

Appendix K  
WATER QUALITY PLAN



City of Tumwater

# Water Quality Plan

2019 Update

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## BACKGROUND

Groundwater is the sole source of drinking water for the City of Tumwater. The City's water utility is committed to providing the cleanest drinking water possible to its customers and ensuring that its water continues to meet all federal and state standards.

The Safe Drinking Water Act (SDWA) is the federal law that protects public drinking water supplies throughout the country. Under this law the Environmental Protection Agency (EPA) sets standards for drinking water quality. The Washington Department of Health (DOH) oversees drinking water standards for "Group A" water systems, defined as a system that regularly serves 15 or more year-round residential connections, or 25 or more year-round residents (for 180 or more days per year). State drinking water regulations are published in Washington Administrative Code (WAC) 246-290.

The City manages two Group A systems including the main Tumwater system and Lakeland Manor. Compliance with state and federal regulations has complex monitoring and administrative requirements, and the purpose of this section is to synthesize information related to these requirements as they apply to Tumwater's water systems.

## REGULATIONS

Federal and State water quality rules and regulations don't change frequently, but they are not static. Several new regulations have taken effect since the City last updated its water system plan (WSP) and additional regulations are on the horizon.

## NEW REGULATIONS

The City completed its last WSP in 2010 and since then several new water quality regulations have taken effect. These rule changes and their implications for Tumwater's water utility are discussed below.

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## GROUNDWATER RULE

The Groundwater Rule (GWR) went into effect in late 2009 shortly before the last WSP was finalized. This rule addresses the health risks of fecal contamination in ground water sources used by public water systems. The GWR's major provisions that apply to the City are as follows:

- Compliance Monitoring
  - The City must monitor its disinfectant concentration and maintain the minimum disinfectant residual concentration determined by DOH.
- Source Water Monitoring
  - If a routine sample tests positive for total coliform then the City must collect at least one groundwater source sample from each source in use at the time of collection. These

triggered source water samples must be analyzed for the presence of a fecal indicator (E. Coli).

- If the triggered source water sample tests positive for a fecal indicator, the City must either take corrective action, as directed by the state, or if corrective action is not required by the state and the sample is not invalidated by the state, the City must conduct additional source water sampling.
- If DOH does not require corrective action in response to a fecal indicator-positive triggered source water sample, the City must collect five additional source water samples (from the same source), using the same indicator as used in triggered source water monitoring, within 24 hours of being notified of the fecal indicator-positive sample.
- Treatment Technique Requirements
  - The City must take corrective action if a significant deficiency is identified during a sanitary survey, or a source sample tests positive for fecal contamination. The City must either (1) correct all significant deficiencies, (2) provide an alternate source of water, (3) eliminate the source of contamination, or (4) provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a state-approved combination of 4-log virus inactivation and removal) before or at the first customer.
- New Sources
  - Sources which come on line after November 30, 2009 are required either to conduct triggered source water monitoring as required by the GWR, or provide at least 4-log inactivation, removal or a state-approved combination of these technologies and conduct compliance monitoring within 30 days of the source being put in service.
- Sanitary Surveys
  - Thurston County Environmental Health or DOH are required to conduct sanitary surveys of Tumwater's water systems in order to identify significant deficiencies, including deficiencies which may make a system susceptible to microbial contamination.
  - Following the initial survey, Thurston County or DOH must conduct additional surveys every 3 years or every 5 years for systems that provide at least 4-log treatment of viruses or have outstanding performance records. (Sanitary surveys are now conducted every five years in all of Tumwater's water systems.)

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### UCMR 3

EPA uses the Unregulated Contaminant Monitoring Rule (UCMR) to collect data for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the SDWA. Every five years EPA selects 30 unregulated contaminants for public water systems to sample and they use the results to inform future drinking water regulations. The City has participated in all three rounds of UCMR sampling. UCMR 1 sampling occurred from 2001-2005, UCMR 2 from 2007-2011, and UCMR 3 from 2012-2016.

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## REVISED CONSUMER CONFIDENCE RULE - ALTERNATIVE DELIVERY

The Consumer Confidence Report (CCR) Rule requires that each public water system must “mail or otherwise directly deliver” one copy of the annual water quality report to each customer and must make a “good faith effort” to reach customers who do not receive water bills by using other means recommended by DOH. The EPA has identified two different approaches allowable under the current rule that a community water system could use in providing electronic delivery of CCRs to its bill-paying customers:

- paper CCR delivery with a customer option to request an electronic CCR, or
- electronic CCR delivery with a customer option to request a paper CCR

The City has elected to continue paper delivery of the CCR and to also make the report available on the City’s website.

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## REVISED TOTAL COLIFORM RULE

The Revised Total Coliform Rule (RTCR) replaced the Total Coliform Rule in April 2016. This rule requires systems vulnerable to contamination to find and fix problems and pathways that could allow pathogens to enter the distribution system. These formalized assessments are initiated by a sequence of events called “treatment technique triggers”. There are two types of assessments that both evaluate the entire system from the sample collection point to the source of supply. Level one assessments are a basic water system evaluation an owner, manager, or other knowledgeable person can do. A level two assessment is a complex evaluation that only a person with state-required qualifications can do. The treatment technique triggers that initiate these assessments are shown below:

- Level One Assessment
  - Total coliform-present sample results in more than five percent of routine and repeat samples in a month.
  - Failure to collect required repeat samples after total coliform-present routine samples.
- Level Two Assessment
  - An E. coli MCL violation. The five scenarios shown in Table 1 all constitute an E. coli MCL violation.
  - A second level one treatment technique trigger within a rolling 12-month period.

*Table 1: Routine + Repeat Coliform Sampling Scenarios that Lead to an E. coli MCL Violation*

<b>Routine Sampling</b>		<b>Repeat Sampling</b>
Total Coliform - Present	→	E. Coli - Present
Total Coliform - Present	→	Total Coliform - Present (but no E. coli analysis)
E. Coli - Present	→	Total Coliform - Present
E. Coli - Present	→	Any missing sample
E. Coli - Present	→	E. Coli - Present

In addition to the E. coli MCL violations defined above, the RTCR also defines monitoring violations, reporting violations, and treatment technique violations as follows:

- Monitoring Violations
  - Failure to collect all required routine samples
  - Failure to test a total coliform-present routine sample for E.coli
- Reporting Violations
  - Failure to submit a monitoring report or completed assessment report in a timely manner
  - Failure to notify DOH of an E. coli-present sample in a timely manner
- Treatment Technique Violations
  - System fails to conduct a required assessment within 30 days of the treatment technique trigger
  - System fails to correct a sanitary defect within required timeframe

The violations described above all require public notification within certain timeframes. E. coli MCL violations require public notification within 24 hours, public notification for treatment technique violations is required within 30 days, and within one year for reporting and monitoring violations.

## FUTURE REGULATIONS

There are a number of new drinking water regulations that have been proposed or are planned to be implemented in the years ahead. The City will work with DOH to ensure that it remains in compliance with any new regulations.

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## CARCINOGENIC VOLATILE ORGANIC COMPOUND (CVOC) RULE

In February 2011 EPA announced that cVOCs would be the first contaminant group to be regulated as part of the agency's "Drinking Water Strategy". EPA believed at the time that regulating groups of contaminants rather than individual contaminants would streamline the rulemaking process. The current status of this proposed new rule is unclear; however the Notice of Proposed Rulemaking is projected to be published in the federal register in November 2018 according to the EPA's website.

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## DRINKING WATER LABORATORY DATA REPORTING RULE

This rule was initiated in November 2006 to consider changes to drinking water laboratory certification requirements in Chapter 246-390 WAC. The State Board of Health is considering eliminating requirements that duplicate Department of Ecology environmental laboratory rules (WAC 173-50) and



establishing reporting requirements for drinking water laboratory sample results. The rule is projected to take effect in May 2018, but should have little to no practical impact to the City's operations.

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#### LEAD AND COPPER RULE LONG-TERM REVISIONS

The recent lead crisis in Flint, Michigan has highlighted a need modernize and strengthen implementation of the Lead and Copper Rule (LCR). This rule was originally signed into law in 1991 and revised in 2000 and 2007. In 2016 the EPA recognized a need to strengthen the rule's public health protections and to clarify its implementation requirements to make it more effective and readily enforceable. The key issues and potential elements currently under consideration are as follows:

- Lead service line replacement
- Improved optimal corrosion control treatment requirements
- Incorporating a health-based benchmark to strengthen protection
- Considering the potential role of point of use filters
- Clarify and strengthen sampling requirements
- Increase transparency and information sharing
- Enhance public education requirements
- Potential revised copper requirements
- Relationship with broader lead exposure pathways

The City of Tumwater's Group A water systems have lead and copper levels that are well below the action levels set by current regulations. The City has no known lead service lines and a corrosion control program throughout most of its service area which reduces the risk of lead and copper exposure.

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#### PERCHLORATE RULE

In February 2011, EPA determined that perchlorate meets the SDWA criteria for regulation as a contaminant. Since that time, EPA has reviewed the best available data on a range of issues related to perchlorate in drinking water including its occurrence, treatment technologies, analytical methods and the costs and benefits of potential standards. Under a consent decree from a lawsuit filed by the National Resource Defense Council the EPA is under an obligation to issue a first-time SDWA standard by Oct. 31, 2018 and to establish a final rule by December 19, 2019.

From 2007 – 2014 the City conducted a perchlorate study at the Tumwater Valley Municipal Golf Course to address concerns about potential contamination associated with the City's annual July 4<sup>th</sup> fireworks display. Over the course of this study perchlorate was occasionally detected in shallow monitoring wells within the fallout area, but never in the City's source water. The City has determined that the fireworks displays pose a low risk to drinking water supplies. There are no additional known sources of perchlorate in the City.

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## CHROMIUM MCL REVIEW

Chromium exists in the environment in several different forms, the most common of which are trivalent chromium and hexavalent chromium. The current MCL for total chromium, which encompasses all forms, is 0.1 mg/L. Hexavalent chromium poses the most significant health risk and the MCL for total chromium accounts for this by assuming that 100% of any total chromium detected in a sample is this more harmful form. Data from a 2008 National Toxicology Program long-term animal study suggests that hexavalent chromium may be a carcinogen. EPA is in the process of reviewing this and other studies to determine whether the drinking water standard for total chromium needs to be updated and whether a new hexavalent chromium standard is appropriate.

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## PFAS

Per- and polyfluoroalkyl substances (together, PFASs) are a class of man-made chemicals. These chemicals are very persistent in the environment and in the human body and may pose health risks. PFASs have been widely used to make products more stain-resistant, waterproof and/or nonstick. PFASs are also used to help fight fires at airfields and other places where petroleum-product-based fires are a risk. PFASs associated with firefighting products have been detected in the past few years at three different military installations in the state. There is no planned federal maximum contaminant level (MCL) for PFASs, but DOH is developing a strategy to address emerging contaminants such as this.

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## UCMR 4

In spring 2019 the City will complete the first round of sampling for UCMR 4. UCMR 4 includes thirty different contaminants, however ten of them are cyanotoxins and only public water systems with surface water sources are required to sample for these constituents. The City will sample its water system for the twenty constituents shown Table 2.

