

Chapter 1

DESCRIPTION OF WATER SYSTEM

1.1 Introduction

This Water System Plan (Plan) updates the City of Tumwater's (City's) 2010 Water System Plan. It was developed collaboratively by City Staff, Carollo Engineers, Inc. (Carollo), and Pacific Groundwater Group.

In accordance with Washington Administrative Code (WAC) 246-290 and Washington State Department of Health (DOH) requirements, this Plan:

- Defines the City's water service area.
- Describes the existing water system.
- Establishes minimum performance criteria for the system.
- Projects future demands within the service area.
- Identifies system deficiencies.
- Presents a capital improvements plan.
- Offers a financing and implementation plan.

1.2 Authorization and Adoption

In 2017, the City authorized Carollo to prepare this document in accordance with City policies and procedures and all applicable federal, Washington State, and Thurston County (County) rules and regulations.

1.2.1 Related Plans

- Wellhead Protection Plan, 2016.
- City of Tumwater Comprehensive Plan, 2016.
- Memorandum of Understanding — Cities of Lacey, Olympia and Tumwater, 1988.
- Thurston County/Tumwater Joint Land Use Plan, 1995, Updated 2009.
- Northern Thurston County Groundwater Management Plan, 1992.
- Thurston County Coordinated Water System Plan, 1986, Updated 1998.

1.2.2 Comments and Responses from Agencies and Adjacent Purveyors

A consumer meeting was publicly advertised and conducted before the Council meeting to adopt this Plan held on July 6, 2021. The Adopting Resolution and Ordinance for this Plan are in Appendix A.

The draft Water System Plan was sent to the cities of Olympia and Lacey, Thurston County, and the DOH for review. Comments and responses are included in Appendix B.

1.2.3 Environmental Assessment

A State Environmental Policy Act (SEPA) checklist was prepared for this Plan. The City determined this Plan does not have adverse impacts on the environment. As a result, the City

issued a Determination of Non-Significance (DNS) under WAC 197-340 (2). Many of the projects this Plan proposes are expected to require additional project-specific environmental review and SEPA checklists during the preliminary and final design process.

Appendix C includes the SEPA checklist and DNS.

1.3 Location and Service Area Characteristics

The City is located in Thurston County, Washington State, at the southern end of the Puget Sound Region, immediately to the south of the state Capital, the City of Olympia. The location of the City Water System is shown in Figure 1.1. Figure 1.2 shows the City's water service area, which is nearly the same as the City's Urban Growth Area (UGA), consisting of approximately 22.4 square miles.

The service area boundaries of water systems in this area were originally established in the 1986 Thurston County Coordinated Water System Plan (CWSP) and the 1996 Area Wide Supplement to the CWSP. The City's water service area has always corresponded to the UGA boundary. In response to comments from the City of Olympia and Thurston County Resolution No. 14401, adopted September 7, 2010, the City's service area was changed to nearly match the revised UGA boundary.

According to Thurston Regional Planning Council (TRPC) statistics, a population of 28,500 resided within the City's service area as of July 2017. City records for 2016 indicate there were about 7,900 service connections, 6,800 (86 percent) of which are residential.

The City's service area shares a border with the City of Olympia Water System to the north and northeast. Besides Olympia, it does not border any other large water systems. The service areas of adjacent purveyors and other small water systems located within the City's service area boundary are shown on Figure 1.3. The South Puget Sound Community College is outside of the City's service area, but it uses a City connection for irrigation. The City of Olympia serves drinking water to the school. Figure 1.3 also shows the two satellite systems that the City owns and operates, Lakeland Manor and Lathrop. It should be noted that the Lathrop satellite system was connected to the main water system in 2019. As this Plan is an evaluation of the water system as it existed in January 2018, the Lathrop system was still considered to be a satellite system during development of this Plan.

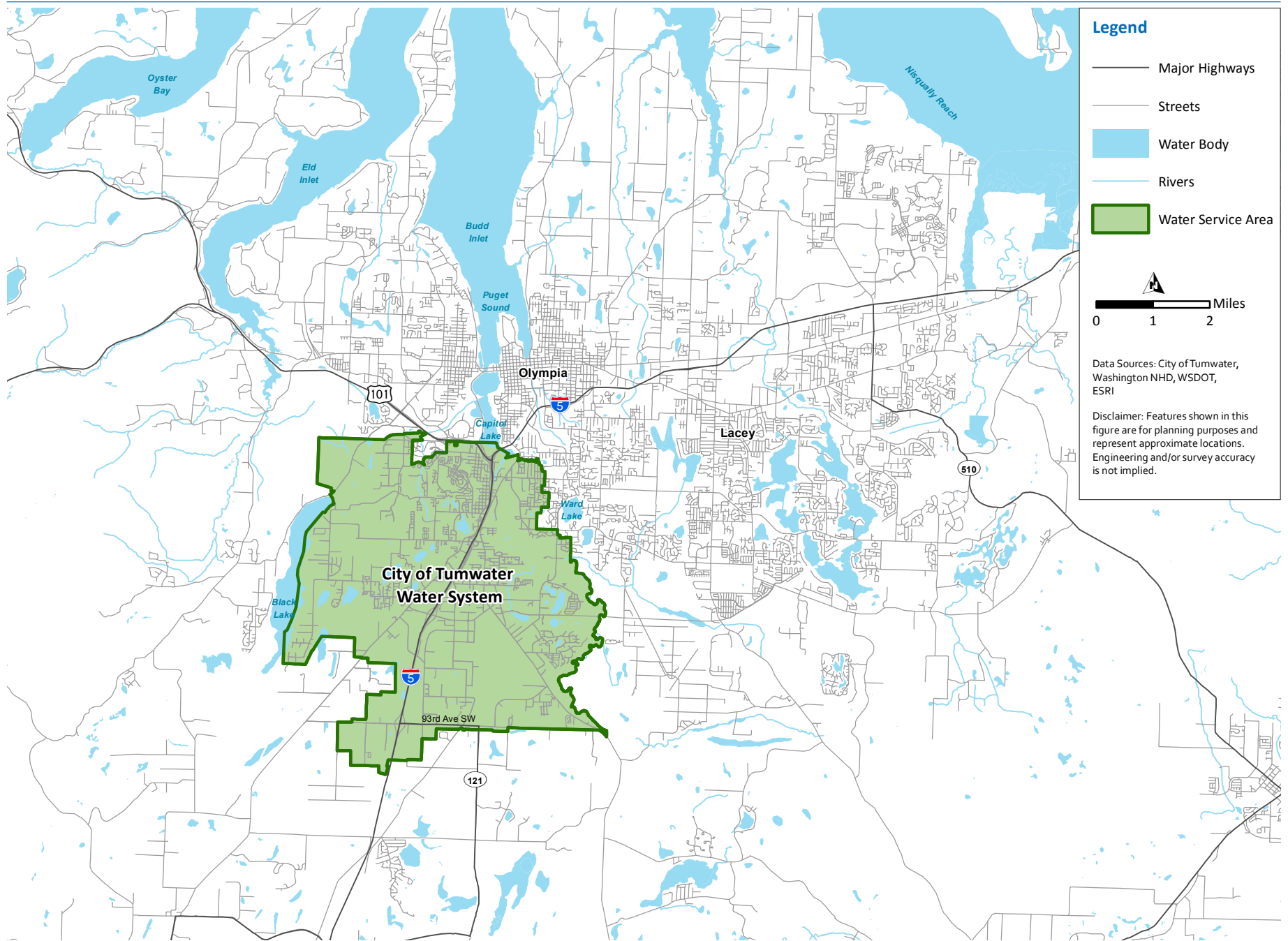
The City's topography is characterized, for the most part, by flat plains or terraces and small hills that slope into river valleys. Alluvial fans and bottom lands are found in the Deschutes River valley. The Deschutes River and Interstate 5 have had a profound influence on the pattern of land use and development. The City was founded where the Deschutes River flows into Puget Sound.

