b]	14	14	6	6	9
Alkalinity [b]	4	4	2	2	3
Calcium [b]	4	4	2	2	3
Conductivity [b]	4	4	2	2	3
Total Chlorine	1	1	1	1	1
Free Chlorine	1	1	1	1	1
Hardness [c]	1	1	1	1	1
Total Dissolved Solids [c]	1	1	1	1	1
Chloride [c]	1	1	1	1	1
Sulfate [c]	1	1	1	1	1
Iron [c]	1	1	1	1	1
Manganese [c]	3	1	1	1	1
DIC [d]	N/A	N/A	N/A	N/A	N/A

[a] Sampled biweekly.
[b] Sampled quarterly.
[c] Based on IOC sampling data.
[d] Dissolved Inorganic Carbon (DIC) calculated based on sample pH and alkalinity values.

Table 4. Select Water Quality Parameters of the City's Water Supplies – Entry Point Data

Parameter	Units	Limit [a]	Palermo Clearwell Average (Range)	Bush Clearwell Average (Range)	Wells 9/10 Average (Range)	Well 11 Average (Range)	Well 15 Average (Range)
pH	Std. Units	6.5 to 8.5	8.0 (7.8 to 8.3)	8.0 (7.8 to 8.2)	6.9 (6.8 to 7.1)	7.4 (7.3 to 7.6)	6.8 (6.7 to 7.0)
Temperature	ºC	-	14 (11 to 17)	14 (11 to 17)	13 (10 to 14)	13 (12 to 15)	14 (11 to 17)
Alkalinity	mg/L as $CaCO_3$	-	61.7 (59.1 to 63.4)	45.4 (42.7 to 46.8)	86.0 (62.9 to 109.0)	81.2 (80.8 to 81.5)	84.5 (81.0 to 86.5)
Calcium	mg/L as Ca	-	12.2 (9.7 to 13.5)	11.7 (10.8 to 12.8)	13.0 (12.5 to 13.5)	16.9 (15.7 to 18.0)	16.7 (16.2 to 17.6)
Conductivity	µS/cm	700	153 (144 to 159)	121 (113 to 128)	130 (125 to 136)	178 (168 to 188)	179 (173 to 187)
Total Chlorine	mg/L as Cl_2	-	0.52	0.45	0.37	0.50	0.59
Free Chlorine	mg/L as Cl_2	4.0	0.50	0.42	0.35	0.48	0.55
Hardness [b]	mg/L	-	57.6	41.7	54.7	69.7	82.3
Total Dissolved Solids [b]	mg/L	500	112	104	102	129	139
Chloride [b]	mg/L	250	5.3	4.4	3.7	4.8	4.1
Sulfate [b]	mg/L	250	5.2	4.2	3.9	3.2	4.2
Iron [b]	mg/L	0.3	Non-detect	Non-detect	Non-detect	Non-detect	Non-detect
Manganese [b]	mg/L	0.05	0.012 (0.011 to 0.013)	Non-detect	Non-detect	Non-detect	Non-detect
DIC [c]	mg/L as C	-	15 (14 to 15)	11 (11 to 12)	26 (18 to 33)	22 (21 to 22)	27 (26 to 28)

[a] Maximum contaminant levels per WAC 246-290-310.

[b] Based on IOC sampling data

[c] Dissolved Inorganic Carbon (DIC) calculated based on sample pH and alkalinity values.

4.2.2 Distribution Water Quality Data

As described previously, sampling is also being conducted at ten distribution system locations. A summary of distribution samples collected to date is presented in Table 6 and the number of samples at each location that inform this data is presented in Table 5. Water samples currently indicate an average pH of 7.7 with a range of 6.8 to 8.3. The majority of sampling locations have an average pH of 8.0, with the exception of sample sites WQ28 and WQ33, where the average pH was 7.0. WQ28 and WQ33 are less than a mile away from each other and are west of the Olympia Regional Airport.

Average alkalinity levels at the distribution sample sites range between 44 and 61 mg/L as $CaCO_3$. While most distribution samples have exhibited relatively consistent alkalinity during the sampling period, the alkalinity levels at WQ28 and WQ33 have decreased by nearly half since the beginning of sampling. This significant range in alkalinity for WQ28 and WQ33 is also apparent in the large range of DIC levels.

The samples have an average free chlorine residual of 0.36 mg/L as Cl_2, based off three to four samples taken at each location in August 2021. While the average chlorine levels are above the DOH’s required disinfectant level of 0.2 mg/L, WQ26 had measurements below the required level. It is recommended that the City further investigate the chlorine levels at WQ26 since low levels may pose LCR compliance issues.

Table 5. Select Water Quality Parameters of the City's Water Supplies – Distribution System Data Number of Samples Collected

Parameter	WQ2	WQ3	WQ6	WQ8	WQ9	WQ10	WQ12	WQ26	WQ28	WQ33
pH [a, b]	15	18	15	16	15	16	15	15	14	15
Temperature [a, b]	15	18	15	16	15	16	15	15	14	15
Alkalinity [b]	4	4	4	4	4	4	4	3	4	4
Calcium [b]	4	4	4	4	4	4	4	3	4	4
Conductivity [b]	4	4	4	4	4	4	4	3	4	4
Total Chlorine	4	4	4	5	4	5	5	4	4	4
Free Chlorine	4	4	4	5	4	5	5	4	4	4
DIC [c]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[a] Sampled biweekly.
[b] Sampled quarterly.
[c] Dissolved Inorganic Carbon (DIC) calculated based on sample pH and alkalinity values.

Table 6. Select Water Quality Parameters of the City's Water Supplies – Distribution System Data

Parameter	Units	WQ2 Average (Range)	WQ3 Average (Range)	WQ6 Average (Range)	WQ8 Average (Range)	WQ9 Average (Range)	WQ10 Average (Range)	WQ12 Average (Range)	WQ26 Average (Range)	WQ28 Average (Range)	WQ33 Average (Range)
pH	Std. Units	7.9 (7.4 to 8.2)	8.0 (6.9 to 8.2)	8.0 (7.3 to 8.2)	8.0 (7.3 to 8.2)	8.0 (7.5 to 8.3)	8.0 (7.4 to 8.1)	8.0 (7.1 to 8.1)	8.0 (7.6 to 8.3)	7.0 (6.8 to 8.0)	7.0 (6.8 to 8.2)
Temperature	ºC	13 (7 to 18)	13 (11 to 18)	15 (7 to 21)	14 (7 to 19)	16 (9 to 24)	16 (8 to 23)	14 (11 to 17)	14 (9 to 19)	16 (9 to 21)	14 (9 to 18)
Alkalinity	mg/L as $CaCO_3$	44.7 (42.1 to 46.0)	45.3 (42.8 to v46.6)	54.3 (52.7 to 56.4)	55.1 (53.4 to 56.0)	61.1 (59.4 to 63.1)	53.0 (50.2 to 56.2)	46.3 (42.5 to 50.5)	44.2 (42.3 to 46.3)	54.1 (44.4 to 71.8)	52.9 (42.2 to 69.3)
Calcium	mg/L as Ca	12.2 (11.5 to 12.9)	12.4 (9.9 to 13.9)	12.6 (10.5 to 14.2)	13.5 (12.8 to 14.0)	13.6 (12.9 to 14.6)	13.1 (12.0 to 13.9)	12.4 (11.4 to 13.2)	12.3 (12.0 to 12.5)	13.0 (12.0 to 14.3)	13.6 (11.4 to 15.6)
Conductivity	mg/L as Cl_2	121 (115 to 126)	122 (115 to 128)	138 (128 to 148)	139 (129 to 145)	153 (144 to 162)	137 (134 to 140)	122 (115 to 128)	120 (112 to 127)	134 (124 to 146)	133 (120 to 149)
Total Chlorine	mg/L as Cl_2	0.44 (0.36 to 0.50)	0.40 (0.38 to 0.40)	0.43 (0.41 to 0.45)	0.47 (0.45 to 0.53)	0.38 (0.36 to 0.39)	0.36 (0.33 to 0.38)	0.42 (0.36 to 0.46)	0.25 (0.21 to 0.28)	0.45 (0.41 to 0.49)	0.47 (0.46 to 0.48)
Free Chlorine	mg/L	0.36 (0.34 to 0.37)	0.36 (0.35 to 0.37)	0.40 (0.38 to 0.43)	0.44 (0.40 to 0.48)	0.34 (0.33 to 0.36)	0.30 (0.23 to 0.36)	0.37 (0.29 to 0.40)	0.21 (0.19 to 0.24)	0.42 (0.40 to 0.43)	0.43 (0.42 to 0.43)
DIC [a]	mg/L as C	11 (10 to 11)	11. (11 to 12)	14 (13 to 14)	14 (13 to 15)	15 (15 to 15)	13 (13 to 15)	12 (11 to 14)	11 (10 to 12)	14 (12 to 22)	14 (11 to 22)

