Water System Plan

City of Dayton

April 2015

Engineering
Surveying
Natural Resources

anderson perry & associates, inc.

Walla Walla, WA La Grande, OR

WATER SYSTEM PLAN

CITY OF DAYTON

APRIL 2015

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Job No. 918-120

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Note: Hydraulic modeling documentation and construction standards are located in separate documents.

Chapter 1 - Introduction

Ownership and Management

The City of Dayton owns and operates the municipal water system (Washington State Department of Health (DOH) identification number 182503) that serves the City of Dayton.

The City is governed by the Mayor and City Council. The Mayor is the Chief Executive Officer whose responsibilities include implementing the Council's legislative directives, presiding over the Council's regular and special meetings, and appointing various City officials. The Council is the City's legislative body which passes all ordinances and resolutions.

System History and Background

The City of Dayton is the County seat for Columbia County. The City is located in southeastern Washington State in the Touchet River Valley at the confluence of the Touchet River and Patit Creek. The City is bisected by the Touchet River north to south and by U.S. Route 12 east to west (see Figure 1-1). Blue Mountain Railroad provides freight service to the City. The commercial and industrial districts are located primarily in the City's central and western portions and along the railway, while residential areas are concentrated in the north and south. Agricultural land is located around the City's periphery and in the Urban Growth Area (UGA), also known as the Urban Growth Boundary (UGB). The valley floor slopes gently to the northwest along the course of the Touchet River with elevations ranging from 1,550 to 1,650 feet. The hillsides surrounding the City are moderate to steep with maximum elevations exceeding 2,085 feet.

Although the original plat of the City of Dayton was registered in 1871, the original water distribution system was not installed until 1891. The major events in the development of the City's water system are summarized in Table 1-1.

TABLE 1-1

Water System History

Date	Event
1891	The original water system was constructed consisting of wooden pipes and a 65,000-gallon brick and masonry reservoir.
1905	A shallow well was constructed at the Water Treatment Plant site and became the system's main water source.
1906	A 350,000-gallon, 8 feet deep, rectangular concrete reservoir was constructed.
1925	A concrete diversion dam was constructed on the Touchet River above the site of the newly constructed Water Treatment Plant.
1936	Well No. 1 was developed at 4th and Tremont Streets.
1939	A 1.15-million gallon (MG) reinforced concrete reservoir was constructed on Syndicate Hill. The reservoir was 210 feet in diameter, 15 feet deep, and had no roof.
1952	The pump and motor at Well No. 1 were replaced.
1960	Master water meters were installed both at the well and in the supply line south of the City limits. Booster Pump No. 1, with a capacity of 1,500 gallons per minute (gpm), was installed in the transmission line at the meter house south of the City limits to increase the existing line's capacity.

TABLE 1-1 (cont.)

Water System History

Date	Event
1961	Booster Pump No. 2, also with a 1,500-gpm capacity, was installed in the transmission line approximately 3,000 feet north of the Water Treatment Plant.
1964	The 1925 diversion dam was destroyed during the December 1964 flood.
1965	A second diversion dam was constructed.
1968	Well No. 1 was deepened to approximately 1,300 feet.
1969	Three shallow wells with low head pumps were installed in the river gravel on the river's south side near the second diversion dam. The capacity of these wells provided an inadequate water supply to the Water Treatment Plant. To supplement the shallow wells, a concrete intake box was installed in the river's west bank approximately 1,800 feet upstream of the Water Treatment Plant using a combination of 12-inch corrugated metal pipe and asbestos-cement (AC) pipe. The original sand in the Water Treatment Plant filters was replaced with graded anthracite coal. Booster Pump No. 3, with a 1,500-gpm capacity, was installed approximately 1,000 feet below the Water Treatment Plant, and Booster Pump No. 1 was discontinued.
1978	A 2.0-MG enclosed steel reservoir and a 220,000-gallon enclosed steel standpipe were constructed. The City's other reservoirs were demolished.
1981-1982	Two deep wells (Wells No. 2 and 3) were drilled. A telemetry system controlling the two new wells was installed, and a standby generator was provided. The wells are controlled based on the water level in the 2.0-MG reservoir. The existing Water Treatment Plant and Booster Pumps No. 2 and 3 were mothballed. A portion of the transmission main between the Water Treatment Plant and the City remains in service.
1991	The 12-Inch Main Street Replacement and Westside/Port 8-Inch Water Main Loop projects were completed.
1993	The water rights for Wells No. 1, 2, and 3 were consolidated into one Certificate, 31-D.
1997	Chlorine disinfection systems were installed at Wells No. 2 and 3.
2002	The Front Street water line was replaced and an altitude valve for the 220,000-gallon reservoir was installed.
2003	The *Water System Plan Supplement and Prioritization Report* was compiled. The Phase I Water System Improvements project was completed. This project included installing a new telemetry system and a new submersible pump and motor for Well No. 1, constructing a new pump station building for Well No. 1, and recoating the 2.0-MG reservoir and 220,000-gallon standpipe. The City relinquished the Touchet River Adjudicated Surface Water Right Certificate No. 10 to the State of Washington.
2004	The Phase 2 Water System Improvements project was completed. This project included replacing approximately 6 miles of old, undersized, and leaking water mains and over 200 valves, and constructing another water main crossing over the Touchet River at the pedestrian bridge. As identified in the *Water System Plan Supplement and Prioritization Report*, all 18 Priority-1 projects, five of the six Priority-2 projects, and seven and a half of the 13 Priority-3 projects were completed with the Phase 2 Water System Improvements.
2008	A moratorium was declared on new connections outside the City's UGA.
2009	Installed flowmeter and backflow preventer at the south end of South 4th Street for the water main serving users off North Touchet Road.
2012	Replaced pump motor for Well No. 1.
2013	Replaced pump motor for Well No. 2. Installed motor protection relay equipment at Wells No. 2 and 3.