The geology of the Tumwater area, like most of the Puget Sound Region, is characterized by glacial deposits. According to the Groundwater Supply Planning Project report, the UGA contains bedrock hills to the northwest and southeast, and a broad northeast/southwest trending valley between the hills that is filled with glacial sediments.

The sediments in the Deschutes Valley were mostly derived from streams draining to the southwest from glaciers that filled the Puget Lowland. Certain glacial sediments store water, forming the aquifers from which the City currently withdraws its drinking water.

1.4 Ownership and Management

The City's water system is officially designated in the DOH records as the City of Tumwater, with a public water system number of 89700Q. It is classified as a Group A municipal water system. The City's satellites, Lakeland Manor Water System and Lathrop Water System, are also Group A. Their public water system numbers are 450874 and 07344X, respectively. As of May 2019, the Lathrop system has been integrated into the City of Tumwater system and is no longer a satellite system.



Legend

- Major Highways
- Streets
- Water Body
- Rivers
- Water Service Area

0 1 2 Miles

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

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

Figure 1.1 Vicinity Map

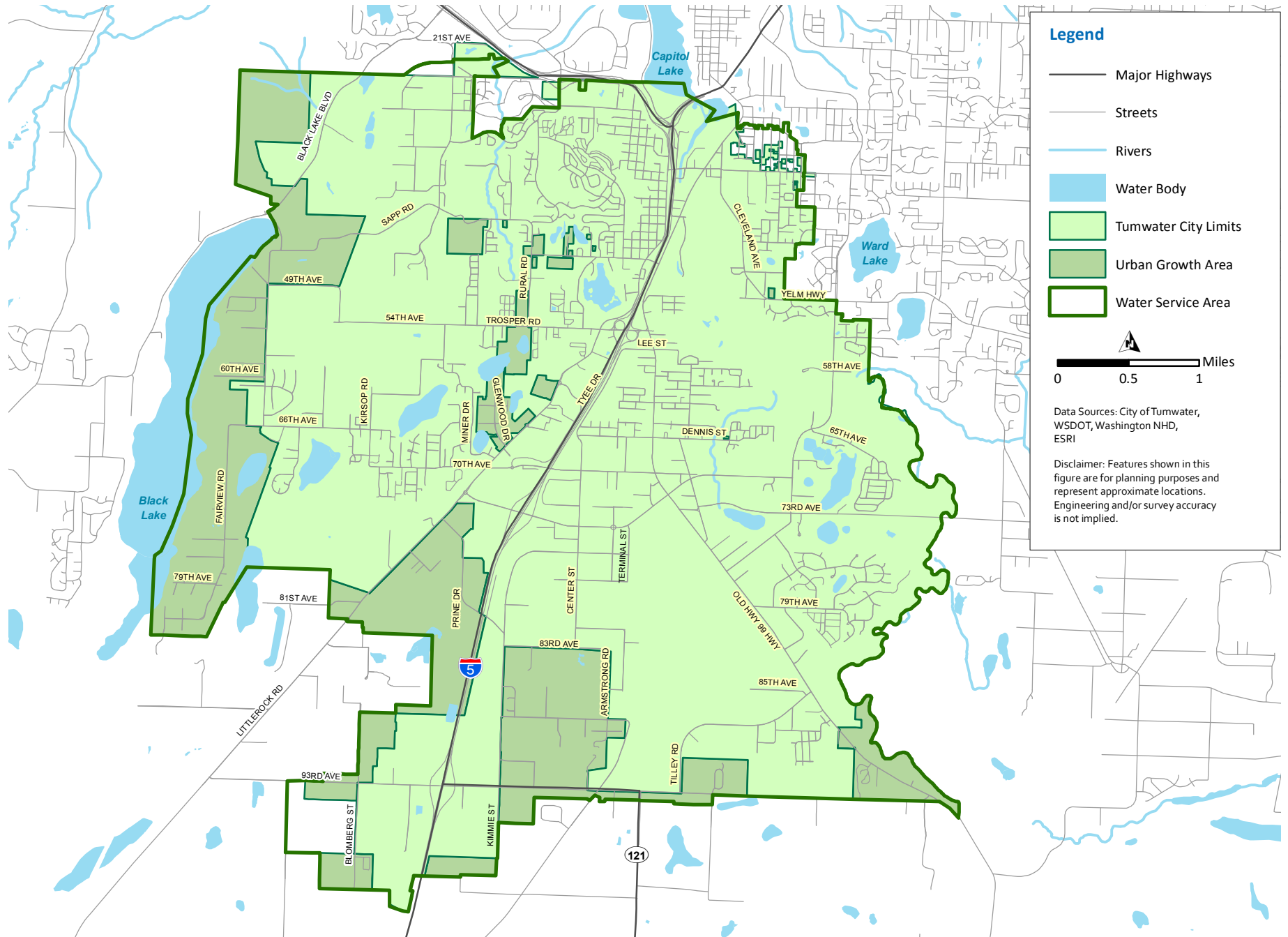
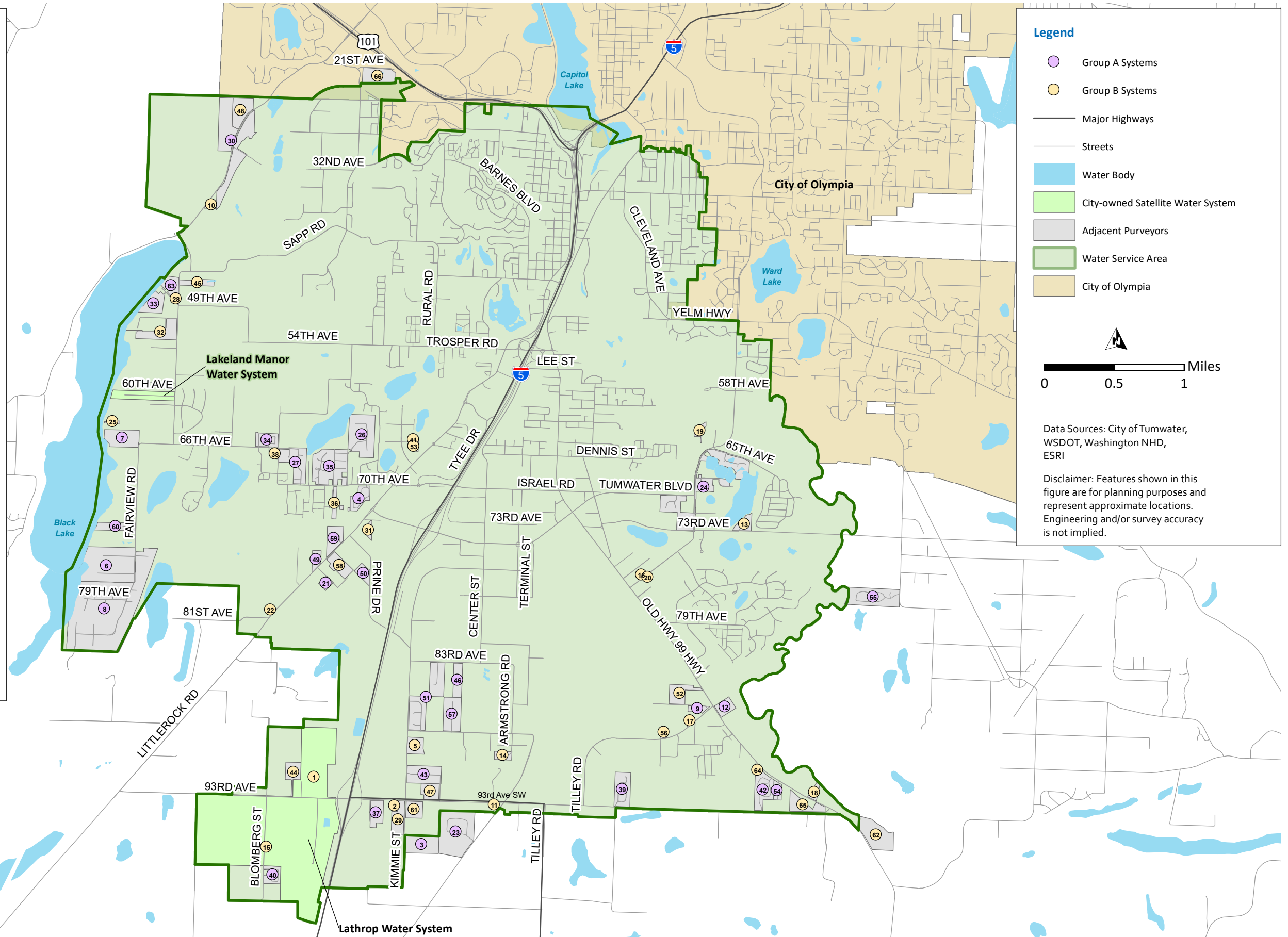