[a] Dissolved Inorganic Carbon (DIC) calculated based on sample pH and alkalinity values.

4.3 Lead and Copper Rule Compliance

The EPA developed the LCR to reduce lead and copper concentrations in drinking water that can occur when corrosive source water, typically water with a pH of less than 7.5, causes lead and copper to leach from utility services and residential plumbing. Per Title 40 of the Code of Federal Regulations (CFR) Part 141, last amended June 16, 2021, the LCR established an action level (AL) of 15 µg/L for lead and 1.3 mg/L for copper, and a lead trigger level of 10 µg/L. The action or trigger levels are triggered if the concentration of lead or copper exceeds the respective limit at the 90th percentile (P90) of their respective samples.

Table 7 summarizes the LCR results the City has collected to date. The following sections provide additional lead and copper sample data.

Table 7. Lead and Copper LCR Results

Sampling Year	No. Samples	Lead (µg/L) Action Level: 15 µg/L Trigger Level: 10 µg/L	Copper (mg/L) Action Level: 1.30 mg/L
		90th Percentile	90th Percentile
1992	60	4	0.150
2000	120	4	0.150
2004	38	**10**	0.261
2007	46	**11**	0.425
2010	31	9	0.347
2013	38	3	0.309
2015	10	2	0.309
2016	45	3	0.359
2019	30	6	0.217
2022	30	9	0.166

Note: Values that meet or exceed the lead trigger level are shown in red.

The latest compliance sampling event was in August 2022. This included sampling 30 locations for lead and copper. This effort also included investigative sampling at 96 locations. Of the 30 compliance samples, lead concentrations at 13 of the sites were non-detect, 14 were below the 10 µg/L trigger level, zero were above the trigger level but less than the 15 µg/L action level, and three were greater than the action level.

Of the 96 investigative samples, lead concentrations at 75 of the sites were non-detect, 18 were below the 10 µg/L trigger level, one was above the trigger level but less than the 15 µg/L action level, and one was greater than the action level. Follow-up sampling was conducted at the four sites with lead concentrations above the action level. Results are summarized in Table 8.

Table 8. 2022 Follow-Up Sampling Results

Site	August 2022 Sampling Lead (µg/L)	October 2022 Sampling Lead (µg/L)
Compliance		
A	57.9	3.3 (Upstairs), 22.4 (Downstairs)
B	26.6	1.3
C	24.9	2.4
Investigative		
D	28.5	ND

4.3.1 Lead Sampling

Figure 11 provides lead sampling results showing the percent occurrence of different lead levels. Sampled lead levels have generally been at or below the action or trigger levels in more than 90 percent of samples. However, the City's P90 lead levels met and exceeded 10 µg/L in 2004 and 2007. While these concentrations were acceptable per the LCR at the time, any future detections at these levels would trigger several additional corrosion control activities per the Lead and Copper Rule Revisions promulgated in Dec. 2021.

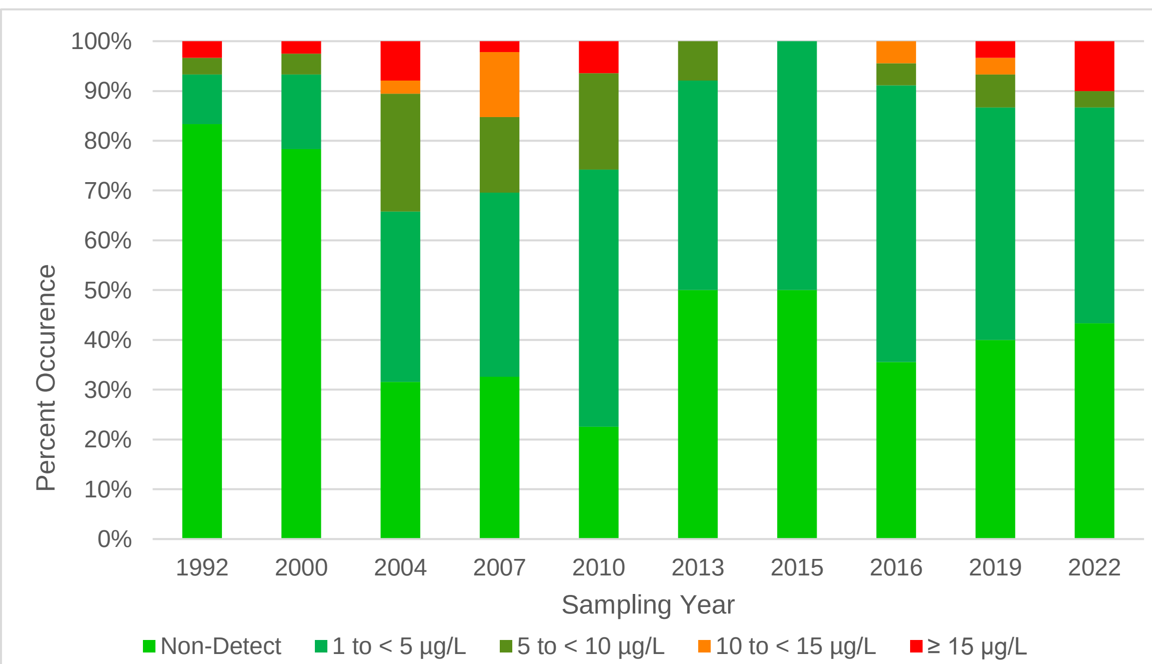


Figure 11. Lead Sampling Results
(Note: Palermo WTP started 1999, Bush WTP started 2000)