Geography

Dayton lies in the Touchet River Valley at the confluence of the Touchet River and Patit Creek. The dominating geological feature of Dayton's service area is the Columbia River Basalt, which is composed of many layers of underformed solidified lava underlying the valley floor.

The major soils associations in the study area are the Patit Creek Hermiston Onyx Association and the Athena-Palouse Association. The Patit Creek-Hermiston-Onyx Association is characterized by nearly level, well-drained, medium textured soils that formed in alluvium. Some of these soils are gravelly or basalt. The gravelly portion of the Patit Creek soils has high permeability (6.3 to 20.0 inches/hour). The Athena-Palouse Association is predominately to moderately steep, with well-drained, medium textured soils that formed in wind laid silts. For both these soil associations, the shrink-swell potential is low to moderate and the corrosion potential is low.

The topography of the Dayton service area affects the existing water system and largely impacts the location of future development. The valley floor is relatively flat with elevations ranging from 1,550 to 1,650 feet while the hillsides are moderate to steep with maximum elevations exceeding 2,085 feet.

The elevation difference between the storage reservoirs (base elevations from 1,745 to 1,750 feet) and the current service area present the major topographical impact on future developments. Sites above 1,680 feet in elevation are in areas with static pressures less than 30 pounds per square inch (psi). Areas below about 1,560 feet elevation have static water pressures in excess of 80 psi.

Neighboring/Adjacent Purveyors

No other water purveyors are adjacent to the City of Dayton. The closest purveyor is the City of Waitsburg, which is approximately 10 miles away.

Ordinances/Bylaws

New water facilities must be in accordance with adopted City standards that reflect American Water Works Association (AWWA), DOH, and other accepted standards. All new developments must provide facilities capable of delivering fire flows, domestic, and/or industrial water demand as required and approved by the City. A copy of the Dayton Municipal Code that applies to the water system is provided in Appendix A.

Inventory of Existing Facilities

Dayton derives its potable water supply from groundwater sources. The current potable water system consists of three wells, a trailer-mounted standby generator, two storage reservoirs (2.0 MG and 220,000 gallons), a telemetry (control) system, and approximately 24 miles of water distribution lines. The City currently has one primary pressure zone, although a small portion of the City near the 2.0-MG reservoir and an area south of the City limits are served by individual booster pumps. Figures 1-2 and 1-3 show the City's current water system facilities.

Sources

Prior to 1982, the City's two water sources were: (1) Diverted and treated water from the North Fork of the Touchet River and (2) pumped water from Well No. 1. Due to the condition and age of the water diversion, treatment and transmission main, and insufficient surface water rights on the Touchet River, the City developed and placed into service two deep wells (Wells No. 2 and 3), switching its source of supply from surface water to groundwater.

Well No. 1 (Source 03, 32G015) located at 201 Tremont Street, has a pump capacity of 700 gpm. This well was constructed in 1936 and re-drilled in 1968. In 2004, a new submersible pump was installed and a new pump station building was constructed. The submersible pump motor was replaced in 2012.