Figure 1.2 Water Service Area and City Limits

- ID WATER PURVEYOR**
- 1 93RD AVENUE PARK WEST
 - 2 ADAIR HOMES
 - 3 AMERICAN HERITAGE CAMPGROUNDS
 - 4 ANDERSEN WATER
 - 5 APEC SUPPLY
 - 6 BLACK LAKE ACRES
 - 7 BLACK LAKE BIBLE CAMP & CONF CTR
 - 8 BLACK LAKE ESTATES
 - 9 BRADLEY DENNY
 - 10 CARPENTAR
 - 11 CASE ROAD FOURPLEX
 - 12 CHZO
 - 13 CLOISTER
 - 14 COMPTON WELL
 - 15 DAIRY FRESH
 - 16 DAVE S TRAILER PARK
 - 17 DECKERT CASE RD
 - 18 DESCHUTES GLEN - 215
 - 19 DESHAYE
 - 20 EMPIRE WATER CO
 - 21 FAIRWIND MOBILE HOME PARK
 - 22 FERNS
 - 23 HAYNES ACRES DIVISION 1
 - 24 HENDERSON BOULEVARD
 - 25 HETLAND, L.A. WATER SUPPLY
 - 26 HOLIDAY ACRES
 - 27 ISRAEL PLACE SAN ANGELO PARK
 - 28 JI S QUICK STOP
 - 29 JOHNSON, LARRY
 - 30 JONES INDUSTRIAL PARK
 - 31 JRS WATER SUPPLY
 - 32 KLIPSUN WATERS
 - 33 LAKESIDE LLC
 - 34 LAUREL PARK COMMUNITY LLC
 - 35 LAZY ACRES 351
 - 36 LAZY CT.
 - 37 LINCOLN CREEK LUMBER CO
 - 38 LOBE WATER
 - 39 LONGHORN COUNTRY ESTATES
 - 40 LOS CEDROS MOBILE HOME PARK
 - 41 MAPLEWOOD
 - 42 MELODY PINES MOBILE HOME ESTATES
 - 43 MULFORD ESTATES
 - 44 NORTHWEST PIPELINE
 - 45 NULL - SS 2220
 - 46 OLYMPIA CAMPGROUND
 - 47 OLYMPIC STRUCTURES
 - 48 PACIFIC DISPOSAL
 - 49 PARKWOOD APARTMENTS
 - 50 PRINE DRIVE APARTMENTS
 - 51 PRINE VILLA APTS BURNSVILLE
 - 52 PRITCHETT H2O
 - 53 RHONDA WATER SUPPLY
 - 54 RICHMOND TOTTEN
 - 55 RIVERLEA
 - 56 SHELTON, RONALD
 - 57 SILVER FOX MANOR
 - 58 STUART, G.-SS 1970
 - 59 SUMMERHILL
 - 60 SYLVAN TERRACE CONDOMINIUMS
 - 61 TAYLOR
 - 62 THURSTON COUNTY FIRE DIST 6 STA 64
 - 63 TIMBERLANE MOBILE ESTATES
 - 64 VILLAGE GREEN MOBILE PARK
 - 65 YOUNG, LENORA
 - 66 MOTTMAN MAINTENANCE FACILITY



- Legend**
- Group A Systems
 - Group B Systems
 - Major Highways
 - Streets
 - Water Body
 - City-owned Satellite Water System
 - Adjacent Purveyors
 - Water Service Area
 - City of Olympia



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.

Figure 1.3 Adjacent Purveyors

The Director of Water Resources & Sustainability is responsible for all water utility administration, engineering, operation, and maintenance. The Director of Water Resources & Sustainability reports directly to the City Council. The Public Works Committee, a subset of the full council, oversees detailed issues relating to the water system.

Operations and maintenance of the water system is supervised by the Operations Manager. While oversight of administration, engineering, operations, and programs is maintained by the Director of Water Resources & Sustainability, general program supervision is conducted by the Water Resources Program Manager.

A copy of the City’s current Water Facilities Inventory Form is provided as Appendix E.

1.4.1 Contact Information

Primary Contact:	Steven Craig	Dan Smith
Job Title:	Operations Manager	Director, Water Resources & Sustainability
Primary Contact Phone:	(360) 754-4150 x151	360-754-4140 x149
Water System Mailing Address:	555 Israel Rd SW Tumwater, WA 98501	(same address)

1.5 System Background

The first water system in the Tumwater area was built by the Olympia Brewing Company in 1885. In 1927, the City purchased that and another system from a small private water company and developed McAleer Springs as a source of supply. When the springs exhibited contamination, the Palermo Valley wellfield was developed as the primary source of supply.

The City grew dramatically following World War II when the war economy expanded state services and jobs. At the same time, the Olympia Brewery was expanded and Fort Lewis was developed. During the 1970s, County population increased 4.9 percent annually. By 1980, the City had a population of 6,700.

The City was historically served at a hydraulic grade of 326 feet by the two C Street Reservoirs. As development occurred at higher elevations in the Mottman area and on Somerset Hill, the 454 Zone (Zone 2), serving Mottman, and the 549 Zone (Zone 4), serving Somerset Hill, were created.

The 1992 Water System Plan identified a need for additional storage and a higher gradient within the 326 Zone to enable use of the Airport Reservoir. As a result, the 4.0-mg 350 Zone Reservoir was constructed in 1995.

The City’s population continued to expand rapidly during the 1980s, 1990s, and 2000s. Years 2006 and 2007 were unprecedented development years, with the addition of between 200 and 300 new accounts annually, reflecting an average of 3 percent to 5 percent of utility growth each year.

An agreement with Lakeland Manor, approved in 2008, authorized the City to acquire the water rights, infrastructure, and assume management, of the Lakeland Manor Water System. Soon after, the City also acquired the Lathrop Industrial Park Water System from the Thurston PUD.

1.5.1 Water System Updates since the 2010 Water System Plan

This Plan is an evaluation of the water system as it existed in January 2018. Note that upgrades were continuously made to the system throughout the development of this Plan. The most notable is the connection of the Lathrop satellite system to the main water system in 2019.

1.5.1.1 Supply

Disinfection

In fulfillment of the City's Bilateral Compliance Agreement (BCA) with DOH, the City has installed sodium hypochlorite chemical feed systems at each system entry point including the Palermo Water Treatment Plant (WTP), Bush WTP, and Airport Wells 9,10,11, and 15. Booster chlorination feed equipment was also installed at the C Street and Zone 4 Booster Pump Station (BPS) site.

Palermo Wellfield

At the Palermo Wellfield, the City commissioned wells 16 and 17 to replace wells 2 and 5. This project increased the supply capacity of the Palermo Wellfield by approximately 500 gallons per minute (gpm). Additionally, an automatic emergency generator was installed that can support the full capacity of the Palermo Wellfield.

Bush Wellfield

The City increased the treatment capacity of the Bush WTP from 2,000 gpm to 3,000 gpm by adding a clearwell overflow.