Further Analysis

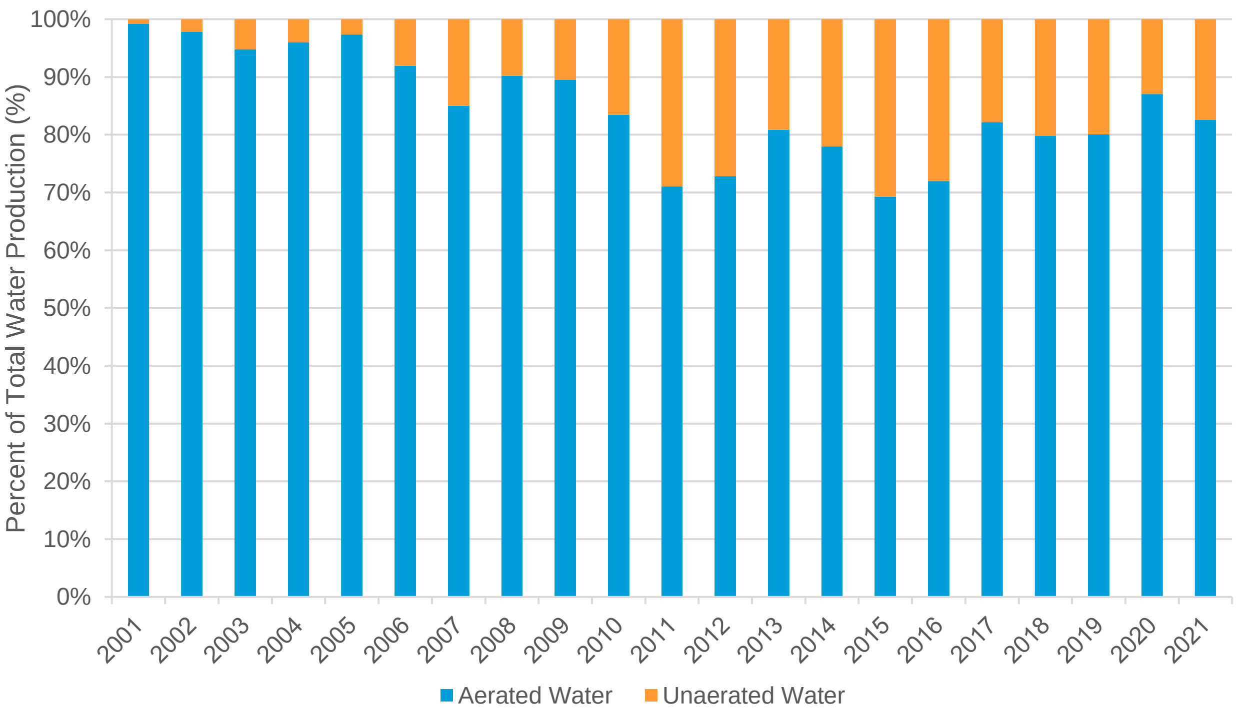
HDR reviewed annual well production data provided by the City since 2001 and lead sampling locations to investigate any trends that may result in the variation in lead concentrations over the years.

Water Production Analysis

Figure 12 presents the percent of water production that was aerated versus unaerated from 2001 through 2021 (i.e. pH adjusted versus not pH adjusted). The use of unaerated, lower pH water has increased over the years, with it accounting for at least 10 percent of the City's annual production since 2007 and accounting for 20 to 25 percent of its annual production for most years since 2011.

Figure 13 further breaks this out into the gallons of water produced from each water source. Bush Wellfield has been the largest producer over the years, accounting for 50 percent of water production for all years besides 2001, 2004, and 2007. Palermo Wellfield is the next largest producer, accounting for at least 20 percent of water production from 2001 to 2016. Production from the Palermo Wellfield decreased from 2009 to 2016, but has been increasing since 2017, accounting for over 25 percent of the annual water production in 2021. Use of the Airport Wells has increased over time, with them accounting for at least 10 percent of annual production since 2008.

Figure 14 presents similar data of water production for the month prior to the LCR sampling. As with the overall annual production trend, the analysis shows that increasing amounts of unaerated/lower pH water is present throughout the distribution system prior to sampling, which could negatively impact corrosion control results.



Notes:
- System-wide disinefection began late 2004 with a brief hiatus in 2006.
- Full-time disinfection using sodium hypochlorite has been in operation since 2007