Well No. 2 (Source 01, 32G013) drilled in the summer of 1981, is located at 1540 South 2nd Street, and Well No. 3 (Source 02, 32G014), drilled in the autumn of 1981, is located at 410 West Commercial Street. Pumps at Wells No. 2 and 3 produce 1,100 gpm each. The pump from Well No. 2 was pulled in 1997, 1999, and again in 2012. The pump at Well No. 3 was rehabilitated in 2007. Wells No. 2 and 3 can be operated either manually or by the telemetry system and can be powered by a portable standby generator. Together, Wells No. 2 and 3 are capable of producing 2,200 gpm.

The operation of all three wells is controlled by a telemetry system and an altitude valve at the 220,000-gallon standpipe.

Water Rights

The City has primary water rights for 2,700 gpm instantaneous and 3,630 acre-feet annual for domestic water supply. A detailed discussion and evaluation of the City's water rights is contained in Chapter 4.

Emergency Backup Generator

The backup trailer-mounted generator is generally stored at Well No. 3 and is capable of running either Well No. 2 or 3. Currently no transfer switch is present at Well No. 1. The generator is manually operated and has a rated capacity of 450 horsepower (Hp).

Storage

The City of Dayton currently owns and operates two reservoirs: A 2.0-MG steel reservoir located east of the City limits near Tremont Street, and a 220,000-gallon steel standpipe located at the northern edge of the City along Front Street. The City's other reservoirs were demolished in 1978 following the construction of these facilities. The inside and outside surfaces of both reservoirs were recoated in 2003. Both reservoirs are located on the east side of the Touchet River.

Telemetry (Control) System

The existing telemetry (control) system, installed in 2003, consists of one master site located at the City's Public Works Shop and five remote sites: Wells No. 1, 2, and 3, the 2.0-MG reservoir, and the 220,000-gallon standpipe. The system utilizes Allen-Bradley PLC units for the telemetry units and RSView for the telemetry software. Telemetry communication is accomplished with spread spectrum radios.

The telemetry system allows City staff remote control of the well pumps and the ability to adjust the water levels for filling the reservoirs. The water level in either City reservoir can be used to control the well pumps operation. The telemetry system also provides information on the water system operation, including the status (i.e., on/off) and run times of each pump, flow rates, total flow from each well, room temperature, chlorination monitoring, and signal status.

Transmission and Distribution System

As of September 2014, the City of Dayton's water service area had 1,481 service connections, as shown on its Water Facilities Inventory (WFI) form included in Appendix A. This number includes residential (single family and multi-family) and commercial customers.

An overview of the City's water distribution system is presented in Figure 1-2. Dayton's water distribution system is a combination of pipe materials and sizes consisting of 2- to 12-inch diameter water mains with residential service lines consisting of 3/4- and 1-inch diameter pipe. The most prevalent pipe in the distribution system (40 percent) is 6-inch diameter pipe. Piping materials include cast iron, copper, steel, AC, ductile iron, polyvinyl chloride (PVC), and high density polyethylene (HDPE). Current materials of choice for replacement are PVC pipe for water mains and laterals and copper pipe for service lines. A summary and additional description of the City's distribution system is provided in Chapter 3.

The distribution system's existing condition depends greatly on the construction materials, level of workmanship at the time of construction, and age of the pipe since installation. In general, steel and cast iron pipe are considered the most susceptible to corrosion and leakage due to their type and age. In 2004, water system improvements replaced much of the undersized steel pipe with larger diameter PVC pipe. However, a significant amount of steel pipe, ranging from 2 to 12 inches in diameter, remains in service.

Water Disinfection

The City disinfects its water supply using a hypochlorite solution derived from calcium hypochloride tablets at each of the well pump houses. Chlorine dosage is flow-paced according to the pumps' flowmeters and averages 0.15 milligrams per liter (mg/L). The City monitors and records chlorine usage daily.

Interties

The City of Dayton has no interties with any other entity.

Water Facilities Inventory (WFI)

A copy of Dayton's WFI is included in Appendix A.

Related Plans and Reports

The following documents were consulted when preparing this *Water System Plan*.

- *Water and Wastewater Capital Facilities Charges Study for the City of Dayton, Washington*, Anderson Perry & Associates, Inc., 2007. The basis for the City's water and wastewater capital facilities charges (CFC) is described in this report.