Brewery Wellfield

In August 2016 the cities of Tumwater, Olympia, and Lacey completed the Brewery Wellfield Incremental Development and Strategic Plan that describes how the cities will develop the Brewery Wellfield for municipal use. The City of Tumwater will be the primary responsible party for development of the initial water increment of 2,615 gpm, constructing, owning and operating the wellfield production and treatment infrastructure. The Cities of Lacey and Olympia will be responsible for initiating the 2nd and 3rd production and treatment increments at a later date (potentially 20-30 years). A formal agreement acknowledging this is in progress as of April 2020.

Southwest Wellfield

The City acquired property for the Southwest Wellfield and has received source approval from the County. In 2018, development of a Mitigation Feasibility Study for the Department of Ecology was underway.

1.5.1.2 Booster Pumping

The City upgraded the C Street and Zone 4 BPS with full-capacity automatic emergency generators.

1.5.1.3 Distribution System

The City's distribution pipe network was reconfigured to bring the Mottman Industrial Park into the 350 Zone.

1.5.1.4 Telemetry System

The City has been replacing its MOSCAD remote terminal units (RTUs) with Alan Bradley systems on an ongoing basis.

1.5.1.5 Satellite Systems

The City installed an intertie and pressure reducing valve (PRV) between Lakeland Manor and the City’s main water system for emergency purposes only, at this time. However, Lakeland Manor continues to be operated independently from the main water system. Additionally, the City acquired the Lathrop Industrial Park Water System from Thurston PUD in 2009.

1.6 Inventory of Existing Facilities

Existing water system facilities that serve this area include twelve active groundwater wells, three active and two inactive reservoirs in three pressure zones, three BPS, and a pipeline distribution network with four PRV stations. Well 24 was taken offline in 2019 and is now inactivated. Figure 1.4 displays the approximate locations of these key water system facilities. A hydraulic profile of the existing system is shown in Figure 1.5.

Both the 200,000 gallon Airport Reservoir, serving the 350 Zone, and the 80,000 gallon Mottman A Tank, serving the 454 Zone, are currently inactive. These reservoirs are in useable condition; however, unlike the City’s other reservoirs, they have not been retrofitted with mixing improvements and are therefore on standby.

The City has two primary BPS, which transfer water from one pressure zone to another, and one that boosts pressure for residential use in the vicinity of Bush Mountain in the 454 Zone. The Bush Mountain BPS is equipped with a bypass check valve to supply fire flows to Bush Mountain.

1.6.1 Pressure Zones

The system is currently divided into three pressure zones: 350 Zone, 454 Zone, and 549 Zone. Pressure zone configurations are summarized in Table 1.1.

Table 1.1 Pressure Zones

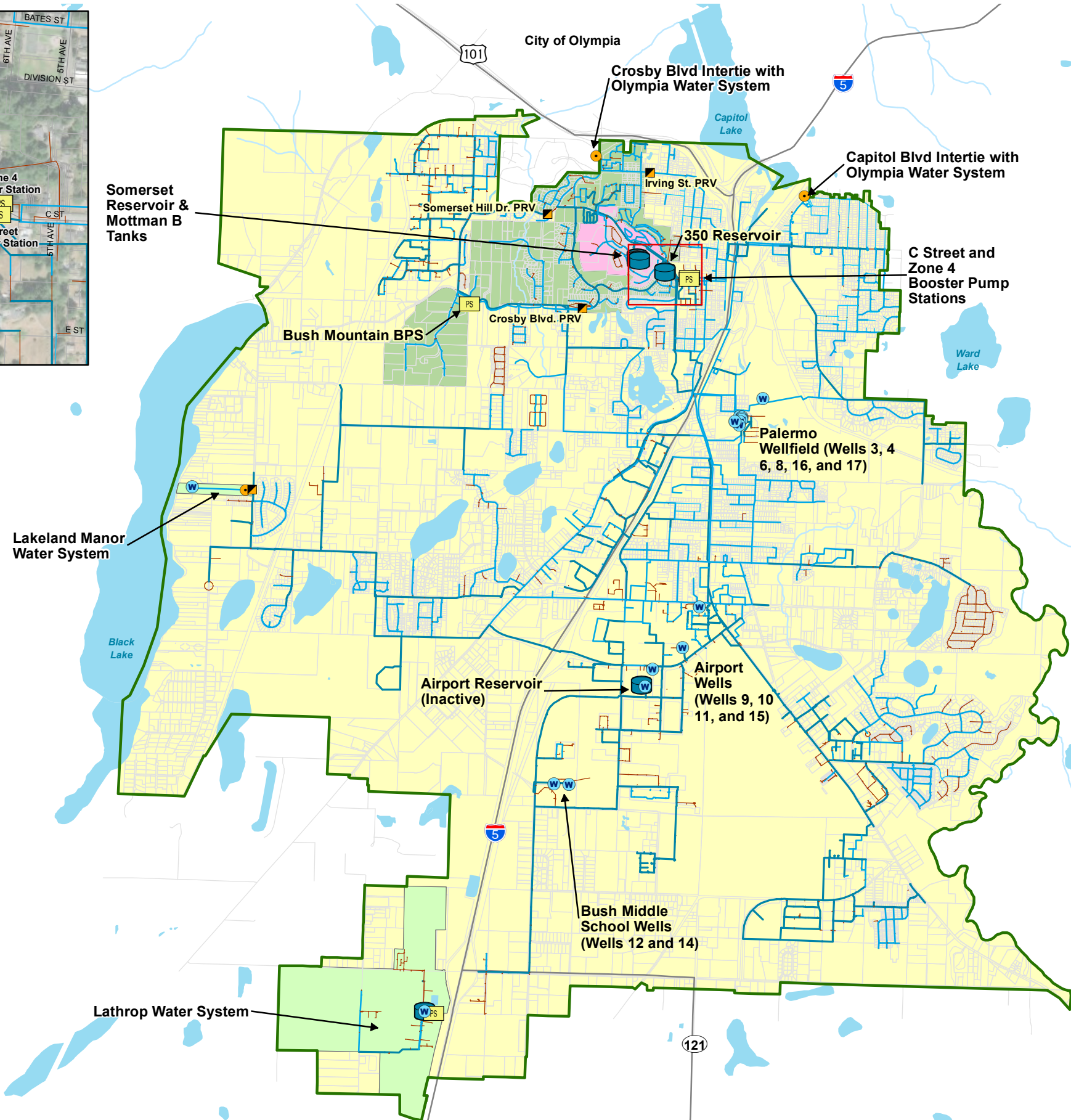
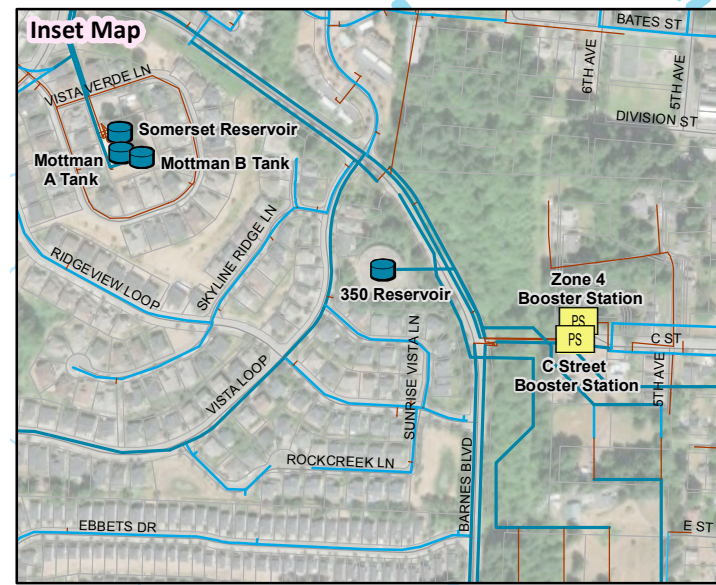
Pressure Zone	HGL	Maximum Elevation Served (feet)	Minimum Elevation Served (feet)	Minimum Static Service Pressure (psi)	Maximum Static Service Pressure (psi)
350 Zone (Zone 1)	350	262	20	38	143
454 Zone (Zone 2)	454	364	146	39	134
549 Zone (Zone 4)	549	420	355	56	84