Figure 12. 2001 to 2021 Aerated Water vs. Unaerated Water

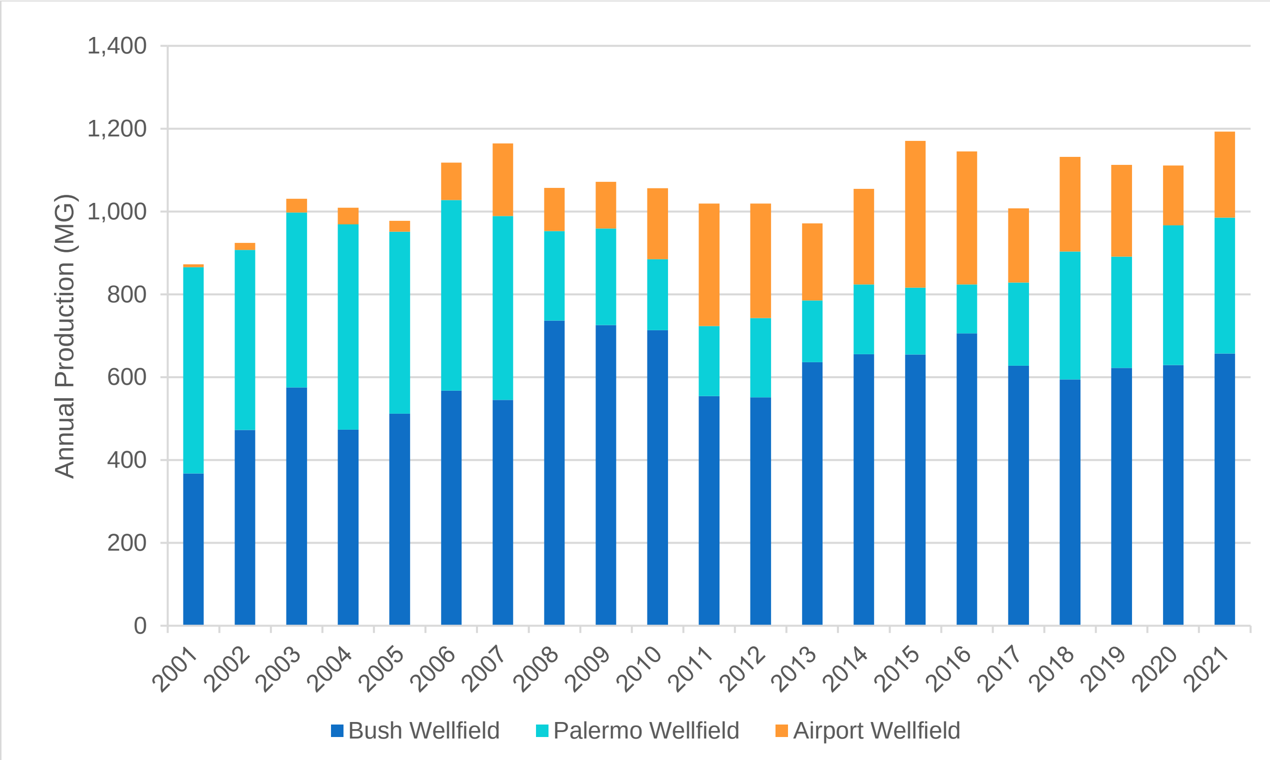


Figure 13. 2001 to 2021 Annual Well Production for Tumwater Water System in MG

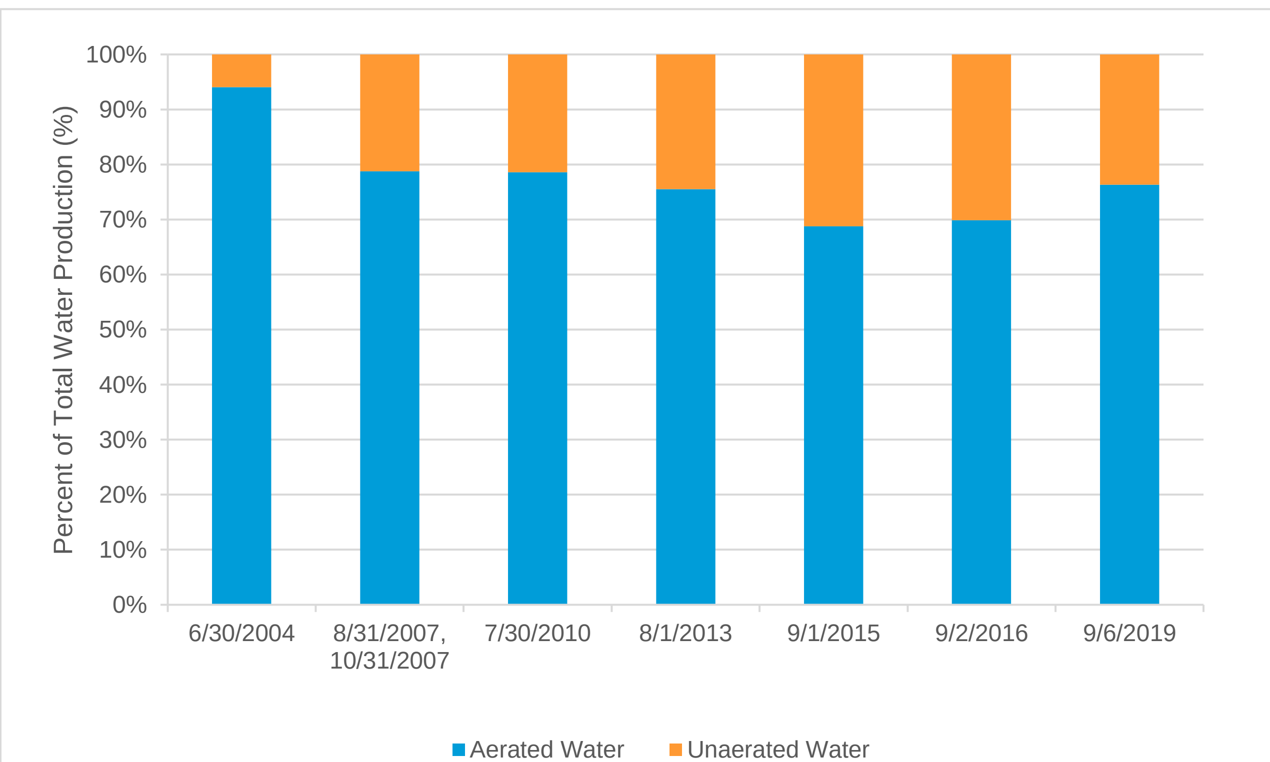


Figure 14. Aerated Water vs Unaerated Water Prior to LCR Sampling

Table 7 and Figure 11 indicate that the best year for LCR compliance (i.e., the year with the lowest overall lead results) was 2015, while Figure 12 shows the City's historical use of unaerated, more corrosive water was greatest that same year. In addition, Figure 14 shows that Airport Well usage was high during the month prior to the LCR sampling. There is no specific explanation for this apparent conflict but it must be noted that only ten LCR compliance samples were collected this year, far less than all other years. One hypothesis is that the limited sampling was conducted in areas that were receiving Palermo or Bush Wellfield water instead of waters from the Airport Wells.

Temporal Analysis

HDR reviewed lead sampling results from sites with four or more sampling events since system-wide disinfection was implemented in 2007. Figure 15 presents concentrations at seven sites that met these criteria. Note that several of the data points in the chart are on top of each other.

The analysis does not find a discernable pattern in detected lead concentrations. For example, Site 4 was found to have 110 µg/L lead in 2007 but 5 µg/L in 2010 and 2 µg/L in both 2013 and 2016. Conversely, Site 23 had < 4 µg/L lead in 2010, 2013, and 2019, but was found to have 14 µg/L in 2016.

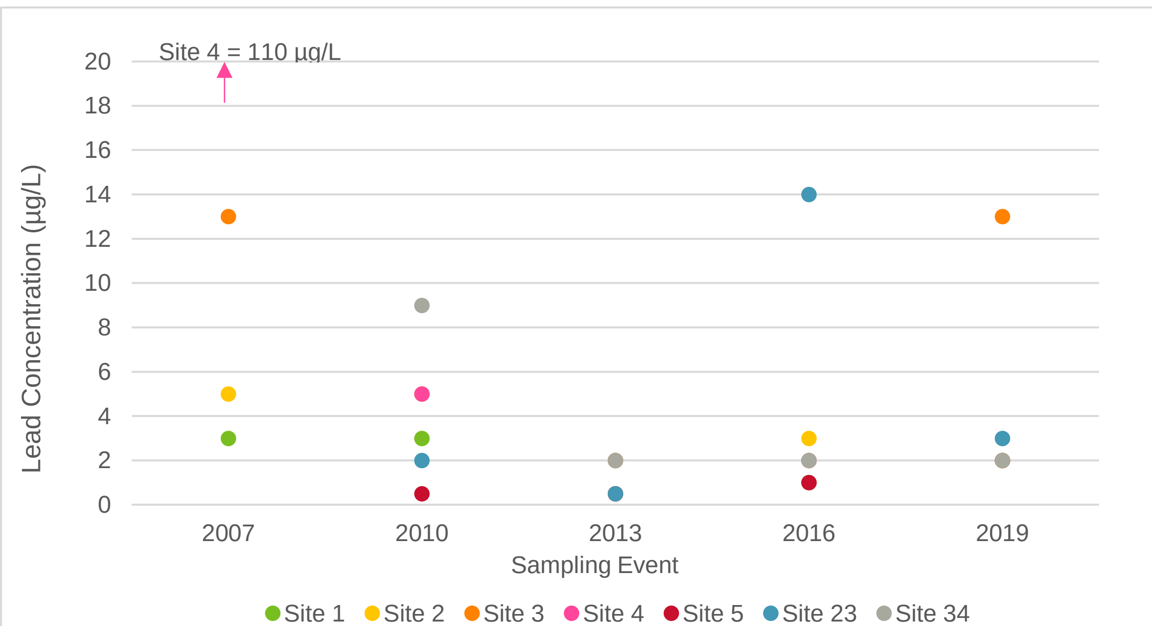


Figure 15. Temporal Analysis of Lead and Copper Sampling Events from 2007 through 2019

4.3.2 Copper Sampling

The City has routinely sampled for copper within its distribution system as required, and has largely stayed at or below 0.64 mg/L, and has never exceeded the action level of 1.3 mg/L. Figure 16 shows the results of the City's sampling over the past few decades.