*Table 2: UCMR 4 Sample Groups and Contaminants*

<b>Group</b>	<b>Contaminant</b>
Metals	germanium
	manganese
Pesticides and a Pesticide Manufacturing Byproduct	alpha-hexachlorocyclohexane
	chlorpyrifos
	dimethipin
	ethoprop
	oxyfluorfen
	profenofos
	tebuconazole
	total permethrin (cis- & trans-)
	tribufos

Alcohols	1-butanol
	2-methoxyethanol
	2-propen-1-ol
Semivolatile Chemicals	butylated hydroxyanisole
	o-toluidine
	quinoline
Disinfection Byproduct Groups	HAA5
	HAA6Br
	HAA9

## WATER QUALITY PROGRAM ACTIVITIES

The Operations and Maintenance division and Engineering division of the Public Works Department administer Tumwater's water quality program activities. The underlying goal is to provide clean, healthy drinking water to all of Tumwater's customers.

Two changes to the City's drinking water infrastructure in the spring of 2019 require comment. The first is the consolidation of the Lathrop Industrial water system with the main Tumwater system. The City operated this satellite system from 2009 until 2019, and during this time period encountered numerous operational challenges including persistent water quality complaints related to high iron and manganese. This consolidation will streamline operations and maintenance activities and improve service to our customers. The second important change is the abandonment of DOH Source 26, also known as Well 24. This well no longer serves as an emergency source of supply to the City and has been disconnected from the distribution system. The City will operate this well as an exempt well and has agreed to allow access to no more than five customers who intend to use this untreated source for non-consumptive commercial purposes.

## COMPLIANCE MONITORING

EPA has established National Primary Drinking Water Regulations that set mandatory water quality standards for drinking water contaminants. These are enforceable standards called "maximum contaminant levels" (MCLs) which are established to protect the public against consumption of drinking water contaminants that present a risk to human health. An MCL is the maximum allowable amount of a contaminant in drinking water which is delivered to the consumer.

EPA has also established National Secondary Drinking Water Regulations that set non-mandatory water quality standards for 15 contaminants. EPA does not enforce these "secondary maximum contaminant levels" (SMCLs). They are established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These contaminants are not considered to present a risk to human health at the SMCL.

Primary and secondary MCLs are listed in WAC 246-290-310. The City monitors these water quality parameters according to a schedule provided by DOH and collects samples at its sources, in the distribution system, and at customer’s taps as described below.

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## SOURCE MONITORING

Source water samples for the main Tumwater system are collected from six different locations. Some of these locations are individual wells, but where piping combines multiple sources a single sample is taken to represent a group of wells. The Table 3 shows the DOH source numbers and the corresponding City well numbers.

*Table 3: DOH Source Numbers and Corresponding City Well Number*

<b>DOH Source Number</b>	<b>City Well Number</b>
2	4, 6, 8, 16 & 17
9	9 & 10
14	12 & 14
15	11
23	15
26	24

The City also regularly collects source water samples at Lakeland Manor. Table 4 shows the current sampling requirements for all City sources across its two systems.

For test panels where the level of risk has been shown to be low, DOH has given the City waivers that allow for less frequent sampling, but many analytes are sampled at the standard intervals set by DOH. The monitoring requirements for nitrate, pesticides, soil fumigants, complete inorganics, herbicides, and radionuclides are the same for all sources. Manganese samples are required at Palermo well field (source 2) because previous samples have surpassed the SMCL. VOC samples are taken more frequently at sources 2 and 9 where some of these analytes have been detected in the past.

Any MCL exceedances are reported to DOH by our laboratory (typically Edge Analytical) as soon as they’re observed. City staff also review all water quality reports as they’re provided and notify DOH of any exceedances.

Table 4: Source Sampling Requirements Across all City Sources

Test Panel	Source	standard - 1 year	standard - 3 year	standard - 6 year	waiver - 3 year	waiver - 6 year	waiver - 9 year
Nitrate	All	x					
Pesticides*	All				x		
Soil Fumigants*	All				x		
Complete Inorganic (IOC)	All						x
Herbicides	All						x
Gross Alpha	All			x			
Radium 228	All			x			
Manganese	2		x				
Volatile Organics (VOC)	2		x				
	9		x				
	14					x	
	15					x	
	23					x	
	Lakeland					x	

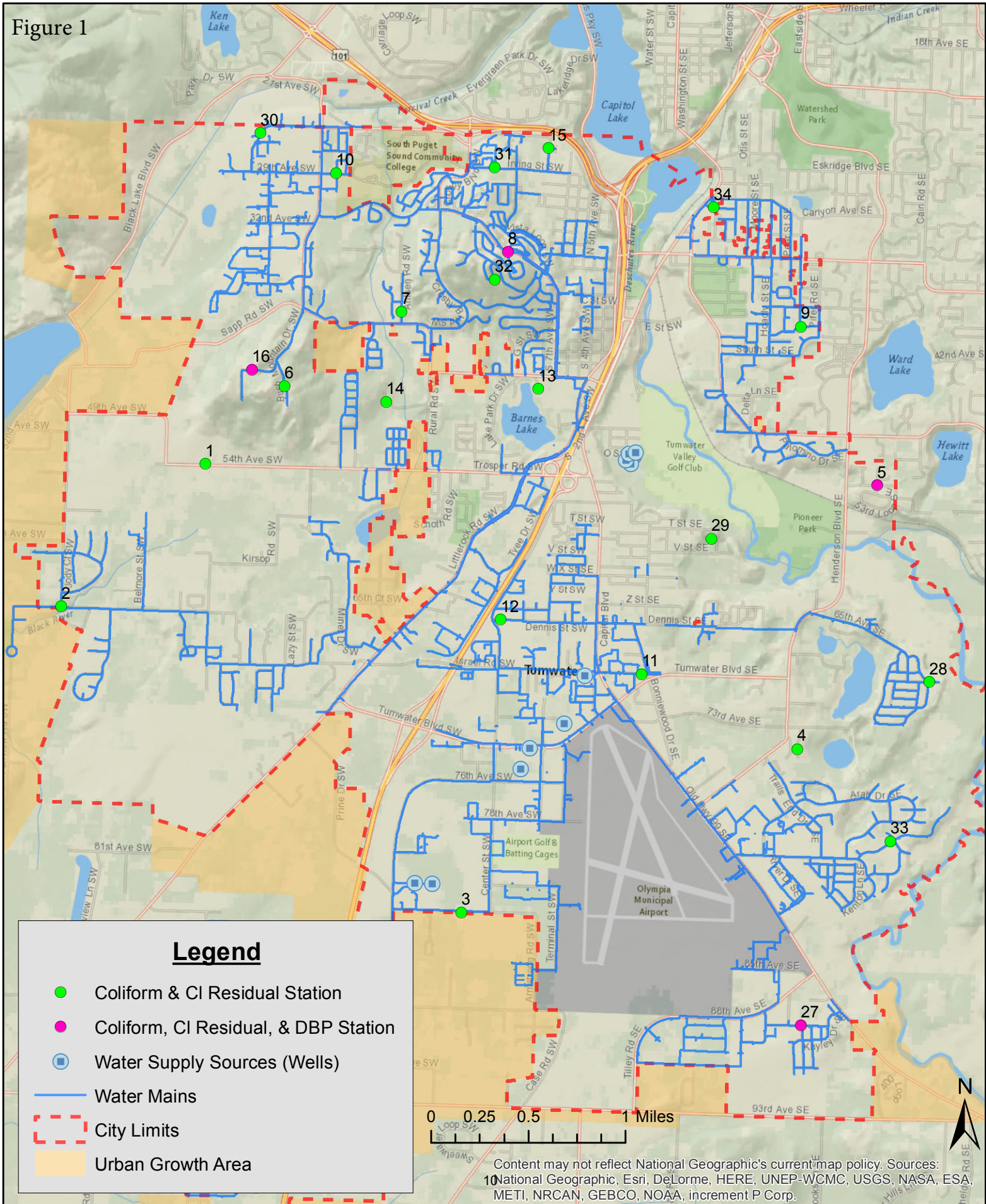
\*The City has a 3 year waiver for pesticides and soil fumigants at all of its sources, but no sampling requirements therefore this requirement is effectively waived.

#### DISTRIBUTION SYSTEM MONITORING

Water in the main distribution system is monitored for total coliform, disinfectant residual, disinfection by-products (total trihalomethanes and residual haloacetic acids), and asbestos. Lakeland Manor is only sampled for total coliform. Figures 1 and 2 illustrate the distribution sampling locations in the City's two water systems and Table 5 describes the locations of these routine sampling sites as well as their corresponding upstream and downstream sampling locations. Figure 3 is a schematic showing how the sampling stations for routine monitoring are built. Consumption meters are tapped in the event that upstream and downstream samples are needed.