Note:
Abbreviations: HGL - Hydraulic grade line; psi - pounds per square inch.

1.6.2 Wells

Groundwater wells, which are all located in the 350 Zone, supply the entire service area. Six wells (wells 3, 4, 6, 8, 16, and 17) are located in the Palermo Wellfield, in the east-central area of the 350 Zone. Well 3 currently is not in use due to interference with other Palermo wells. The casing for a seventh well, Well 1, is currently in place and can be used for monitoring; however, the well is inactive due to a regular and excessive intake of sand.

In 2012 and 2014, the City replaced wells 2 and 5 with new wells 16 and 17 to increase the yields from the Palermo Wellfield. All Palermo wells are located close together and cannot be pumped simultaneously, due to inefficiencies that have developed over the years. The maximum output from all of the pumps together is approximately 1,500 gpm.



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

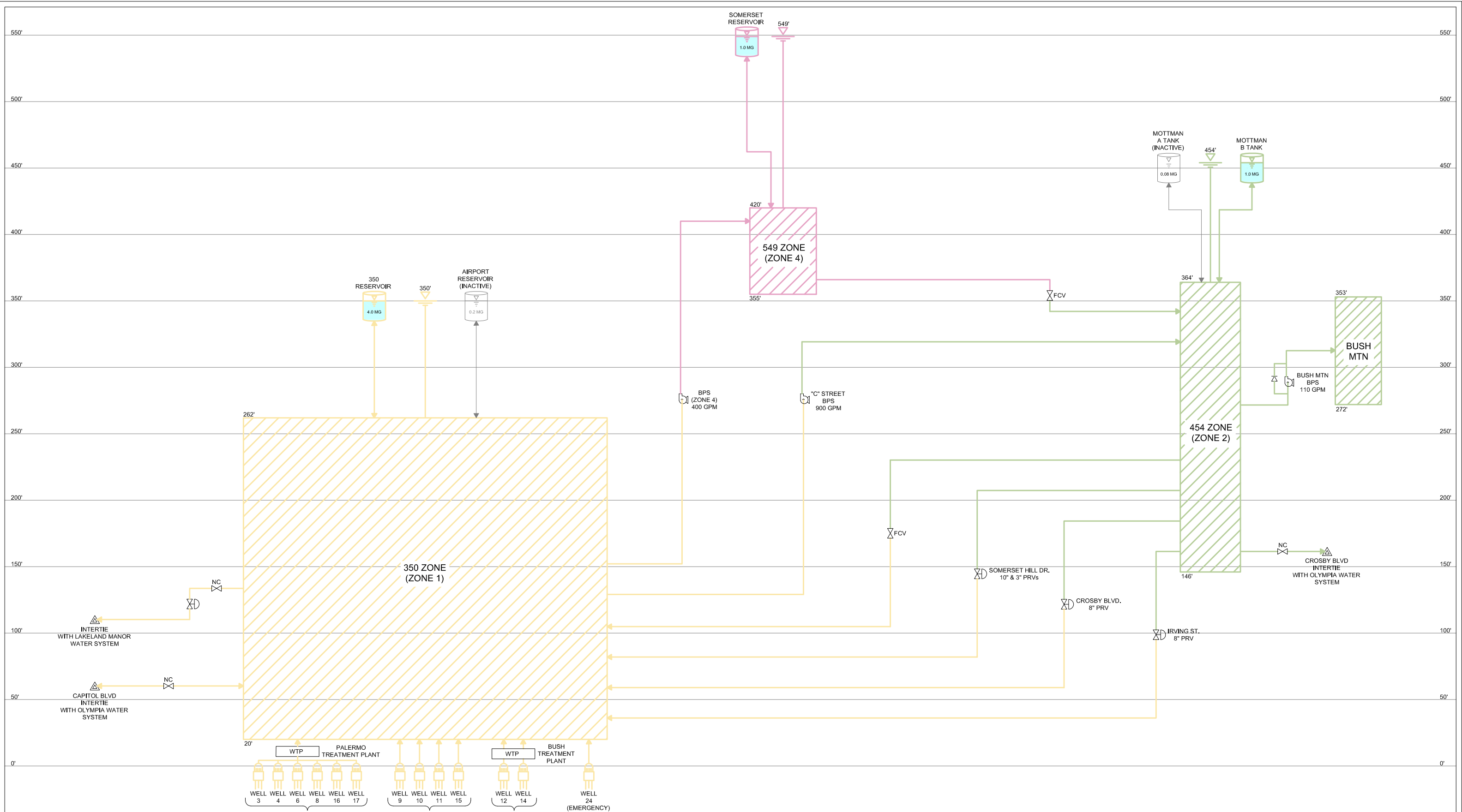
- 350 Zone (Zone 1)
- 454 Zone (Zone 2)
- 549 Zone (Zone 4)