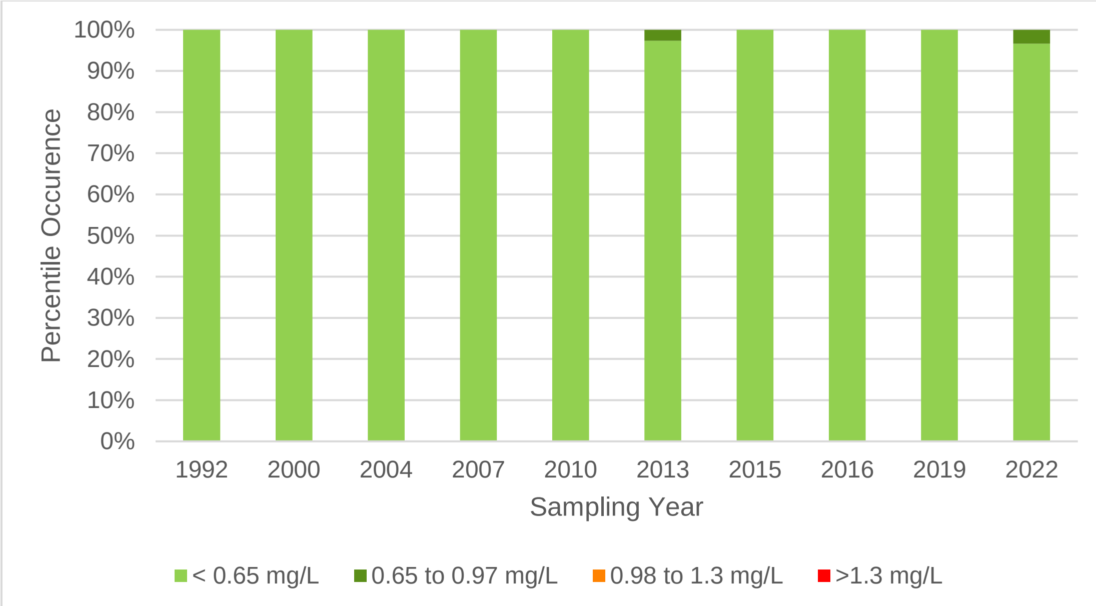


Figure 16. Copper Sampling Results
(Note: Palermo WTP starts 1999, Bush WTP starts 2000)

5 Treatment Implementation Alternatives

The aeration installed at the Palermo and Bush WTPs results in a higher pH and a more stable water quality that is conducive to reducing corrosion. Although the Airport Wells have a higher alkalinity, the low pH results in higher DIC values compared to the other water sources. Therefore, the water quality from the Airport Wells pose the greatest corrosion risk in the distribution system. There are several treatment options the City can implement at the Airport wells to match the water quality of the Palermo and Bush Wellfields to limit the water quality variability between the three wellfields and to reduce the potential of corrosion issues. HDR recommends implementing the addition of 25% caustic soda or aeration at the Airport Wells to raise the water pH if well usage remains high and future 90th percentile lead results exceed the 10 μg/L trigger level.

Due to the decentralized nature of the four Airport Wells, the City should consider if any treatment added should be decentralized (i.e. at individual wells), centralized to a single location, or a hybrid of the two. These scenarios are depicted in Figure 17 to Figure 19 .

Figure 17. Decentralized Treatment Piping

The decentralized treatment option (Figure 17) maintains the existing operation of the Airport Wells and includes treatment at each well site (Wells 9/10, Well 15, and Well 11).

Figure 18. Hybrid Treatment Piping

The hybrid treatment option (Figure 18) involves routing well water from Well 15 to Well 10 where the existing 8-inch line can be reused to bring water to the treatment site at Well 9. Well 11, given its distance away from the other wells, would have its own wellhead treatment system.

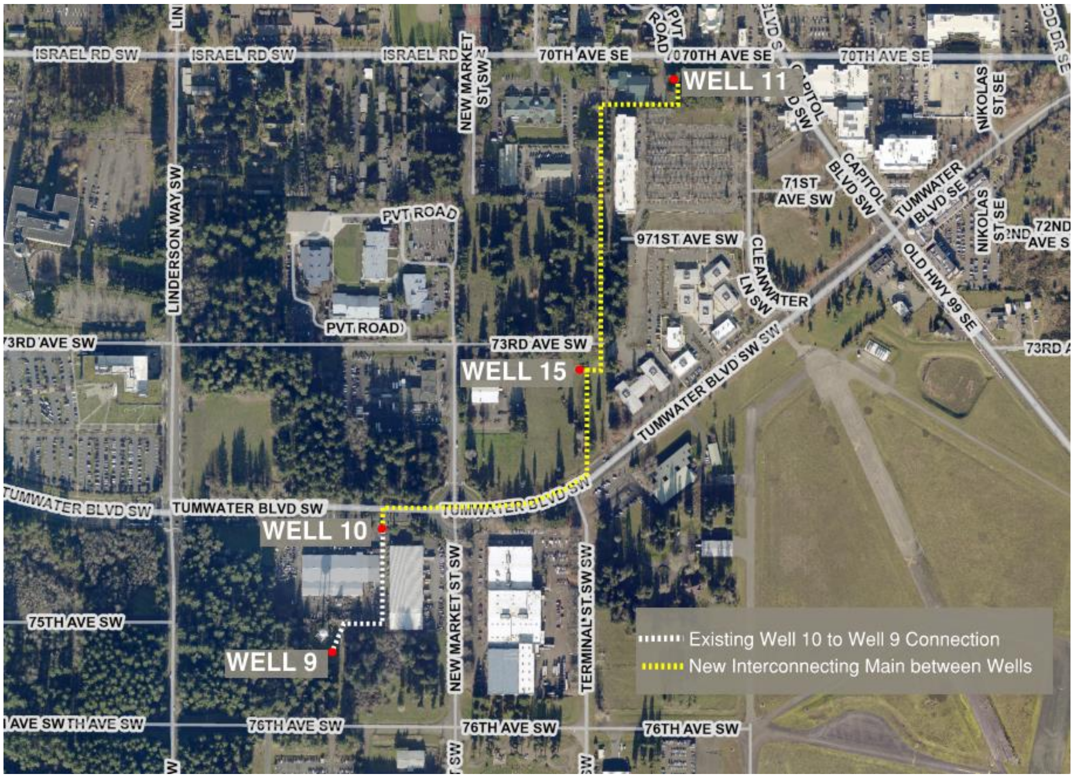


Figure 19. Centralized Treatment Piping

The centralized treatment option (Figure 19) involves routing well water from Well 11 to Well 15, and then from Well 15 to Well 10 where the existing 8-inch line can be reused to bring water to the treatment site at Well 9.

Costs for the implementation of each treatment piping configuration and pH adjustment technology are summarized in Table 9. A breakdown of these budgetary costs are provided in Appendix A.

Table 9. Treatment Implementation Alternatives

Technology	Decentralized	Hybrid	Centralized
Aeration	$2,877,000	$3,650,000	$3,589,000
25% Caustic Soda	$2,746,000	$3,181,000	$3,091,000

6 Summary and Recommendations

The following sections provide a summary of water quality data collected to date and recommendations for optimized corrosion control.

6.1 Wellfield and Treated Water Quality

The difference in wellfield water quality between the Palermo and Bush WTPs and the Airport Wells can be primarily attributed to the differences in treatment. The aeration installed at the Palermo and Bush WTPs results in a higher pH and a more stable corrosion chemistry. Although the Airport Wells have a higher alkalinity, the low pH results in higher DIC values compared to the other water sources. Therefore, the water quality from the Airport Wells pose the greatest corrosion risk in the distribution system.

The water production analysis found that more unaerated/lower pH water is entering the system, which is more corrosive to lead. While no discernable trend could be established with the available data between the presence of unaerated/lower pH water and corrosion, there is extensive published literature showing intermittent exposure to lower pH water can be as bad as, or even worse than, continuous low pH exposure.

Furthermore, minimal blending takes place in the system since the configuration of wells causes water displacement rather than blending to occur. The variable water quality and lack of blending means that the system is by definition not optimized for corrosion control, even though it is in compliance with the LCR.