- *City of Dayton, Washington Water System Plan*, Anderson Perry & Associates, Inc., 2007. This is the City's current *Water System Plan*.
- *City of Dayton, Washington Development Standards, Specifications, and Standard Plans*, Anderson Perry & Associates, Inc., 2008, revised in April 2012. The City's adopted water material specifications, construction requirements, and standard water system plans are described in this document.
- *Snake River Region Salmon Recovery and Walla Walla Watershed Detailed Implementation Plan,* HDR, Inc., 2006. In this plan, specific requirements for watershed and salmon recovery planning are addressed. The City's existing annual water demand and projected future annual demands (Years 2010 and 2025) are also presented.
- *Walla Walla Watershed Plan, Planning Unit Final*, HDR/EES, Dr. Michael Barber, Washington State University, and Steward & Associates, Inc., 2005. This plan provides basin wide plans and strategies for managing water resources within the Walla Walla drainage area.
- *Water System Plan Supplement and Prioritization Report*, Anderson Perry & Associates, Inc., 2003. Revised and additional capital improvements to the City's water system from the improvements originally identified in the 2001 *Water System Plan* are presented and discussed in this report.
- *Water System Plan*, Gray & Osborne, Inc., 2001. This plan includes information and historical data on the City's water system.
- *City of Dayton Comprehensive Land Use Plan*, Don Bingham Plus Associates, 2008, revised 2014, adopted with updates February 9, 2015. This plan fulfills the requirements of the Growth Management Act and provides the most recent information on growth, land use, and utilities.
- *Comprehensive Water System Plan*, JUB Engineering, 1992. Historical data on the City's water system components, water quality, and the City are included in this plan.
- *Water System Operation and Maintenance Manual*, Anderson Perry & Associates, Inc., 1982. Information on system components and operating and maintenance procedures are included in this manual.
- *Water System Study*, Anderson Perry & Associates, Inc., 1979. Historical information on the City's water system and the need for developing groundwater as the City's source of potable water are discussed in this study.

Service Area Characteristics

A utility's service area is comprised of existing, retail, future, and water rights place of use service areas (WRPOUSA). These service areas are discussed below and shown on Figures 1-4 through 1-8.

Existing Service Area (ESA)

The ESA is the area where the utility currently provides service. The City's ESA is defined by the UGB with the exceptions of service to the Trails West Mobile Home Park located west of town on U.S. Route 12 and service to approximately 25 homes located south of the current UGB (i.e., the Baileysburg area). These 25 homes are located along a 12-inch diameter transmission main previously used to transport water from the Water Treatment Plant to the City. A portion of this original transmission main is now used to provide water service to the customers originally connected to the water system when the treatment plant was in operation.

Retail Service Area (RSA)

The RSA is the area where the City has a duty to provide direct service under defined conditions. This area is currently the same as the ESA.

Future Service Area (FSA)

The FSA is the area in which a purveyor intends to provide direct water service in the future. The City's desired FSA includes the ESA, RSA, and portions of land shown in Figures 1-4 through 1-8.

The City of Dayton does not plan to expand the current service area. The City plans to maintain the current service area throughout the 20-year planning period.

Water Rights Place of Use Service Area (WRPOUSA)

The WRPOUSA is the area where the City is using or plans to exercise their water rights. The City's WRPOUSA includes all the property of the ESA, RSA, and FSA.

Zoning and Land Use

The City's existing land use designations are Low Density Residential, Urban Density Residential, Central Commercial, Fringe Commercial, Industrial, Open Space and Recreation, Public/Quasi-Public, and Agricultural. Residential areas are mostly located within the northern and southern sectors of the City, and Commercial areas are centered largely adjacent to Main Street. Industrial areas are located in the northeast and southwest sectors and in the UGB west of the current City limits. The Open Space and Recreation areas are located adjacent to the Touchet River levees. Public/Ouasi-Public areas are located primarily on the City's periphery, and the Agricultural land is primarily located on the south end of the City. A description of the land use designations and copies of figures showing the UGA (zoning) and existing land use from the 2008 *Comprehensive Land Use Plan* are presented in Appendix A.

Service Area Agreements

The City of Dayton does not have any service area agreements with any other entity.

Service Area Policies

The City's service area policies include service area requirements and conditions of service, duty to serve, and local government consistency.

Service Area Requirements and Conditions of Service

The City's service policy and requirements for water service are summarized in Table 1-2.