# Sampling Stations in Tumwater Distribution System

Figure 1



Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

# Sampling Stations in Lakeland Manor Distribution System

Figure 2

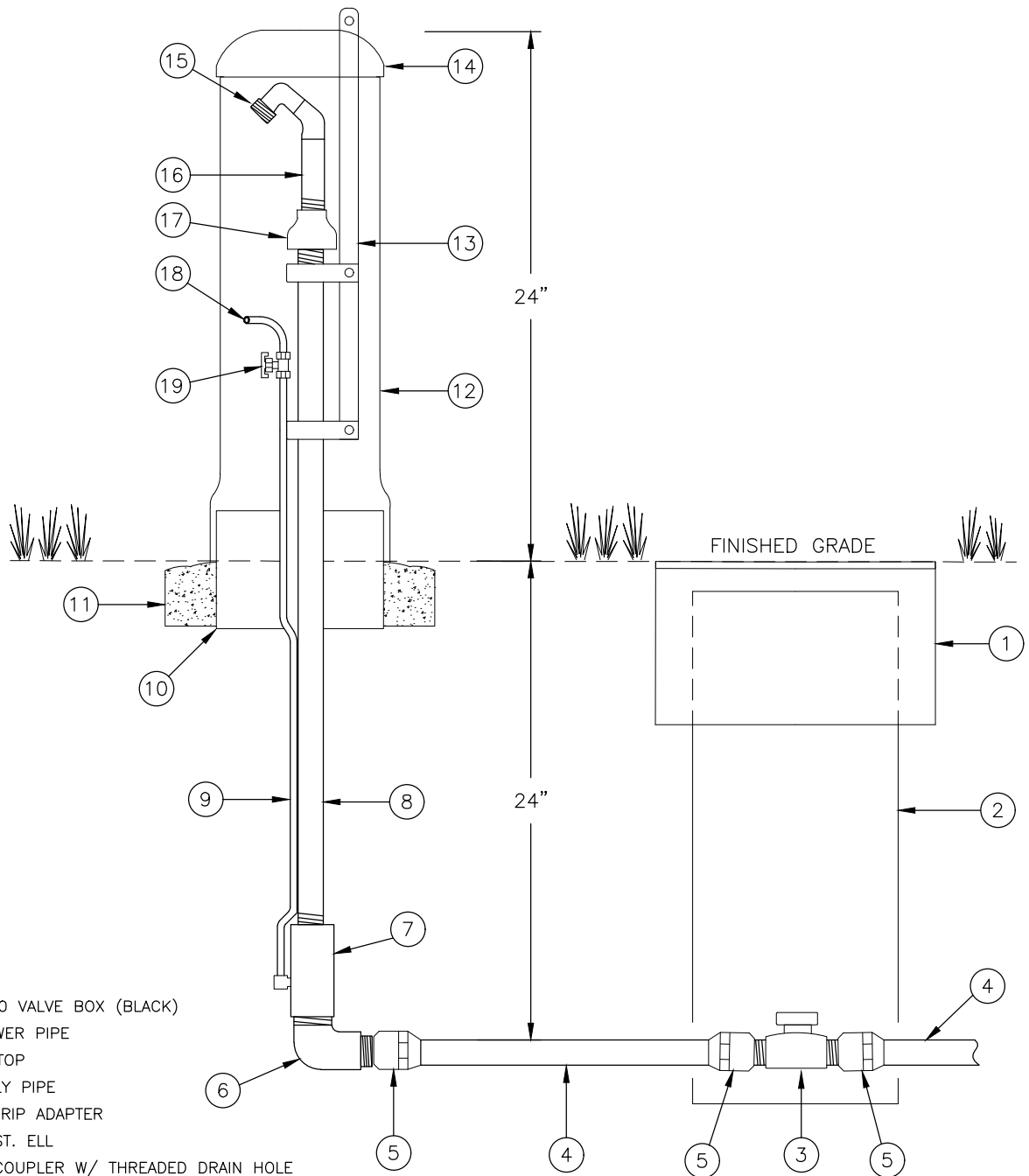


Table 5

<b>Main Tumwater System</b>	
<b>Routine Distribution Sample Site</b>	<b>Upstream &amp; Downstream Sample Site Location</b>
WQ1. 3142 54th St.	1-1. 2614 54th St.
	1-2. 5240 54th St.
WQ2. 66th Ave. & Fish Pond Creek Dr.	2-1. 6624 Cavalier St.
	2-2. 4077 66th Ave.
WQ3. 1441 83rd Ave.	3-1. 8220 Center St.
	3-2. 2120 83rd Ave.
WQ4. 7406 Henderson Ct.	4-1. 7404 Henderson Ct.
	4-2. 7418 Henderson Ct.
WQ5. 53rd Ave & Arlington Ct.	5-1. 5237 Arlington Ct.
	5-2. 1837 53rd Ave.
WQ6. 4828 Bush Mtn. Dr.	6-1. 4746 Bush Mtn. Dr.
	6-2. 4902 Bush Mtn. Dr.
WQ7. 3902 Antsen St.	7-1. 2210 Sapp Rd.
	7-2. 3848 Antsen St.
WQ8. 1205 Barnes Blvd.	8-1. 610 C St.
	8-2. 1534 Vista Loop
WQ9. 1114 40th	9-1. 1105 Middle St.
	9-2. 40th Ave.
WQ10. 29th Ave & Noble St.	10-1. 3000 RW Johnson Blvd
	10-2. 2894 Noble St.
WQ11. Israel Rd. & Bonniewood Dr.	11-1. 397 Israel Rd.
	11-2. 600 Israel Rd.
WQ12. Dennis St. & Linderson Way	12-1. 824 Dennis St.
	12-2. 6506 Linderson Way
WQ13. 1027 Daisy Ln.	13-1. 1023 Daisy Ln.
	13-2. 1031 Daisy Ln.
WQ14. 2333 48th Ave	14-1. 2315 48th Ave.
	14-2. 2365 48th Ave.
WQ15. 1123 N. 9th Ave.	15-1. 1107 N. 9th Ave.
	15-2. 1199 N. 9th Ave.
WQ16. 2930 Bush Mtn. Ct.	16-1. 2920 Bush Mtn. Ct.
	16-2. 3015 Bush Mtn. Ct.
WQ27. 1322 89th Ave. SE	27-1. 1314 89th Ave SE.
	27-2. 1330 89th Ave. SE
WQ28. 2131 69th Ct. SE	28-1. 6904 Desperado Dr. SE
	28-2. 2138 69th Ct. SE
WQ29. 759 T St. SE	29-1. 746 T St. SE
	29-2. 756 T St. SE
WQ30. 2501 Crites St. SW	30-1. 2535 Crites St. SW
	30-2. 3300 Mottman Rd. SW
WQ31. 1262 Irving St. SW	31-1. 1550 Irving St. SW
	31-2. 1259 Irving St. SW
WQ32. 1624 Anthem Ln. SW	32-1. 1638 Anthem Ln. SW
	32-2. 1631 Friday Ln. SW
WQ33. 1940 79th Ave. SE	33-1. 1929 79th Ave. SE
	33-2. 2003 79th Ave. SE
WQ34. 3003 Sunset Way SE	34-1. 3201 Fairfield Rd. SE
	34-2. 419 Carlyon Ave. SE
<b>Lathrop Industrial</b>	
<b>Routine Distribution Sample Site</b>	<b>Upstream/Downstream Sample Site Location</b>
WQ25. 9702 Lathrop Industrial Dr. SW	25-1. Unspecified
	25-2. Unspecified
WQ26. 9809 Blomberg St. SW	26-1. Unspecified
	26-2. Unspecified
<b>Lakeland Manor</b>	
<b>Routine Distribution Sample Site</b>	<b>Upstream/Downstream Sample Site Location</b>
WQ22. 4120 60th Ave. SW	22-1. 4248 60th Ave. SW
	22-2. 4008 60th Ave. SW



Figure 3



- ① - CARSON 910 VALVE BOX (BLACK)
- ② - 6" PVC SEWER PIPE
- ③ - 1" CURB STOP
- ④ - 1" CTS POLY PIPE
- ⑤ - 1" MIP X GRIP ADAPTER
- ⑥ 1" BRASS ST. ELL
- ⑦ 1" BRASS COUPLER W/ THREADED DRAIN HOLE
- ⑧ 1" BRASS PIPE
- ⑨ 1/8" COPPER TUBING
- ⑩ 6" X 6" SEWER PIPE
- ⑪ CONCRETE
- ⑫ 6" SEWER PIPE W/ BELL END
- ⑬ 1/8" X 3/4" FLAT BAR W/ LOCK HOLE & (2) 1" PIPE CLAMPS
- ⑭ 6" PVC SOLVENT CAP
- ⑮ 3/4" CAST COPPER 90° MIP X SLIP W/ CAP
- ⑯ COPPER 45°, 3/4" MIP X SLIP & PIPE
- ⑰ 3/4" X 1" BRASS BELL REDUCER
- ⑱ 1/8" COPPER TUBING W/ PLASTIC CAP
- ⑲ 1/8" BALL VALVE

CITY OF TUMWATER

SAMPLING STATION DETAIL

DRAWN BY:  
DRM  
CHECKED BY:  
JCE

STD. PLAN NO.  
WA-18  
DATE:  
MAR 2018

Figure 4

## TOTAL COLIFORM

All Group A public water systems are required to perform routine coliform monitoring. The number of samples required each calendar month depends on the type of water system, how many connections are active, how many people are served, and the source of the water. The coliform monitoring population is calculated based on the different user group populations identified in the Water Facilities Inventory (WFI) for the water system. These groups include full-time residential, part-time residential, temporary and transient, and regular non-residential users. The current coliform monitoring population values for the City's two water systems can be found in Table 6.

*Table 6: Current Coliform Monitoring Populations for Tumwater's Water Systems*

		September - May	June - August
City of Tumwater	Monitoring Population	52,105	52,105
	<i>Samples Required</i>	<i>60</i>	<i>60</i>
Lakeland Manor	Monitoring Population	122	113
	<i>Samples Required</i>	<i>1</i>	<i>1</i>

The City is required to collect sixty routine samples each month in the main system and one per month at the Lakeland Manor satellite system.

Only one sample taken since the City began chlorinating in 2006 tested positive for total coliform and this was most likely due to sample contamination and therefore did not pose a human health threat. The City has never detected E.Coli in any samples taken from our distribution system or at our sources. Detecting total coliform or fecal indicator bacteria anywhere in the water system is a serious concern and there is a specific process to follow when either occurs. Figure 4 describes the process for when routine distribution samples test positive for total coliform or E. Coli, and Figure 5 describes the process for samples taken at individual wells.

Appendix A provides more detail regarding coliform monitoring in Tumwater including an overall system map and a hydraulic profile.