6.2 Distribution System Water Quality

A review of available distribution system water quality indicates relatively stable corrosion chemistry for most locations with the exception of low pH levels at WQ28 and WQ33 and low chlorine residuals at WQ26. Also, LCR sampling indicates that lead levels are typically below trigger and action levels while copper levels have not exceeded the action level. Thus, copper corrosion is not an issue for the City, and while the City currently complies with the LCR action level of 15 µg/L for lead, the results of this analysis find that the City could exceed the upcoming 10 µg/L trigger levels unless changes are made to the Airport Wells.

6.3 Recommendations

This analysis is based on current operation of the City’s distribution system. However, use of the Airport Wells is expected to decrease as the Brewery Wellfield is developed and brought online in the next five years. The Brewery Wellfield water will be treated with aeration and the water quality concerns associated with intermittent use of the Airport Wells are expected to decline. Based on the data reviewed, HDR recommends implementing the following actions in the event of a 90th percentile action level exceedance and Airport Well usage remains high:

- Airport Wells should be treated with aeration to match the water quality from Palermo and Bush Wellfields to limit the water quality variability between the three wellfields.

Alternatively, the City can increase Airport Well Water pH to that of Bush and Palermo well water through the implementation of treatment with caustic soda.

- Though well usage is not solely based on water quality and is impacted by multiple parameters (production, pressures, groundwater levels), it is encouraged that the City consider limiting usage of the Airport Wells from a solely water quality perspective until treatment can be implemented.

Appendix A. Budgetary Cost Estimate

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Aeration - Decentralized

Description	Quantity	Unit	Unit Cost	Installation	Total Cost (Rounded Up)	Comment
Treatment - Well 11						
8" Ductile Iron Pipe	75	LF	$ 250	$ -	$ 19,000	Piping to aeration treatment.
Aeration equipment	1	EA	$ 67,165	$ 36,940.75	$ 105,000	Vendor quote. Model DB63. Added 55% for installation.
Aeration building	565.5	SQFT	$ 300	$ -	$ 170,000	
					$ 294,000	
Treatment - Well 15						
8" Ductile Iron Pipe	50	LF	$ 250	$ -	$ 13,000	Piping to aeration treatment.
Aeration equipment	1	EA	$ 91,100	$ 50,105.00	$ 142,000	Vendor quote. Model DB86. Added 55% for installation.
Aeration building	870	SQFT	$ 300	$ -	$ 261,000	
					$ 416,000	
Treatment - Well 9/10						
8" Ductile Iron Pipe	90	LF	$ 250	$ -	$ 23,000	Piping to aeration treatment.
Aeration equipment	1	EA	$ 87,547	$ 48,150.85	$ 136,000	Vendor quote. Model DB84. Added 55% for installation.
Aeration building	742.5	SQFT	$ 300	$ -	$ 223,000	
					$ 382,000	
				Subtotal	$ 1,092,000	
				Electrical (25%)	$ 273,000	
				Instrumentation (15%)	$ 164,000	
				Mobilization (10%)	$ 110,000	
				Contractor's Overhead and Profit (15%)	$ 164,000	
				Subtotal	$ 1,803,000	
				Sales Tax (9.5%)	$ 172,000	
				Contingency (50%)	$ 902,000	
				Subtotal Direct Cost	$ 2,877,000	
					$ 2,877,000	

Aeration - Hybrid

Description	Quantity	Unit	Unit Cost	Installation	Total Cost	Comment
Treatment - Well 9/10/15						
8" Ductile Iron Pipe	1550	LF	$ 250	$ -	$ 388,000	Well 15 to Well 10 interconnection
10" Ductile Iron Pipe	100	LF	$ 300	$ -	$ 30,000	Piping to aeration treatment.
Aeration equipment	1	LS	$ 179,320	$ 98,626.00	$ 278,000	Vendor quote. Model DB86. Added 55% for installation.
Aeration building	1320	SQFT	$ 300	$ -	$ 396,000	
			Subtotal		$ 1,092,000	
Treatment - Well 11						
8" Ductile Iron Pipe	75	EA	$ 250	$ -	$ 19,000	Piping to aeration treatment.
Aeration equipment	1	EA	$ 67,165	$ 36,940.75	$ 105,000	Vendor quote. Model DB63. Added 55% for installation.
Aeration building	565.5	SQFT	$ 300	$ -	$ 170,000	
			Subtotal		$ 294,000	
				Subtotal	$ 1,386,000	
				Electrical (25%)	$ 347,000	
				Instrumentation (15%)	$ 208,000	
				Mobilization (10%)	$ 139,000	
				Contractor's Overhead and Profit (15%)	$ 208,000	
				Subtotal	$ 2,288,000	
				Sales Tax (9.5%)	$ 218,000	
				Contingency (50%)	$ 1,144,000	
				Subtotal Direct Cost	$ 3,650,000	
					$ 3,650,000	

Aeration - Centralized

Description	Quantity	Unit	Unit Cost	Installation	Total Cost	Comment
Treatment - Well 9/10/15/11						
4" Ductile Iron Pipe	1800	LF	$ 150	$ -	$ 270,000	Well 11 to Well 15 interconnection
8" Ductile Iron Pipe	1550	LF	$ 250	$ -	$ 388,000	Well 15 to Well 10 interconnection
10" Ductile Iron Pipe	100	LF	$ 300	$ -	$ 30,000	Piping to aeration treatment
Aeration equipment	1	LS	$ 179,320	$ 98,626.00	$ 278,000	Vendor quote. Lowry Model DB86. Two units. Added 55% for installation.
Aeration building	1320	SQFT	$ 300	$ -	$ 396,000	
				Subtotal	$ 1,362,000	
				Electrical (25%)	$ 341,000	
				Instrumentation (15%)	$ 205,000	
				Mobilization (10%)	$ 137,000	
				Contractor's Overhead and Profit (15%)	$ 205,000	
				Subtotal	$ 2,250,000	
				Sales Tax (9.5%)	$ 214,000	
				Contingency (50%)	$ 1,125,000	
				Subtotal Direct Cost	$ 3,589,000	
					$ 3,589,000	

Caustic - Decentralized

Description	Quantity	Unit	Unit Cost	Installation	Total Cost	Comment
Treatment - Well 11						
8" Ductile Iron Pipe	75	LF	$ 250	$ -	$ 19,000	Piping to treatment.
Storage Tank	1	EA	$ 3,000	$ 1,650.00	$ 5,000	300 gal tank. Added 55% for installation.
Metering Pumps	2	EA	$ 6,000	$ 6,600.00	$ 19,000	Added 55% for installation.
Treatment Building	850	SQFT	$ 300	$ -	$ 255,000	
					$ 298,000	
Treatment - Well 15						
8" Ductile Iron Pipe	50	LF	$ 250	$ -	$ 13,000	Piping to treatment.
Storage Tank	1	EA	$ 20,000	$ 11,000.00	$ 31,000	2,700 gal tank. Added 55% for installation.
Metering Pumps	2	EA	$ 6,000	$ 6,600.00	$ 19,000	Added 55% for installation.
Treatment Building	1000	SQFT	$ 300	$ -	$ 300,000	
					$ 363,000	
Treatment - Well 9/10						
8" Ductile Iron Pipe	90	LF	$ 250	$ -	$ 23,000	Piping to treatment.
Storage Tank	1	EA	$ 18,000	$ 9,900.00	$ 28,000	1,600 gal tank. Added 55% for installation.
Metering Pumps	2	EA	$ 9,300	$ 10,230.00	$ 29,000	Added 55% for installation.
Treatment Building	1000	SQFT	$ 300	$ -	$ 300,000	
					$ 380,000	
				Subtotal	$ 1,041,000	
				Electrical (25%)	$ 261,000	
				Instrumentation (15%)	$ 157,000	
				Mobilization (10%)	$ 105,000	
				Contractor's Overhead and Profit (15%)	$ 157,000	
				Subtotal	$ 1,721,000	
				Sales Tax (9.5%)	$ 164,000	
				Contingency (50%)	$ 861,000	
				Subtotal Direct Cost	$ 2,746,000	
					$ 2,746,000	