0 0.5 1 Miles

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

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Figure 1.4 Water System Facilities and Pressure Zones



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

Figure 1.5
Hydraulic Profile
City of Tumwater Water System Plan



The City's Airport wells (wells 9, 10, 11, and 15) are located in the south-central area of the central plain. Wells 9 and 10 were constructed by the Port of Olympia to serve the airport area before it was annexed to the City. Well 9 has an active connection to supply the 350 Zone, as well as an elevated reservoir that was constructed concurrently with the wells with an overflow elevation of 350 feet; however, the reservoir is currently not in service. Well 15, which is also located on the Port of Olympia property, northeast of Wells 9 and 10, was constructed by the City in 1991. Well 11, constructed in 1993, is located in a green space adjacent to Israel Road Southwest. The well pump assembly is located in a pre-cast below-grade vault. A second vault that houses the flow-meter, control valve, and pump-to-waste system is located adjacent to the well vault.

Wells 12 and 14, constructed in the late 1990s, are located near George Washington Bush Middle School. The wellfield was developed to achieve a total capacity of approximately 3,000 gpm; Well 14 production capacity is currently approximately 2,300 gpm and Well 12 is approximately 700 gpm.

In addition to the twelve sources described above, the City also placed into service, in 2010, a rehabilitated former Olympia Brewery well (Well 24), which provided 500 gpm during emergencies. In August 2019, Well 24 was taken offline and disconnected from the water system.

Information for all of the City's existing wells are summarized in Table 1.2.

Table 1.2 Existing Well Capacities

Well No.	Rated Pumping Capacity (gpm)	Current Pumping Capacity (gpm)	Wellfield Limitations	Standby Power
Palermo Wellfield				
3	260	284		
4	350	373		
6	350	364	1,520	Automatic Generator
8	480	254		
16	400	355		
17	350	284		
Airport Wells				
9	330	371	N/A	None
10	440	118		
11	310	240		
15	450	811		
Bush Wellfield				
12	675	665	N/A	Automatic Generator
14	2,350	2,273		
Emergency Wells				
24 ⁽¹⁾	N/A	N/A	N/A	None

Note:

(1) In August of 2019, Well 24 was taken offline and disconnected from the water system.

The City currently operates two separate WTPs – one for the six active wells that constitute the Palermo Wellfield and another for the two wells near Bush Middle School. Each WTP consists of packed tower aeration, below-grade clearwell storage, and high-service pumping. The Palermo WTP, which includes two identical packed towers each designed for 1,000 gpm capacity, was originally constructed as part of a groundwater remediation project to remove trichloroethylene and perchloroethylene from the aquifer. The packed tower process also strips out naturally-occurring carbon dioxide (CO₂), which helps to boost the pH to achieve compliance with the Lead and Copper Rule. The Bush WTP consists of a single packed tower designed to provide air stripping of CO₂ for pH adjustment. The capacity of the Bush WTP is 3,000 gpm. Disinfection is provided for all production sources by a sodium hypochlorite feed system.

1.6.3 Booster Pump Stations

The City owns and maintains three booster pump stations. They are listed in Table 1.3. The C Street and Zone 4 BPS are located at the same site and are equipped with chlorine booster feed systems. The C Street BPS pumps water from the 350 Reservoir to the Mottman B Tank (454 Zone). The C Street Booster Station houses three interchangeable pumps, each with a 450 gpm capacity. The station is controlled by the level in the Mottman B Tank. The Zone 4 BPS pumps water from the 350 Reservoir up to the Somerset Reservoir (549 Zone). Zone 4 BPS houses two interchangeable pumps, each with a capacity rating of 300 gpm at 250 feet of head or 400 gpm at 225 feet of head. The BPS is controlled by the level in the Somerset Reservoir and pumps into an elevated inlet in the reservoir. The Bush Mountain Booster Station pumps from the 454 Zone to the Bush Mountain area, alleviating low pressure in this area due to high ground elevations.

Table 1.3 Booster Pump Stations

Booster Pump Station	Zone Pumping From	Zone Pumping To	Pump Number	Pump Capacity	Standby Power
C Street	350	454	1	450	Onsite Generator
			2	450	
			3	450	
Zone 4	350	549	1	400	Onsite Generator
			2	400	
Bush Mountain	454	454	1	110	None

1.6.4 Pressure Reducing Valve Stations

The City's system currently has three pressure reducing stations as shown in Table 1.4. The station located on Irving Street, east of 12th Avenue Southwest, allows water to flow from the 454 Zone to the 350 Zone. The setpoint (discharge) pressure of this PRV is set to maintain a downstream hydraulic grade of 310 feet in the 350 Zone. This setpoint results in the pressure reducing station functioning when the levels in the 350 Zone Reservoir fall below 310 feet, or the hydraulic elevation of the 350 Zone falls below 310 feet in the area of the pressure reducing station (e.g., from a fire being extinguished in the area). Therefore, the primary purpose of this PRV is to: 1) maintain pressures in the 350 Zone during high demand periods; and 2) increase pressure and flow in the 350 Zone, which would be required during an emergency such as a fire or water distribution pipeline failure.