Figure 4

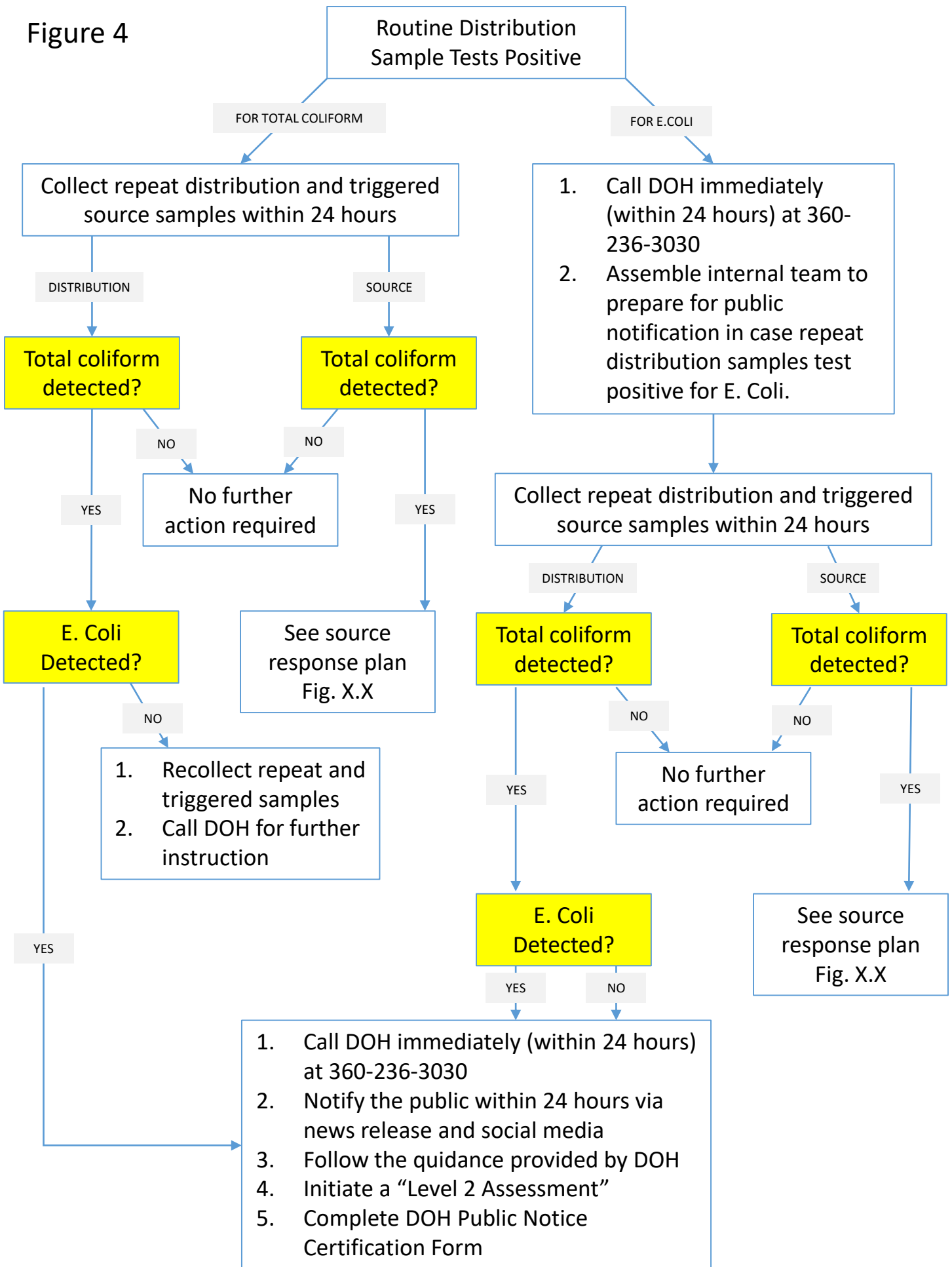
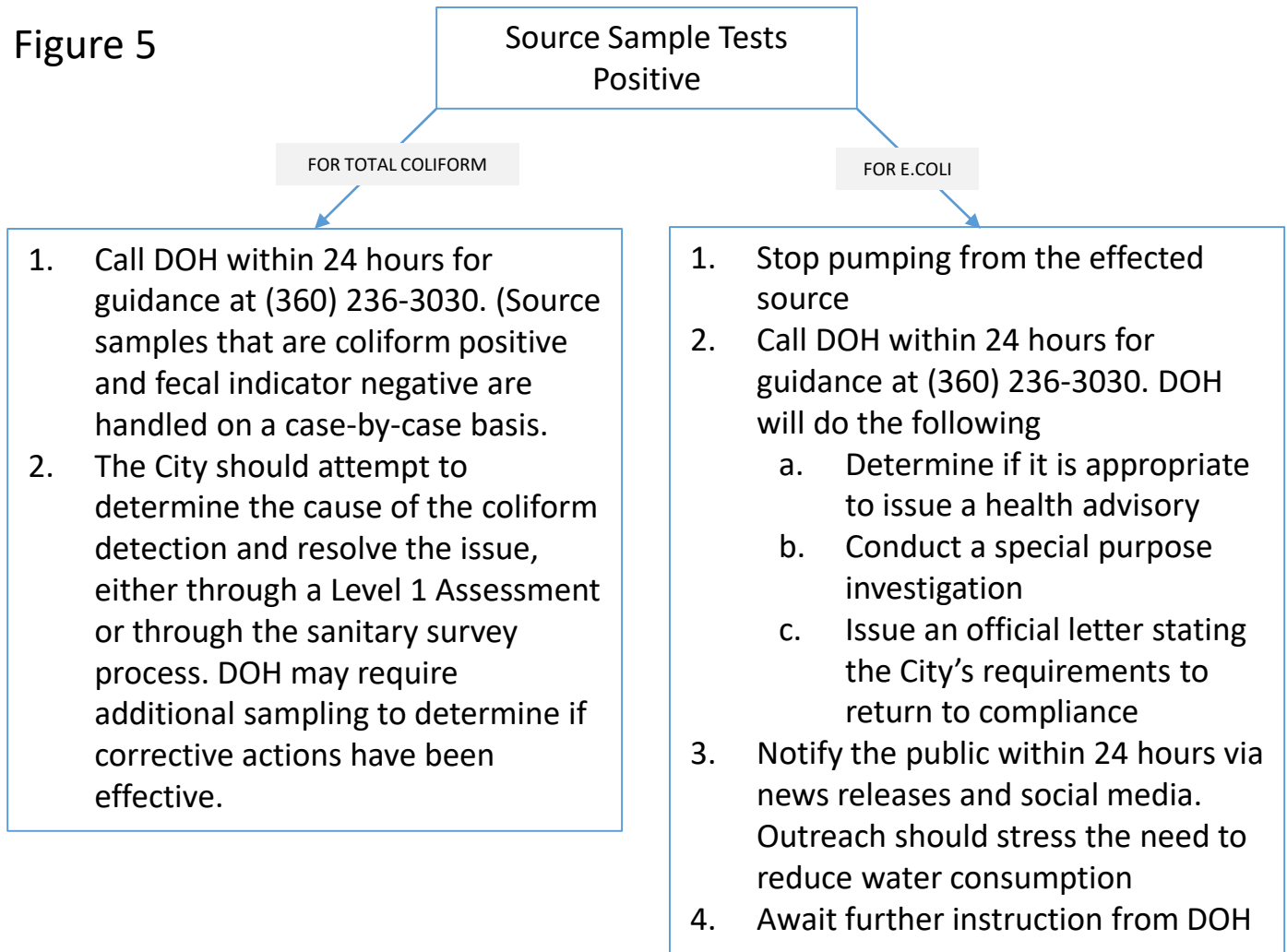


Figure 5



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## DISINFECTANT RESIDUAL

All public water systems that add chlorine for the purpose of continuous disinfection are required to monitor the residual chlorine concentration in order to show that the disinfection procedure is effective. The City has not been mandated to chlorinate its drinking water, however in 2006 the City began voluntary chlorination at all of its sources as a precautionary measure. A solution of 12.5% sodium hypochlorite is injected into the drinking water in order to maintain a free chlorine residual in the distribution system sufficient to kill any pathogens. With the adoption of regulatory changes in January 2017, the detectable residual disinfectant concentration was defined as 0.2 mg/L; however, the City has demonstrated the ability to measure lower free chlorine levels that are sufficient to kill harmful pathogens. In August 2017 the City received a waiver from DOH requiring maintenance of a free chlorine level greater than 0.04 mg/L. The Lakeland Manor water system is not chlorinated.

City staff measure and record the chlorine residual at representative locations throughout the distribution system 5 days a week and send the results to DOH. Failure to comply with this monitoring requirement is considered a 'monitoring violation' and failure to submit the report on time is considered a 'reporting violation'. Failure to maintain the minimum residual results in a 'treatment technique violation'. The City has not received any violations related to chlorine residual monitoring.

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## DISINFECTION BYPRODUCTS

Chlorine added to the distribution system to disinfect drinking water reacts with naturally occurring substances to form compounds known as disinfection byproducts (DBPs). The most common DBPs formed in this way are trihalomethanes (THMs), and haloacetic acids (HAAs or HAA5). Potential health effects from long-term exposure to these contaminants include liver, kidney, or central nervous system problems and increased risk of cancer. Given these findings, and the large number of people drinking chlorinated water nationwide, the EPA has established monitoring requirements for THMs and HAAs.

The City has been monitoring DBPs in the Tumwater distribution system since November 2007. At this time the City sampled 6 "Stage I" sites and 6 "Stage II" sites. In 2008 the City sampled these same 12 sites at 3 separate intervals. From 2009 until 2014 the City transitioned to sampling the Stage I sites on a quarterly basis. In 2015 the City was told that it qualified for reduced monitoring and for 2 years sampled the Stage I sites once each summer.

In 2017 City staff noticed that the waiver allowing it to sample once per year was given in error. In response, DOH requested that the City conduct supplemental quarterly monitoring at four locations in the Tumwater distribution system (Figure 1). These locations were chosen because previous monitoring showed them to be where DBPs are highest. (The overall level of total THMs and HAAs in the distribution system is very low compared to the MCL values of 0.080 mg/L and 0.060 mg/L respectively. Between 2008 and 2016, where these contaminants have been detected, total THMs has ranged from 0.003 - 0.005 mg/L across all sites and HAAs has ranged from 0.001 - 0.005 mg/L.) The City completed this supplemental monitoring in May 2018 and the results are shown in Table 7.

Table 7: Quarterly DBP Sampling results from August, 2017 - May, 2018

<b>HAA5 (MCL 60 ug/L)</b>					
<b>Site Name</b>	<b>8/29/2017</b>	<b>11/15/2017</b>	<b>2/27/2018</b>	<b>5/30/2018</b>	<b>Avg</b>
Station 5	<6	1.4	<6	1.2	1.3
Station 16	<6	<6	<6	<6	NA
Station 8	<6	<6	<6	<6	NA
Station 27	<6	<6	<6	<6	NA

<b>TOTAL TRIHALOMETHANE (MCL 80 ug/L)</b>					
<b>Site Name</b>	<b>8/29/2017</b>	<b>11/15/2017</b>	<b>2/27/2018</b>	<b>5/30/2018</b>	<b>AVG</b>
Station 5	6.8	4.7	5.8	5.9	5.8
Station 16	5.1	3.8	4.5	3.8	4.3
Station 8	6.1	5.4	5.4	2.6	4.9
Station 27	ND	1.3	0.5	ND	0.9

After completing this round of increased DBP monitoring City staff consulted with DOH on next steps. Given the low DBP concentrations DOH requested that the City resume reduced monitoring at the two sites where DBPs were highest. Going forward the City will monitor distribution sampling stations 8 and 5 once per year in September or October.

## ASBESTOS

Water systems with asbestos concrete pipes are required to sample the distribution system for asbestos. Less than ten percent of the Tumwater's distribution system is composed of this type of pipe and as a result the City has received a waiver to sample for asbestos every nine years. There is no asbestos concrete pipe in the Lakeland Manor water system.

## MONITORING AT CUSTOMER'S TAPS

Generally speaking lead and copper enter drinking water through service lines and premise plumbing. These include lead and copper pipe, lead-based solder, and brass materials used in faucets and fittings. As a result the best place to sample for these harmful constituents is at the customer's taps. The Lead and Copper Rule (LCR) requires that all public drinking water systems regularly test a sample of the taps in high-risk homes.

## LEAD AND COPPER

The LCR requires monitoring at customer's taps for lead and copper every three years. Based on Tumwater's population the City is required to sample thirty sites within the main system. In the Lakeland Manor system the City is required to sample five locations. The EPA has created criteria for selecting sample sites to ensure that water system operators collect tap samples where the risk to lead and copper exposure is the highest. Potential sample sites are divided into the three tiers as shown Table 8.

*Table 8: Lead and Copper Sampling Site Criteria*

<b>Tier</b>	<b>Criteria</b>
<b>1</b>	Single family residence with copper pipe and lead solder installed from 1983 - 1987; and/or
	served by lead service lines.
<b>2</b>	Any building with copper pipe and lead solder installed from 1983 - 1987; and or
	served by lead service lines
<b>3</b>	Single family residence with copper pipe and lead solder installed before 1983.

Public water systems have been directed to collect all tap samples from Tier 1 locations if possible. Tumwater does not have any known lead service lines, however, approximately 300 single family homes that receive water service from the City's main system were built between 1983 and 1987. Prior to the 2016 round of sampling City staff conducted a GIS analysis to identify sample sites built within this timeframe. Public Works sent letters to these residents along with a survey seeking additional information about the plumbing systems in these homes. These surveys sought to identify when the plumbing was installed, if and when it was replaced, and detailed information about the materials used. Most residents were not able to complete the surveys, so staff made the assumption that homes built between 1983 and 1987 were constructed with copper pipe and lead solder, and that these original systems were still in service.