Cacaustic - Hybrid

Description	Quantity	Unit	Unit Cost	Installation	Total Cost	Comment
Treatment - Well 9/10/15						
8" Ductile Iron Pipe	1550	LF	$ 250	$ -	$ 388,000	Well 15 to 10 interconnection
10" Ductile Iron Pipe	100	LF	$ 300	$ -	$ 30,000	Piping to treatment.
Storage Tank	1	EA	$ 26,000	$ 14,300.00	$ 41,000	4,300 gal tank
Metering Pumps	2	EA	$ 6,000	$ 6,600.00	$ 19,000	
Treatment Building	1400	SQFT	$ 300	$ -	$ 420,000	
					$ 898,000	
Treatment - Well 11						
8" Ductile Iron Pipe	75	LF	$ 250	$ -	$ 19,000	Piping to treatment.
Storage Tank	1	LS	$ 10,000	$ 5,500.00	$ 16,000	300 gal tank
Metering Pumps	2	EA	$ 6,000	$ 6,600.00	$ 19,000	
Treatment Building	850	SQFT	$ 300	$ -	$ 255,000	
					$ 309,000	
				Subtotal	$ 1,207,000	
				Electrical (25%)	$ 302,000	
				Instrumentation (15%)	$ 182,000	
				Mobilization (10%)	$ 121,000	
				Contractor's Overhead and Profit (15%)	$ 182,000	
				Subtotal	$ 1,994,000	
				Sales Tax (9.5%)	$ 190,000	
				Contingency (50%)	$ 997,000	
				Subtotal Direct Cost	$ 3,181,000	
					$ 3,181,000	

Caustic - Centralized

Description	Quantity	Unit	Unit Cost	Installation	Total Cost	Comment
Treatment - Well 9/10/15/11						
4" Ductile Iron Pipe	1800	LF	$ 150	$ -	$ 270,000	Well 11 to Well 15 interconnection
8" Ductile Iron Pipe	1550	LF	$ 250	$ -	$ 388,000	Well 15 to Well 10 interconnection
10" Ductile Iron Pipe	100	LF	$ 350	$ -	$ 35,000	Piping to treatment.
Storage Tank	1	LS	$ 26,000	$ 14,300.00	$ 41,000	4,500 gal tank
Chemical Metering Pumps	2	EA	$ 6,000	$ 6,600.00	$ 19,000	
Treatment Building	1400	SQFT	$ 300	$ -	$ 420,000	
				Subtotal	$ 1,173,000	
				Electrical (25%)	$ 294,000	
				Instrumentation (15%)	$ 176,000	
				Mobilization (10%)	$ 118,000	
				Contractor's Overhead and Profit (15%)	$ 176,000	
				Subtotal	$ 1,937,000	
				Sales Tax (9.5%)	$ 185,000	
				Contingency (50%)	$ 969,000	
				Subtotal Direct Cost	$ 3,091,000	
					$ 3,091,000	

600 University Street
Seattle, WA 98101-4132
(206) 826-4700

hdrinc.com

TO: Public Works Committee

FROM: Mary Heather Ames, Transportation Manager

DATE: January 19, 2023

SUBJECT: Transportation Grants Discussion

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1) Recommended Action:

For information and discussion only.

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2) Background:

Staff have successfully applied for several transportation grants in 2022. This discussion will provide an introduction to each project and grant information.

---

3) Policy Support:

Goals & Priorities 2023-2024
C. Create and Maintain a Transportation System Safe for All Modes of Travel

---

4) Alternatives:

❑ None.

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5) Fiscal Notes:

Differs based on the grant program and project specifics.

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6) Attachments:

None

TO: Public Works Committee

FROM: Mary Heather Ames, Transportation Manager

DATE: January 19, 2023

SUBJECT: Fuel Tax Agreement with the Transportation Improvement Board for Tumwater Boulevard Interchange

---

1) Recommended Action:

Staff requests the Public Works Committee recommend the City Council approve and authorize the Mayor to sign the Fuel Tax Agreement with the Transportation Improvement Board for Tumwater Boulevard Interchange.

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2) Background:

Thousands of vehicles utilize the Tumwater Boulevard Interchange on Interstate 5 daily. The interchange is integral to the development of properties in the southwest area of the City. Previous study and pre-design efforts resulted in a reconstruction plan for the entire interchange. Due to scale and cost, the project has been split into three phases, with the first being a roundabout at the northbound on and off ramp. Staff applied for Transportation Improvement Board (TIB) grant funding for the first phase and the City was awarded $2.25 million.

---

3) Policy Support:

Goals & Priorities 2023-2024
C. Create and Maintain a Transportation System Safe for All Modes of Travel

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4) Alternatives:

- ❑ Do not accept the grant.

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5) Fiscal Notes:

Total project cost is estimated to be $6,250,000. The TIB award is for $2,250,000, with the remaining costs being made up of Transportation CFP and developer mitigation.

---

6) Attachments:

A. Fuel Tax Agreement

City of Tumwater
8-5-196(019)-1
Tumwater Boulevard
NB I-5 On/Off Ramp Intersection

STATE OF WASHINGTON
TRANSPORTATION IMPROVEMENT BOARD
AND
City of Tumwater
AGREEMENT

THIS GRANT AGREEMENT (hereinafter “Agreement”) for the Tumwater Boulevard, NB I-5 On/Off Ramp Intersection (hereinafter “Project”) is entered into by the WASHINGTON STATE TRANSPORTATION IMPROVEMENT BOARD (hereinafter “TIB”) and City of Tumwater, a political subdivision of the State of Washington (hereinafter “RECIPIENT”).

1.0 PURPOSE

For the project specified above, TIB shall pay 36.0000 percent of approved eligible project costs up to the amount of $2,250,000, pursuant to terms contained in the RECIPIENT’S Grant Application, supporting documentation, chapter 47.26 RCW, title 479 WAC, and the terms and conditions listed below.

2.0 SCOPE AND BUDGET

The Project Scope and Budget are initially described in RECIPIENT’s Grant Application and incorporated by reference into this Agreement. Scope and Budget will be further developed and refined, but not substantially altered during the Design, Bid Authorization and Construction Phases. Any material alterations to the original Project Scope or Budget as initially described in the Grant Application must be authorized by TIB in advance by written amendment.

3.0 PROJECT DOCUMENTATION

TIB requires RECIPIENT to make reasonable progress and submit timely Project documentation as applicable throughout the Project. Upon RECIPIENT’s submission of each Project document to TIB, the terms contained in the document will be incorporated by reference into the Agreement. Required documents include, but are not limited to the following:

a) Project Funding Status Form
b) Bid Authorization Form with plans and engineers estimate
c) Award Updated Cost Estimate
d) Bid Tabulations
e) Contract Completion Updated Cost Estimate with final summary of quantities
f) Project Accounting History

4.0 BILLING AND PAYMENT

The local agency shall submit progress billings as project costs are incurred to enable TIB to maintain accurate budgeting and fund management. Payment requests may be submitted as often as the RECIPIENT deems necessary, but shall be submitted at least quarterly if billable amounts are greater than $50,000. If progress billings are not submitted, large payments may be delayed or scheduled in a payment plan.