The remaining two PRV stations allow water to flow from the 454 Zone to the Mottman industrial area; there are 10-inch and 3-inch PRV's located on Somerset Hill Drive and an 8-inch PRV located on Crosby Boulevard. These stations provide water to the lower ground elevations in the Mottman Industrial area, reducing system pressures below 100 psi.

Table 1.4 PRV Stations

PRV Station	Supplying Zone	Receiving Pumping	Valve Size
Irving Street	454	350	8
Crosby Boulevard	454	350	8
Somerset Hill Drive	454	350	10 3

Note:

Lakeland Manor Water System, a City-owned Satellite Water System, owns and operates one PRV Station

1.6.5 Storage Facilities

The water system contains five reservoirs, with a total capacity of 6.28 million gallons (MG) as shown in Figure 1.4. All reservoirs have flow control valves that allow for the transfer of water from a higher elevation zone to lower zones. The flow control valves are operated remotely through the telemetry system.

The City previously had a Zone 3 pressure zone that served the airport facilities. The Airport Reservoir served this zone. When Zone 1 and Zone 3 were consolidated, Zone 1 became the 350 Zone. Both the 350 Reservoir and the Airport Reservoir are hydraulically compatible with the 350 Zone. However, because it lacks mixing equipment, the Airport Reservoir is currently inactive.

The 454 Zone has two independent reservoirs, referred to as the Mottman Tanks, at the Tumwater Hill area site with capacities of 0.08 and 1.0 MG. These reservoirs can be operated as a single 1.08-MG storage facility or independently so that either tank can be taken out of service. Currently, the 0.08 MG reservoir, the Mottman A Tank, is functional but inactive and may be reinstated intermittently during system maintenance or other emergency use as needed.

The 549 Zone has a single 1.0-MG reservoir, referred to as the Somerset Reservoir. This reservoir contains emergency storage for not only the 549 Zone by also the 454 and 350 zones. Transfers from the 549 Zone to the lower zones occur through flow control valves that are remotely operated through the City's telemetry system.

Table 1.5 Storage Facilities

Storage Facility	Zone Served	Capacity (MG)	Diameter (feet)	Height (feet)	Year Constructed	Active
350 Reservoir	350	4.0	154	30	1996	Yes
Airport Reservoir	350	0.2			1972	No
Mottman A Tank	454	0.08	20	35		No
Mottman B Tank	454	1.0	70	33	1985	Yes
Somerset Reservoir	549	1.0	36	128	1991	Yes

1.6.6 Interties

The City maintains two standby interties with the City of Olympia, which are located to the north and northeast of the City's water system, as summarized in Table 1.6. The locations of the interties are shown on Figure 1.4. Both interties must be manually operated by Olympia or the City. The intertie at SR 101/Crosby benefits Olympia more than the City because of the difference in the two adjacent pressure zones. Olympia's pressure zone is at a substantially lower elevation than the City's 454 Zone. Therefore, water will not flow into the City of Tumwater system unless pressures in the City's system are extremely low or the intertie facility is supplied with a booster pump. The other intertie, located near Capital Boulevard, benefits both the City and Olympia. The adjacent pressure zones are almost hydraulically equivalent. A portable booster pump can be installed and used to pump water from either system through the intertie. The specific requirements for use of these interties are outlined in the 2001 Mutual Aid Agreement, between the Cities of Tumwater and Olympia, for the Use of Emergency Water System Interties. A copy of this agreement is found in Appendix D.

Table 1.6 Standby Interties

Intertie	With	Source No.	PZ served	Available flow (gpm)	Notes
Capitol Blvd	Olympia	S24	350 Zone	--	Indirect connection requiring the installation of a temporary pump between two stand pipes to move water between systems.
Crosby Blvd	Olympia	S25	454 Zone	0	Primarily allows flow to Olympia because Olympia pressure zone is lower.

1.6.7 Distribution Piping

The City's distribution system includes more than 150 miles of pipe. The oldest pipes in the system were constructed in the 1940s. Of the pipes whose material is known, most are polyvinyl chloride (PVC). The City also has asbestos cement, cast iron, and ductile iron pipes as seen in Table 1.7.

Table 1.7 Pipe Length and Percentage by Size

Diameter	Material						Total Linear Feet	Percentages (%)
	Unknown	Ductile Iron	Cast Iron	PVC	Asbestos Cement	Galvanized		
0	490,194		400				490,595	90%
2	140			525		1,937	2,601	0%
2.5				515			515	0%
3			2,857	168			3,025	1%
4	516		10,178	1	1,138		11,833	2%
6	747	1,230	4,972	6,196	4,060		17,205	3%
8	3,740	1,554	3	4,549	2,378		12,225	2%
10	138	2,660		1,007	783		4,588	1%
12	2,468	3		659	304		3,433	1%
Total Linear Feet	497,944	5,446	18,410	13,620	8,664	1,937	546,021	100%
Percentage	91%	1%	3%	2%	2%	0%	100%	

It is recommended that the City work to update GIS data relative to pipe size, material, and installation data due to the large percentage of unknown pipe materials and installation dates.

1.6.8 Emergency Generators

Emergency generators are provided at several locations within the system. The full capacity of the Palermo Wellfield can be supplied by the Palermo emergency generator that has an automatic transfer switch. The Bush wells also have an emergency generator with an automatic transfer switch. The C Street and Zone 4 BPS site also has an onsite emergency generator with an automatic transfer switch. The 454/549 reservoir site has a generator for the telemetry system only.

1.6.9 Telemetry

The water system is monitored with a radio-based telemetry system. The telemetry system provides control, monitoring, and alarms for the reservoirs, pump stations, wells, and treatment facilities.

1.7 Satellite Systems

As described above, the City owns and operates two satellite systems. The Lakeland Manor Water System has an intertie with the City's 350 Zone but is operated independently. The Lathrop satellite system was connected to the main water system in 2019, but the Lathrop system was still considered to be a satellite system during development of this Plan. Maps and descriptions of the City's satellite systems can be found in Appendix F.