To satisfy LCR sampling requirements the City solicited participation from 134 individuals and by the end of the monitoring effort had collected samples from 38 locations. Of these sample sites 30 were single family homes built between 1983 and 1987. Presuming assumptions about the plumbing systems in these homes are true, one hundred percent of Tumwater's samples were taken from Tier 1 locations during the most recent round of sampling in the system.

Of the 43 single family homes on the Lakeland Manor water system 41 were built between 1967 and 1979. Letters seeking volunteers for the sampling program were sent to all residents on the system and all of the five respondents had homes built before 1979

The LCR requires that ninety percent of the water system tap samples in a given year must be below the “action level” (1.3 mg/L for copper and 0.015 mg/L for lead). Table 9 shows the ninetieth percentile values for lead and copper for the most recent rounds of sampling in the City’s two water systems.

*Table 9: Summary of Most Recent Lead and Copper Sampling in the Two Water Systems managed by the City.*

	Tumwater (2016)	Lakeland (2018)
Lead (mg/L)	0.006	0.003
Copper (mg/L)	0.38	0.26

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## ANALYTICAL SERVICES

The City uses the following certified water quality laboratories for biological and chemical testing and analysis. In case of an emergency or for after-hours services, Water Management Laboratories would be used for both bacteriological and chemical analysis.

### *Bacteria Testing Laboratory*

Thurston County Health Department Laboratory  
 2000 Lakeridge Drive SW  
 Olympia, WA 98502  
 (360) 867-2631  
 (360) 867-2661 after hours

### *Chemical Testing Laboratory*

Edge Analytical Laboratory  
 1620 S Walnut  
 Burlington, WA 98223  
 (800) 755-9295

### *Emergency/After Hours Laboratory*

Water Management  
 1515 80<sup>th</sup> St. E  
 Tacoma, WA 98404  
 (253) 531-3121

## WATER QUALITY EXCEEDANCES

The City continues to meet all health based water quality standards in all of the water systems that it manages. Water quality reports for the City going back to 2012 can be found at the following web address:

<http://www.ci.tumwater.wa.us/WaterQualityReport>



In addition to these health based standards the EPA has established secondary drinking water standards for aesthetic considerations such as color, odor, iron, and manganese that the City strives to meet. Tumwater’s main system as well as the Lakeland Manor water system continually meet these secondary water quality standards.

## TREATMENT

The City of Tumwater treats most of its groundwater sources in order to kill any pathogens that may be present, to remove volatile organic compounds, and to control pH. Table 10 shows the different types of treatment the City uses.

*Table 10: Different Types of Treatment Used across the City’s Water Systems*

Water System	Wellfield	Wells	Treatment Type
City of Tumwater	Palermo Wellfield	4, 6, 8, 16, and 17	Chlorination and Aeration
	Bush	12 and 14	Chlorination and Aeration
	Airport	9, 10, 11, and 15	Chlorination
Lakeland Manor	--	Lakeland	none

## CHLORINATION

In coordination with DOH, the City began voluntarily disinfecting the COT system in September 2007. The risk of bacterial contamination at the Lakeland Manor system is very low, therefore there is no need to add a disinfectant. To satisfy the chlorination requirement the City maintains a minimum free chlorine residual near 0.25 mg/L in its main distribution system. City staff measure and record the residual Monday through Friday from the coliform sampling stations located throughout the distribution systems. The City also continuously measures the free chlorine residual with automated chlorine analyzers at the points of entry into the distribution system.

## AERATION

Wells in the City of Tumwater’s Palermo well field were found to be contaminated with trichloroethylene (TCE) in 1993. Aeration has been shown to be an effective and efficient way to remove TCE from groundwater and with help from the EPA in the mid-1990s the City constructed aeration facilities at Palermo. Aeration for TCE removal can have a secondary effect of raising the pH of the treated water by stripping out the soluble, naturally occurring, carbon dioxide gas. A 1996 corrosion control study suggested this approach to raise the pH of the City’s drinking water in order to inhibit the leaching of lead and copper from household plumbing. In the early 2000’s aeration towers were

constructed at the Bush well field. Today, with aeration at Palermo and Bush well fields, over 70% of the City's drinking water in the main system receives pH adjustment through this process.

When the City's residential and non-transient population surpasses 50,000 (currently 49,038) it will be required to conduct additional monitoring in order to demonstrate that the corrosion control treatment it provides through aeration in the main system has been "optimized". Optimized corrosion control is achieved when the difference between the source water lead level and the ninetieth percentile action level at the tap is less than 0.005 mg/L. These samples must be collected in two consecutive six month intervals. Because Tumwater is very close to surpassing the population threshold the City has instituted supplemental pH and alkalinity monitoring in its distribution system to better understand where its drinking water may be corrosive to lead and copper.

## PROGRAM MANAGEMENT

Water resources program management includes responding to complaints, maintaining records, reporting to DOH, public notification, and annual consumer confidence reporting.

## RESPONDING TO COMPLAINTS

The City occasionally receives complaints from its customers concerning water quality or pressure. Between 2008 and 2018, Operations and Water Resources staff fielded 142 complaints and addressed these complaints in a timely manner over the phone or through site visits. City staff track these complaints within an asset management system to help identify reoccurring problems. Table 11 describes these 142 complaints by type.

*Table 11: Water quality complaints, 2008 - 2018*

Complaint Type	Count
smell/taste	56
appearance	43
debris	26
discoloration	7
feel	4
other	6

## MAINTAINING RECORDS

Water quality and operational records are maintained according to WAC 246-290-480 and 485 as shown in Table 12. All records must bear the signature of the operator in charge of the water system or the operator's representative. These records are available for inspection by DOH and will be sent to DOH if requested. Records are kept digitally, on paper, or both.

Table 12: Water System Record Retention Requirements

Description	Record Retention
Bacteriological test results	5 years
Turbidity test results	5 years
Chemical analysis results	as long as in operation
Other records of operation and analysis	3 years
Documentation of level 1 or level 2 assessments (including documentation of corrective actions completed as a result of the assessments or other summary documentation of the sanitary defects and corrective actions).	5 years
Records of action taken by the system to correct violations of primary drinking water standards and public notification about these actions.	10 years
Copies of any written reports, summaries, or communications relating to sanitary surveys or special purpose investigations of the system conducted by system personnel, by a consultant or by any local, state, or federal agency.	10 years
Copies of project reports, construction documents and related drawings, inspection reports and approvals.	life of facility
Records of DOH-specified minimum disinfectant residual.	10 years
Records of the lowest residual disinfectant concentration, and the date and duration of any failure to maintain the department-prescribed minimum residual disinfectant concentration for a period of more than four hours.	5 years
Water treatment performance including type of chemicals used and quantity, amount of water treated, and results of analyses.	3 years
Other information as specified by DOH.	3 years
Public notification of national primary drinking water regulation violations and DOH certification of these notices.	3 years
Copies of monitoring plans.	As long as plan is current.
Records of invalidation of groundwater source samples under WAC 246-290-320 (2)(g)(vii).	5 years

## REPORTING TO DOH

The City provides information related to routine compliance monitoring to DOH on a regular basis. If violations occur the City is required to notify DOH as well. Table 13 describes the City's requirements to provide information to DOH.

*Table 13: Water System Reporting Requirements*

<b>Description</b>	<b>Reporting Deadline</b>
Notice of violation of national primary drinking water regulations including monitoring requirements	Within 48 hrs (unless otherwise specified)
Tests, measurements, and analytic reports that are part of compliance monitoring	Monthly reports are due before the tenth day of the following month, unless otherwise specified
Copies of any written summaries or communications relating to the status of monitoring waivers	During each monitoring cycle or as directed by DOH
Source meter readings	As requested by DOH
Water facilities inventory form (WFI) update	Annual
Updated WFI reflecting any change in name, category, ownership, or responsibility for management of the water system, or addition of source or storage facilities	Within 30 days of change
Notification of the presence of total coliform in a sample	Within 10 days of lab notification
Notification of treatment technique violations (under the revised total coliform rule)	No later than the end of the next business day after the violation is known.
Certification that the City has complied with public notification requirements	ASAP
Notification of having completed corrective actions identified during sanitary surveys and source fecal contamination identified under routine monitoring or follow-up actions.	Within 30 days

## PUBLIC NOTIFICATION

The Public Notification Rule is part of the SDWA and ensures that consumers will know if there is a problem with their drinking water. This rule describes three tiers of public notification as described below.

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## TIER 1

Any time a situation occurs where there is the potential for human health to be immediately impacted, water suppliers have **24 hours** to notify people who may drink the water about the situation. The City must use media outlets such as social media, television, radio, and newspapers, post notices in public spaces, personally deliver notices to customers, or an alternative method approved by DOH. The following situations require tier 1 public notification:

- Distribution system sample violation when fecal coliform or E. coli are present; failure to test for fecal coliform or E. coli after initial total coliform distribution system sample tests positive.
- Nitrate, nitrite, or total nitrate and nitrite MCL violation; failure to take confirmation sample.
- Waterborne disease outbreak or other waterborne emergency.
- Detection of E. coli, enterococci, or coliphage in a ground water source sample.
- Other violations or situations determined by DOH.

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## TIER 2

If the City were to serve water to its customers with levels of a contaminant that exceed EPA or state standards or that hasn't been treated properly, but that doesn't pose an immediate risk to human health, the City must notify its customers as soon as possible, but **within 30 days** of the violation. Notice may be provided through the media, public posting, or the mail. The following situations require tier 2 public notification:

- All MCL, Maximum Residual Disinfectant Limit (MRDL), and treatment technique violations, except where Tier 1 notice is required.
- Monitoring violations, if elevated to Tier 2 notice by DOH.
- Failure to comply with variance and exemption conditions.
- Failure to take any required corrective action or be in compliance with a corrective action plan for a fecal indicator-positive ground water source sample.
- Failure to take any required corrective action or be in compliance with a corrective action plan for a significant deficiency under the Ground Water Rule.

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## TIER 3

If the City were to violate a drinking water standard that does not have a direct impact on human health (for example, failing to take a required sample on time) it has up to a year to notify its customers. Notice may be provided via the media, posting, or through the mail and may be included in the annual consumer confidence report. The following situations require tier 3 public notification:

- All monitoring or testing procedure violations, unless DOH elevates to Tier 2, including failure to develop monitoring plans.

- Operating under a variance and exemption.
- Special public notice for availability of unregulated contaminant monitoring results.

The City must notify new customers of ongoing violations or situations requiring public notification. Following a public notice the City must send a certification of compliance and a copy of the completed notice to DOH. Each public notification has ten required elements illustrated in Figure 6.