5.0 TERM OF AGREEMENT

This Agreement shall be effective upon execution by TIB and shall continue through closeout of the grant or until terminated as provided herein, but shall not exceed 10 years unless amended by the Parties.

6.0 AMENDMENTS

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

7.0 ASSIGNMENT

The RECIPIENT shall not assign or transfer its rights, benefits, or obligations under this Agreement without the prior written consent of TIB. The RECIPIENT is deemed to consent to assignment of this Agreement by TIB to a successor entity. Such consent shall not constitute a waiver of the RECIPIENT's other rights under this Agreement.

8.0 GOVERNANCE & VENUE

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

9.0 DEFAULT AND TERMINATION

9.1 NON-COMPLIANCE

a) In the event TIB determines, in its sole discretion, the RECIPIENT has failed to comply with the terms and conditions of this Agreement, TIB shall notify the RECIPIENT, in writing, of the non-compliance.

b) In response to the notice, RECIPIENT shall provide a written response within 10 business days of receipt of TIB's notice of non-compliance, which should include either a detailed plan to correct the non-compliance, a request to amend the Project, or a denial accompanied by supporting details.

c) TIB will provide 30 days for RECIPIENT to make reasonable progress toward compliance pursuant to its plan to correct or implement its amendment to the Project.

d) Should RECIPIENT dispute non-compliance, TIB will investigate the dispute and may withhold further payments or prohibit the RECIPIENT from incurring additional reimbursable costs during the investigation.

9.2 DEFAULT

RECIPIENT may be considered in default if TIB determines, in its sole discretion, that:

a) RECIPIENT is not making reasonable progress toward correction and compliance.
b) TIB denies the RECIPIENT's request to amend the Project.
c) After investigation TIB confirms RECIPIENT'S non-compliance.

TIB reserves the right to order RECIPIENT to immediately stop work on the Project and TIB may stop Project payments until the requested corrections have been made or the Agreement has been terminated.

9.3 TERMINATION

a) In the event of default by the RECIPIENT as determined pursuant to Section 9.2, TIB shall serve RECIPIENT with a written notice of termination of this Agreement, which shall be served in person, by email or by certified letter. Upon service of notice of termination, the RECIPIENT shall immediately stop work and/or take such action as may be directed by TIB.

b) In the event of default and/or termination by either PARTY, the RECIPIENT may be liable for damages as authorized by law including, but not limited to, repayment of grant funds.

c) The rights and remedies of TIB provided in the AGREEMENT are not exclusive and are in addition to any other rights and remedies provided by law.

9.4 TERMINATION FOR NECESSITY

TIB may, with ten (10) days written notice, terminate this Agreement, in whole or in part, because funds are no longer available for the purpose of meeting TIB's obligations. If this Agreement is so terminated, TIB shall be liable only for payment required under this Agreement for performance rendered or costs incurred prior to the effective date of termination.

10.0 USE OF TIB GRANT FUNDS

TIB grant funds come from Motor Vehicle Fuel Tax revenue. Any use of these funds for anything other than highway or roadway system improvements is prohibited and shall subject the RECIPIENT to the terms, conditions and remedies set forth in Section 9. If Right of Way is purchased using TIB funds, and some or all of the Right of Way is subsequently sold, proceeds from the sale must be deposited into the RECIPIENT's motor vehicle fund and used for a motor vehicle purpose.

11.0 INCREASE OR DECREASE IN TIB GRANT FUNDS

At Bid Award and Contract Completion, RECIPIENT may request an increase in the maximum payable TIB funds for the specific project. Requests must be made in writing and will be considered by TIB and awarded at the sole discretion of TIB. All increase requests must be made pursuant to WAC 479-05-202 and/or WAC 479-01-060. If an increase is denied, the recipient shall be liable for all costs incurred in excess of the maximum amount payable by TIB. In the event that final costs related to the specific project are less than the initial grant award, TIB funds will be decreased and/or refunded to TIB in a manner that maintains the intended ratio between TIB funds and total project costs, as described in Section 1.0 of this Agreement.

12.0 INDEPENDENT CAPACITY

The RECIPIENT shall be deemed an independent contractor for all purposes and the employees of the RECIPIENT or any of its contractors, subcontractors, and employees thereof shall not in any manner be deemed employees of TIB.

13.0 INDEMNIFICATION AND HOLD HARMLESS

The PARTIES agree to the following:

Each of the PARTIES, shall protect, defend, indemnify, and save harmless the other PARTY, its officers, officials, employees, and agents, while acting within the scope of their employment as such, from any and all costs, claims, judgment, and/or awards of damages, arising out of, or in any way resulting from, that PARTY's own negligent acts or omissions which may arise in connection with its performance under this Agreement. No PARTY will be required to indemnify, defend, or save harmless the other PARTY if the claim, suit, or action for injuries, death, or damages is caused by the sole negligence of the other PARTY. Where such claims, suits, or actions result from the concurrent negligence of the PARTIES, the indemnity provisions provided herein shall be valid and enforceable only to the extent of a PARTY's own negligence. Each of the PARTIES agrees that its obligations under this subparagraph extend to any claim, demand and/or cause of action brought by, or on behalf of, any of its employees or agents. For this purpose, each of the PARTIES, by mutual negotiation, hereby waives, with respect to the other PARTY only, any immunity that would otherwise be available to it against such claims under the Industrial Insurance provision of Title 51 RCW. In any action to enforce the provisions of the Section, the prevailing PARTY shall be entitled to recover its reasonable attorney's fees and costs incurred from the other PARTY. The obligations of this Section shall survive termination of this Agreement.

14.0 DISPUTE RESOLUTION

a) The PARTIES shall make good faith efforts to quickly and collaboratively resolve any dispute arising under or in connection with this AGREEMENT. The dispute resolution process outlined in this Section applies to disputes arising under or in connection with the terms of this AGREEMENT.

b) Informal Resolution. The PARTIES shall use their best efforts to resolve disputes promptly and at the lowest organizational level.

c) In the event that the PARTIES are unable to resolve the dispute, the PARTIES shall submit the matter to non-binding mediation facilitated by a mutually agreed upon mediator. The PARTIES shall share equally in the cost of the mediator.

d) Each PARTY agrees to compromise to the fullest extent possible in resolving the dispute in order to avoid delays or additional incurred cost to the Project.

e) The PARTIES agree that they shall have no right to seek relief in a court of law until and unless the Dispute Resolution process has been exhausted.

15.0 ENTIRE AGREEMENT

This Agreement, together with the RECIPIENT'S Grant Application, the provisions of chapter 47.26 Revised Code of Washington, the provisions of title 479 Washington Administrative Code, and TIB Policies, constitutes the entire agreement between the PARTIES and supersedes all previous written or oral agreements between the PARTIES.

16.0 RECORDS MAINTENANCE

The RECIPIENT shall maintain books, records, documents, data and other evidence relating to this Agreement and performance of the services described herein, including but not limited to accounting procedures and practices which sufficiently and properly reflect all direct and indirect costs of any nature expended in the performance of this Agreement. RECIPIENT 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 Agreement shall be subject at all reasonable times to inspection, review or audit by TIB personnel duly authorized by TIB, 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.

Approved as to Form
Attorney General

By:

Signature on file

Guy Bowman
Assistant Attorney General

Lead Agency		Transportation Improvement Board	
Chief Executive Officer	Date	Executive Director	Date
Print Name		Print Name	