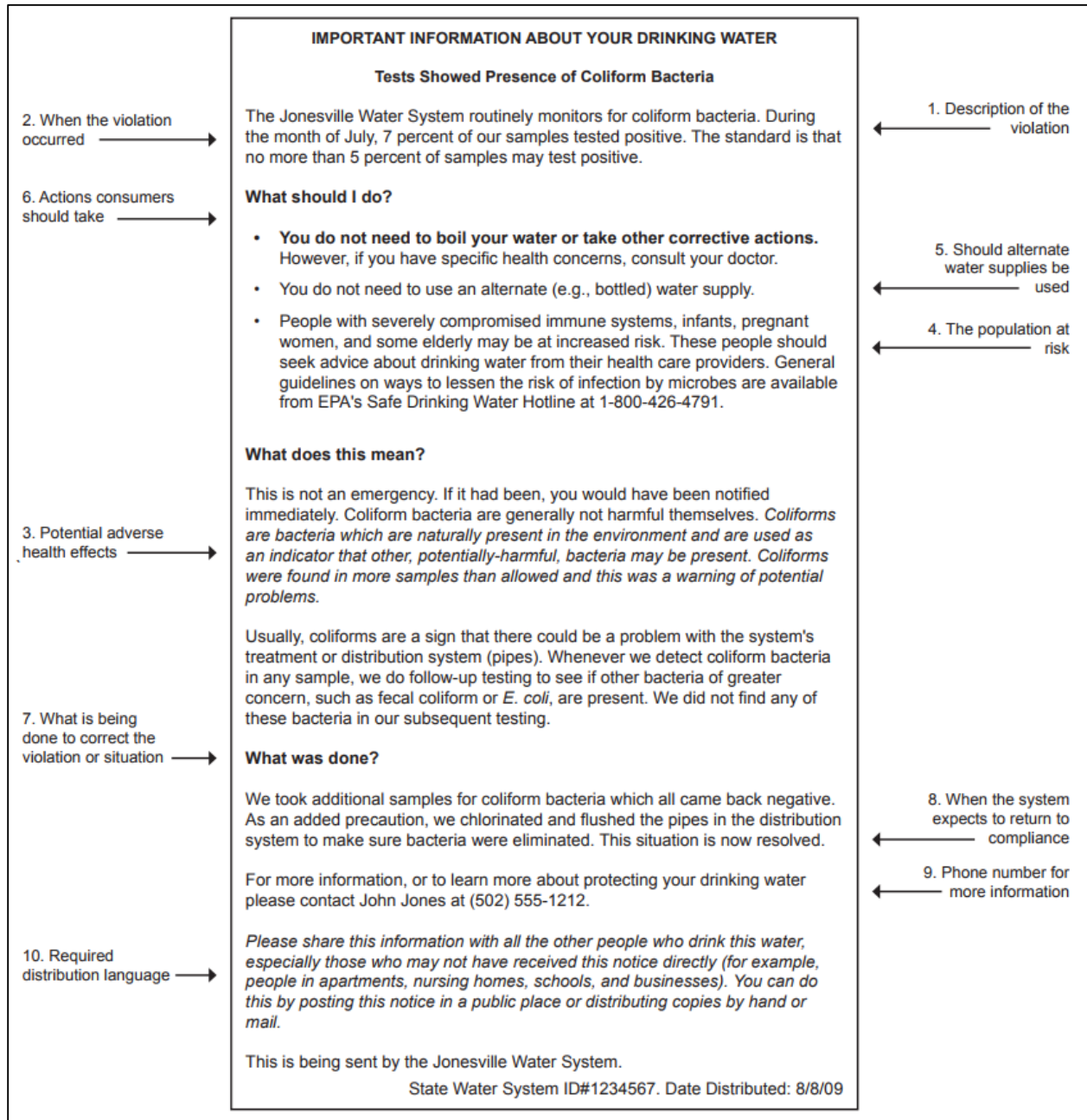


Figure 6: Required elements of a public notice for new water customers.

## CONSUMER CONFIDENCE REPORTS

Consumer Confidence Reports (CCRs) are the centerpiece of the right-to-know provisions in Safe Drinking Water Act. CCRs must contain information on the quality of the water delivered by the systems and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner. The formatting and content requirements for CCRs can be found at the following website:

<https://www.epa.gov/ccr/how-water-systems-comply-ccr-requirements>

## WATER QUALITY INCIDENT RESPONSE

If compliance monitoring reveals the presence of a primary drinking water contaminant above the MCL, City staff will take the following steps as outlined in WAC 246-290-320, which covers water quality follow-up actions:

1. Notify DOH.
2. Notify consumers served by the system in accordance with public notification requirements outlined above as well as additional requirements found in WAC 246-290-320.
3. Determine the cause of the contamination.
4. Take action as directed by DOH.

It is likely, that upon notifying DOH of the presence of a primary drinking water contaminant above the MCL at a source that DOH staff will instruct the City to remove this source from service until the problem is resolved or more information can be gathered. In anticipation of this the City will preemptively remove from service any well that exceeds a primary drinking water standard until DOH can provide input. If an MCL exceedance occurs during the summer high demand season shutting down a source may impact the City's ability to provide water to its customers. In this instance the City will follow the protocol described in the Water Shortage Response Plan.

In addition to the compliance monitoring required by DOH the City collects groundwater samples from a network of monitoring wells throughout its wellhead protection areas. These wells serve as an early warning network to alert the City to contaminants that might move towards source wells. If the City detects contaminants of concern before they reach the wells it can take steps to ensure that water quality issues don't disrupt water service in the future. The City's Wellhead Protection Plan can be found as an appendix to the current Water System Plan.

## EMERGING WATER QUALITY ISSUES

This section addresses several drinking water issues that the City will face over the next ten-year planning period.

### NEW SOURCES OF SUPPLY

Over the next ten years the City will develop two new sources of supply. One, in partnership with the Cities of Olympia and Lacey within the former Olympia Brewery well field and one in the southwest corner of the City. Integrating these new sources into the existing water system is a large project that will initiate additional treatment and water quality monitoring requirements.

### NEW REGULATIONS ASSOCIATED WITH EXPANDING POPULATION

As the City's population grows the water quality monitoring requirements will evolve. For example, as mentioned above population growth will soon trigger a requirement that the City sample additional sites for coliform bacteria and optimize its corrosion control. The City will work with DOH to ensure that it continues to comply with all applicable regulations.



## **Appendix A**

### Coliform Monitoring Plan

**Coliform Monitoring Plan for: City of Tumwater**

**A. System Information**

**Plan Date: 8/7/2017**

<b>Water System Name</b> Tumwater, City of	<b>County</b> Thurston	<b>System I.D. Number</b> 89700 Q
<b>Name of Plan Preparer</b> <u>Chris Hartman</u>	<b>Position</b> <u>Water Resource Specialist</u>	<b>Daytime Phone</b> <b>360-754-4140</b>
<b>Sources:</b> DOH Source Number, Source Name, Well Depth, Pumping Capacity	<u>S08, Well 8, 67,166</u> <u>S12, Well 12, 118, 578</u> <u>S13, Well 14, 118, 2350</u> <u>S15, Well 11, 115, 357</u> <u>S17, Well 3, 96, 290 (inactive)</u> <u>S18, Well 4, 90, 187</u> <u>S20, Well 6, 120, 248</u> <u>S21, Well 9, 99, 321</u> <u>S22, Well 10, 109, 442</u> <u>S23, Well 15, 145, 508</u> <u>S28, Well 17, 96, 350</u> <u>S27, Well 16, 97, 400</u>	
<b>Storage:</b> List and Describe	<u>Somerset Reservoir, 1 MG</u> <u>350 Reservoir, 4 MG</u> <u>Mottman B Tank, 1 MG</u> <u>Mottman A Tank, 0.08 MG (Inactive)</u> <u>Airport Reservoir, 0.2 MG (Inactive)</u>	
<b>Treatment:</b> Source Number & Process	<u>Bush Treatment Plant (Aeration), Sources 12 &amp; 13</u> <u>Palermo Treatment Plant (Aeration), Sources 8, 18, 20, 26 &amp; 27</u>	
<b>Pressure Zones:</b> Number and name	<u>Zone 1 (aka 350 Zone)</u> <u>Zone 2 (aka 454 Zone)</u> <u>Zone 4 (aka 549 Zone)</u>	

<b>Population by Pressure Zone</b>	<u>Approximate population based on GIS analysis of active water accounts. This analysis took into account the residential, transient, and regular non-residential components of the coliform monitoring population (49,038 September – May).</u>  <u>Zone 1 = 46,100 (94%)</u> <u>Zone 2 = 2,148 (4%)</u> <u>Zone 4 = 790 (2%)</u>	
<b>Number of Routine Samples Required Monthly by Regulation:</b>	<u>50</u>	
<b>Number of Sample Sites Needed to Represent the Distribution System:</b>	<u>16-24</u>	
<b>*Request DOH Approval of Triggered Source Monitoring Plan?</b>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

\*If approval is requested a fee will be charged for the review.

## B. Laboratory Information

<b>Laboratory Name</b> Thurston County Health Dept. Lab	<b>Office Phone 360-867-2631</b> <b>After Hours Phone 360-867-2661 (pager)</b>
<b>Address</b> <u>2000 Lakeridge Drive SW</u> Olympia, WA 98502	<b>Cell Phone</b> - - <b>Email</b> <u>iversoe@co.thurston.wa.us</u>
<b>Hours of Operation</b> <u>Monday- Friday, 8-5</u>	
<b>Contact Name</b> <u>Erik Iverson</u>	
<b>Emergency Laboratory Name</b> Spectra Laboratories	<b>Office Phone 253-272-4850</b> <b>After Hours Phone 253-244-0680</b>
<b>Address</b> <u>2221 Ross Way, Tacoma, WA 98421</u>	<b>Cell Phone</b> - - <b>Email</b> <u>info@spectra-lab.com</u>
<b>Hours of Operation</b> <u>Monday – Friday, 8-5</u>	
<b>Contact Name</b> <u>Jeff Cooper</u>	

**C. Wholesaling of Groundwater**

	Yes	No
We are a consecutive system and purchase groundwater from another water system.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**D. Routine and Repeat Source Sample Locations**

Existing Stations

Location/Address for <u>Routine</u> Sample Sites	Location/Address for <u>Repeat</u> Sample Sites
WQ1. 3142 54 <sup>th</sup> St. (approx.)	1-1. 2614 54 <sup>th</sup> St. 1-2. 5240 54 <sup>th</sup> St.
WQ2. 66 <sup>th</sup> Ave. & Fish Pond Creek Dr.	2-1. 6624 Cavalier St. 2-2. 4077 66 <sup>th</sup> Ave.
WQ3. 1441 83 <sup>rd</sup> Ave.	3-1. 8220 Center St. 3-2. 2120 83 <sup>rd</sup> Ave.
WQ4. 7406 Henderson Ct.	4-1. 7404 Henderson Ct. 4-2. 7418 Henderson Ct.
WQ5. 53 <sup>rd</sup> Ave & Arlington Ct.	5-1. 5237 Arlington Ct. 5-2. 1837 53 <sup>rd</sup> Ave.
WQ6. 4828 Bush Mtn. Dr.	6-1. 4746 Bush Mtn. Dr. 6-2. 4902 Bush Mtn. Dr.
WQ7. 3902 Antsen St.	7-1. 2210 Sapp Rd. 7-2. 3848 Antsen St.
WQ8. 1205 Barnes Blvd.	8-1. 610 C St. 8-2. 1534 Vista Loop
WQ9. 1114 40 <sup>th</sup>	9-1. 1105 Middle St. 9-2. 40 <sup>th</sup> Ave.
WQ10. 29 <sup>th</sup> Ave & Noble St.	10-1. 3000 RW Johnson Blvd 10-2. 2894 Noble St.

WQ11. Israel Rd. & Bonniewood Dr.	11-1. 397 Israel Rd. 11-2. 600 Israel Rd.
WQ12. Dennis St. & Linderson Way	12-1. 824 Dennis St. 12-2. 6506 Linderson Way
WQ13. 1027 Daisy Ln.	13-1. 1023 Daisy Ln. 13-2. 1031 Daisy Ln.
WQ14. 2333 48 <sup>th</sup> Ave	14-1. 2315 48 <sup>th</sup> Ave. 14-2. 2365 48 <sup>th</sup> Ave.
WQ15. 1123 N. 9 <sup>th</sup> Ave.	15-1. 1107 N. 9 <sup>th</sup> Ave. 15-2. 1199 N. 9 <sup>th</sup> Ave.
WQ16. 2930 Bush Mtn. Ct.	16-1. 2920 Bush Mtn. Ct. 16-2. 3015 Bush Mtn. Ct.
WQ25. 9702 Lathrop Industrial Dr SW	25-1. 9628 Lathrop Industrial Dr SW 25-2. 9730 Lathrop Industrial Dr SW
WQ26. 9809 Blomberg St SW	26-1. 9746 Blomberg St SW 26-2. 9803 Blomberg St SW
WQ27. 1322 89 <sup>th</sup> Ave. SE	27-1. 1314 89 <sup>th</sup> Ave SE. 27-2. 1330 89 <sup>th</sup> Ave. SE
WQ28. 2131 69 <sup>th</sup> Ct. SE	28-1. 6904 Desperado Dr. SE 28-2. 2138 69 <sup>th</sup> Ct. SE
WQ29. 759 T St. SE	29-1. 746 T St. SE 29-2. 756 T St. SE
WQ30. 2501 Crites St. SW	30-1. 2535 Crites St. SW 30-2. 3300 Mottman Rd. SW
WQ31. 1262 Irving St. SW	31-1. 1550 Irving St. SW 31-2. 1259 Irving St. SW
WQ32. 1624 Anthem Ln. SW	32-1. 1638 Anthem Ln. SW 32-2. 1631 Friday Ln. SW

WQ33. 1940 79 <sup>th</sup> Ave. SE	33-1. 1929 79 <sup>th</sup> Ave. SE 33-2. 2003 79 <sup>th</sup> Ave. SE
WQ34. 3003 Sunset Way SE	34-1. 3201 Fairfield Rd. SE 34-2. 419 Carlyon Ave. SE

Groundwater Sources for <b>Triggered Sample Sites**</b>
<b>S02 (Palermo Well Field)</b>
<b>S09 (Airport Well Field)</b>
<b>S15 (Well 11)</b>
<b>S23 (Well 15)</b>
<b>S14 (Bush Well Field)</b>

**\*\* These triggered sample sites apply to every routine sample site**

## **E. Reduced Triggered Source Monitoring Justification (add sheets as needed):**

For the purposes of triggered source water monitoring the City is requesting same aquifer designation, consistent with the DOH well field designations.

In order to meet demand the City typically operates 8 wells during the low demand season and as many as 11 wells during the high demand period. These wells are located in three distinct well fields known as Palermo, Airport, and Bush. The Palermo and Bush well fields, along with well 15 in the Airport well field provide the majority of the City's water. During the high demand season the City pumps water from 3 additional wells in the Port well field. The water from Palermo and Bush is treated prior to entering the distribution/storage system, but sources 09, 15, 23, and 28 enter the system directly without treatment.

### **Total Coliform Detected**

We propose that in the event the City is required to conduct triggered source water monitoring due to a *total coliform detection* that rather than sample each individual well we will sample the points of entry into the distribution system. Depending on which wells/ well fields are active at the time of a future coliform detection the City would sample up to six locations as follows:

- 1. Palermo Well Field (S02)**
  - Well 3 (S17, inactive)
  - Well 4 (S18)
  - Well 6 (S20)
  - Well 8 (S08)
  - Well 16 (S27)
  - Well 17 (S28)
- 2. Airport Well Field (S09)**
  - Well 9 (S21)
  - Well 10 (S22)
- 3. Well 11 (S15)**
- 4. Well 15 (S23)**
- 5. Bush Well Field (S14)**
  - Well 12 (S12)
  - Well 14 (S13)

### **E.Coli Detected**

In the event that source water monitoring is triggered by an *E. coli detection* during routine monitoring the City will take a more cautious approach and sample each individual well that was active when the detection occurred. This will facilitate a more targeted response in the event that a source is truly contaminated.

## F. Routine Monthly Sample Rotation

The city typically collects its 60 monthly samples over the course of three weeks. Samples are collected over two to three days in a given week. All 24 of the sites shown section 4 are sampled at least once per month, but most are sampled twice. All of the sites are sampled year-round.

Month	Routine Sites	Month	Routine Sites
January	ALL 24	July	ALL 24
February	ALL 24	August	ALL 24
March	ALL 24	September	ALL 24
April	ALL 24	October	ALL 24
May	ALL 24	November	ALL 24
June	ALL 24	December	ALL 24

## G. Level 1 and Level 2 Assessment Contact Information

### Level 1

<b>Name</b> <b>Carrie Gillum – Water Resources Specialist</b>	<b>Office Phone 360-754-4140</b>
<b>Address</b> <b>555 Israel Rd. SW, Tumwater, WA 98501</b>	<b>Email cgillum@ci.tumwater.wa.us</b>
<b>Name</b> <b>Steve Craig – Operations Manager</b>	<b>Office Phone 360-754-4150</b> <b>After Hours Phone 360-507-7634</b>
<b>Address</b> <b>555 Israel Rd. SW, Tumwater, WA 98501</b>	<b>Email scraig@ci.tumwater.wa.us</b>

### Level 2

<b>Name</b> <b>Steve Craig – Operations Manager</b>	<b>Office Phone 360-754-4150</b> <b>After Hours Phone 360-507-7634</b>
<b>Address</b> <b>555 Israel Rd. SW, Tumwater, WA 98501</b>	<b>Email scraig@ci.tumwater.wa.us</b>
<b>Name</b> <b>Mike Erickson – Maintenance Lead</b>	<b>Office Phone 360-754-4150</b> <b>After Hours Phone 360-507-7634</b>
<b>Address</b> <b>555 Israel Rd. SW, Tumwater, WA 98501</b>	<b>Email merickson@ci.tumwater.wa.us</b>



## H. *E. coli*-Present Response Plans

<b>Distribution System <i>E. coli</i> Response Checklist</b>				
<b>Background Information</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>To Do List</b>
We inform staff members about activities within the distribution system that could affect water quality.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We document all water main breaks, construction & repair activities, and low pressure and outage incidents.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
We can easily access and review documentation on water main breaks, construction & repair activities, and low pressure and outage incidents.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Our Cross-Connection Control Program is up-to-date.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We test all cross-connection control devices annually as required, with easy access to the proper documentation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We routinely inspect all treatment facilities for proper operation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We identified one or more qualified individuals who are able to conduct a Level 2 assessment of our water system.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have procedures in place for disinfecting and flushing the water system if it becomes necessary.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We can activate an emergency intertie with an adjacent water system in an emergency.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a map of our service area boundaries.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have consumers who may not have access to bottled or boiled water.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is a sufficient supply of bottled water immediately available to our customers who are unable to boil their water.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have identified the contact person at each day care, school, medical facility, food service, and other customers who may have difficulty responding to a Health Advisory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
We have messages prepared and translated into different languages to ensure our consumers will understand them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
We have the capacity to print and distribute the required number of notices in a short time period.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Policy Direction</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>To Do List</b>
We have discussed the issue of <i>E. coli</i> -present sample results with our policy makers.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If we find <i>E. coli</i> in a routine distribution sample, the policy makers want to wait until repeat test results are available before issuing advice to water system customers.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>(Cont.)</b>				

### Distribution System *E. coli* Response Checklist

Potential Public Notice Delivery Methods	Yes	No	N/A	To Do List
It is feasible to deliver a notice going door-to-door.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a list of all of our customers' addresses.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a list of customer telephone numbers or access to a Reverse 9-1-1 system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
We have a list of customer email addresses.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We encourage our customers to remain in contact with us using social media.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have an active website we can quickly update to include important messages.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our customers drive by a single location where we could post an advisory and expect everyone to see it.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We need a news release to supplement our public notification process.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Distribution System *E. coli* Response Plan

**If we have *E. coli* in our distribution system we will immediately:**

1. Call DOH.
2. Collect repeat and triggered source samples per Part D. Collect additional investigative samples as necessary.
3. Assemble internal team to prepare for public notification in case repeat/triggered samples test positive for *E. coli*
4. Conduct an assessment of our water facilities to identify "red flags" using the sanitary survey field guide.
5. Discuss with DOH whether to issue a Health Advisory based on the findings of steps 3-4.

***E. coli*-Present Triggered Source Sample Response Checklist –  
All Sources**

<b>Background Information</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>To Do List</b>
We review our sanitary survey results and respond to any recommendations affecting the microbial quality of our water supply.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We address any significant deficiencies identified during a sanitary survey.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There are contaminant sources within our Wellhead Protection Area that could affect the microbial quality of our source water, and If yes, we can eliminate them.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
We routinely inspect our well site(s).	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a good raw water sample tap installed at each source.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
After we complete work on a source, we disinfect the source, flush, and collect an investigative sample.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Public Notice</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>To Do List</b>
We discussed the requirement for immediate public notice of an <i>E. coli</i> -present source sample result with our water system's governing body (board of directors or commissioners) and received direction from them on our response plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
We discussed the requirement for immediate public notice of an <i>E. coli</i> -present source sample result with our wholesale customers and encouraged them to develop a response plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
We have prepared templates and a communications plan that will help us quickly distribute our messages.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

***E. coli*-Present Triggered Source Sample Response Plan – All Sources**

**If we have *E. coli* at any source water we will immediately:**

1. Call DOH.
2. Stop using the source in question.
3. Notify the public within 24 hours via news releases and social media.
4. If necessary (see below) consult the water shortage response plan.
5. Await further instruction from DOH.

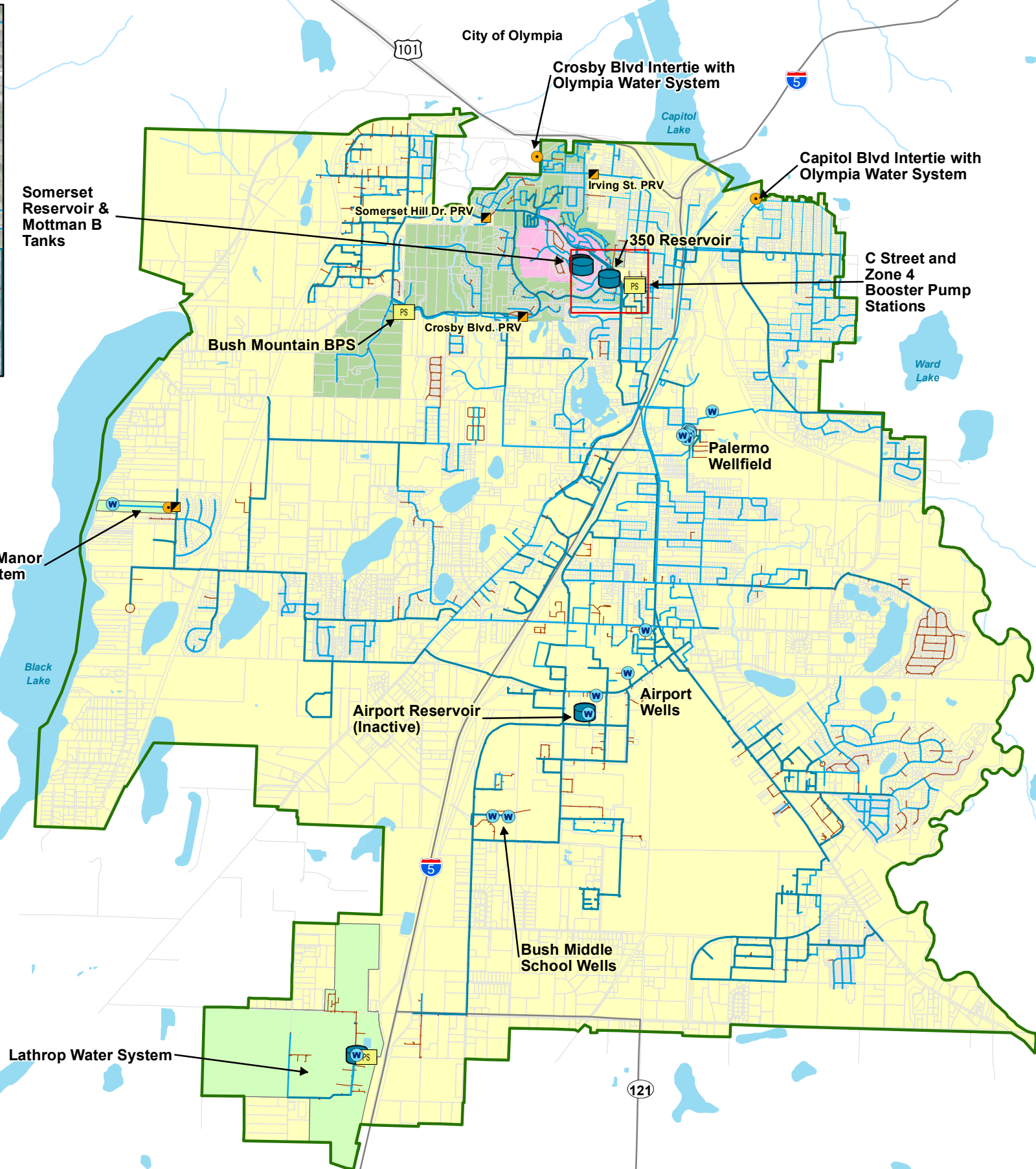
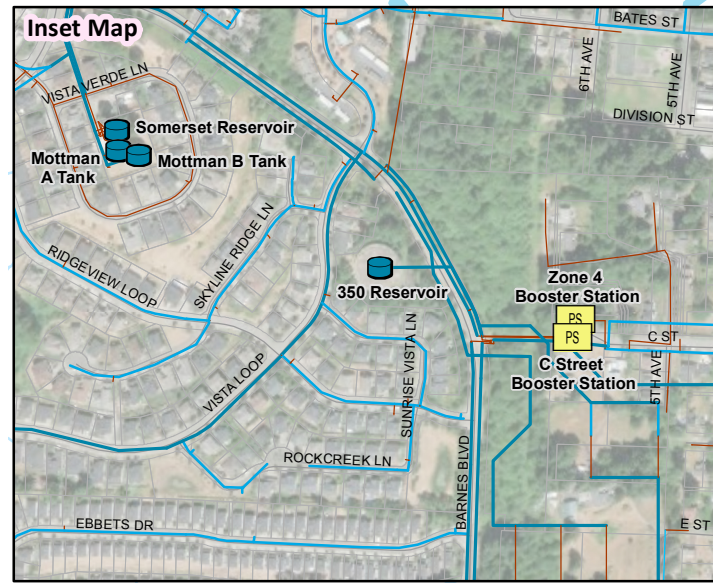
## Bacterial Contamination and Water Shortage

The affect that a source outage would have on the ability of the City to provide adequate water to its customers would depend on several factors and could be anywhere from a minor operational inconvenience to a major emergency. Depending on which sources were affected a source outage could result in the loss of anywhere from 2 – 50% of the City's production capacity (see below).

	Description	Individual Wells or Well fields
Level 1	Loss of production 5% or less	8, 10, 11, 16 or 17
Level 2	Loss of production 5-11%	4, 6, 9, 15, 12 or Airport Well field (Source 09)
Level 3	Loss of production 27-51%	14, Palermo (Source 02), or Bush (Source 14)

Depending on the time of year and the weather conditions the City might be at full production capacity or might have plenty of surplus capacity to make up losses without taking drastic measures. To effectively address an outage the City will do the following:

1. Initiate stage 1 of the Water Shortage Response Plan (WSRP) and calculate the present possible production (P3) value based on the non-contaminated sources.
2. Convene a meeting between Public Works Engineering and Operations staff to determine the ability of the City to keep up with current and upcoming demand without demand reduction actions described in the WSRP.
3. If demand reductions **are** needed implement the appropriate stage of the WSRP to achieve the required reduction.



**Legend**

- PRV
- Intertie
- Well
- Pump Station
- Reservoir
- Water Service Area

**Water Mains**

- <= 4 inches
- 6-8 inches
- >= 10 inches
- Unknown Diameter
- Major Highways
- Streets
- Water Body
- Rivers
- City-owned Satellite Water System
- Parcel

**Pressure Zone**

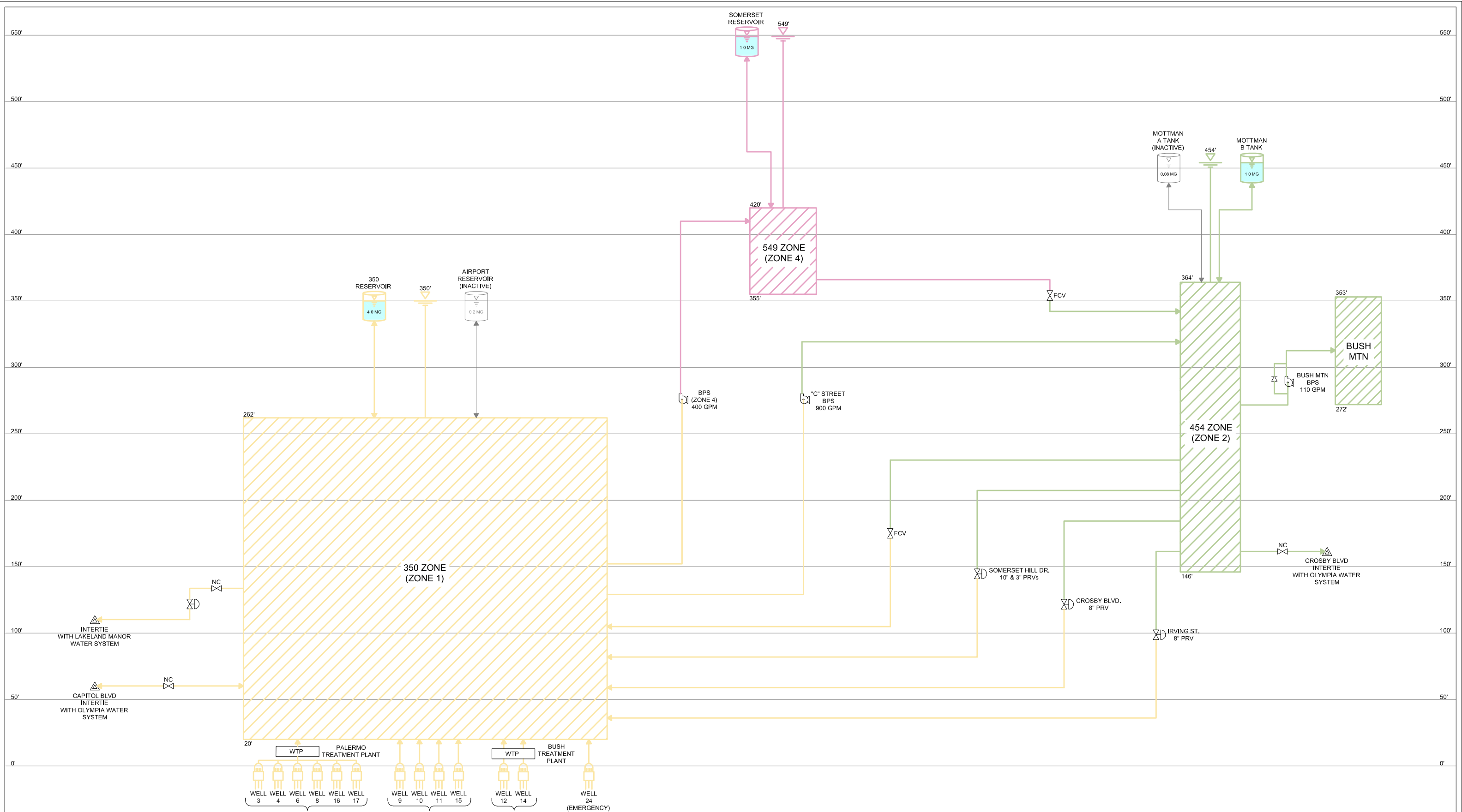
- 350 Zone (Zone 1)
- 454 Zone (Zone 2)
- 549 Zone (Zone 4)

0 0.5 1 Miles

Data Sources: City of Tumwater, WSDOT, Washington NHD, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.





**LEGEND**

- 350 ZONE (ZONE 1)
  - 454 ZONE (ZONE 2)
  - 549 ZONE (ZONE 4)
- 
- STORAGE FACILITY VOLUME
  - GROUNDWATER WELL
  - BOOSTER PUMPING STATION
  - INTERTIE
  - WATER TREATMENT PLANT
  - FACILITIES OUTLINED IN GRAY ARE INACTIVE
  - PRESSURE REDUCING VALVE
  - VALVE (NORMALLY CLOSED)
  - FLOW CONTROL VALVE
  - CHECK VALVE
- 
- PRESSURE ZONE
  - HIGH: HIGHEST ELEVATION SERVED IN ZONE
  - LOW: LOWEST ELEVATION SERVED IN ZONE
  - HGL: HYDRAULIC GRADE LINE FOR ZONE