TABLE 1-2

Summary of City Water Service Policies and Requirements

<table>
<tr><th>Service Policy/Requirement</th><th>Reference</th></tr>
<tr><td colspan="2">Water Use and Metering</td></tr>
<tr><td>Applications for water service must be submitted and accepted by the City. Water is furnished for ordinary domestic, business, and community purposes and fire protection only. All services must be metered with a City-provided water meter.</td><td>Chapter 4-2, Municipal Code</td></tr>
<tr><td colspan="2">Cost of Water Service</td></tr>
<tr><td>Water service cost is established and periodically revised by the City Council to account for the proper operation, maintenance, and replacement of the City's water system. The current rate consists of a base rate for the first 800 cubic feet (cf) of water metered, and a unit rate for any cf metered above 800 cf. Current charges, adopted in November 2012, are as follows:
Base Rate:
Inside City Limits = $33.60
Outside City Limits = $46.40
Unit Rate:
<table>
<tr><th>Water Consumption (cf)</th><th>Inside City Limits ($ per cf)</th><th>Outside City Limits ($ per cf)</th></tr>
<tr><td>0 to 800</td><td>Included in Basic</td><td>Included in Basic</td></tr>
<tr><td>801 to 50,000</td><td>0.00772</td><td>0.00882</td></tr>
<tr><td>50,001 to 100,000</td><td>0.00849</td><td>0.00959</td></tr>
<tr><td>> 100,000</td><td>0.00882</td><td>0.00992</td></tr>
</table>
Surcharge for Outside Services:
The City imposes a surcharge on all water related charges to customers outside the City limits. This surcharge is imposed to offset the cost of City services and support provided to the water system that is funded by ad valorem (property) taxes.</td><td>Chapter 4-3, Municipal Code</td></tr>
<tr><td colspan="2">Water Meter Surcharge</td></tr>
<tr><td>The City imposes a water meter surcharge for all meters greater than 1-1/4 inches according to the following table:
<table>
<tr><th>Meter Size</th><th>Water Meter Surcharge</th></tr>
<tr><td>1-1/4-inch or less</td><td>$0.00</td></tr>
<tr><td>1-1/2-inch to 2-inch</td><td>$25.00</td></tr>
<tr><td>3-inch</td><td>$50.00</td></tr>
<tr><td>4-inch</td><td>$75.00</td></tr>
<tr><td>6-inch</td><td>$150.00</td></tr>
</table></td><td>Chapter 4-3, Municipal Code</td></tr>
</table>

TABLE 1-2 (cont.)

Summary of City Water Service Policies and Requirements

<table>
<tr><th>Service Policy/Requirement</th><th>Reference</th></tr>
<tr><td colspan="2">Service Application and Connection Fees</td></tr>
<tr><td>For new water services, if the City does the work, the City imposes fees for service application and connection to the City's water system. The service application fee of $50.00 is used to offset the City staff time and expenses for setting up a new account number and service.
The connection fee is used to offset the City's costs for installing the connection. This fee is based on the costs of the materials and labor required to provide service. The City's current connection fees for 3/4-inch service is $1,204.75. For services 1 inch in diameter and greater, the City may or may not make the connection depending upon City staff availability. The connection charges for these larger services are founded on a time and materials basis. If the City chooses not to make the connection or install the service water meters, the service connection needs to be completed by a licensed contractor and paid for by the service applicant. In this situation, only a City service application fee applies. Meters are supplied and installed by the City as part of the service connection.</td><td>Chapter 4-2, Municipal Code</td></tr>
<tr><td colspan="2">Capital Facilities Charges (CFC)</td></tr>
<tr><td>The CFCs for connecting to the City's water system are based on water meter size. CFCs for water connections both inside and outside City limits are the same.
<table>
<tr><th>Meter Size</th><th>CFC</th></tr>
<tr><td>3/4-inch and 1-inch</td><td>$1,250</td></tr>
<tr><td>1-1/2-inch</td><td>$4,125</td></tr>
<tr><td>2-inch</td><td>$6,625</td></tr>
<tr><td>3-inch</td><td>$12,500</td></tr>
<tr><td>4-inch</td><td>$20,875</td></tr>
<tr><td>6-inch</td><td>$41,615</td></tr>
<tr><td>8-inch</td><td>$66,625</td></tr>
<tr><td>10-inch</td><td>$95,875</td></tr>
</table>
</td><td>Chapter 4-2, Municipal Code</td></tr>
<tr><td colspan="2">Wholesaling Water</td></tr>
<tr><td>The City considers providing wholesale water supply to other utilities and entities on a temporary, case-by-case basis based on the merit of the request. The following conditions must be satisfied for the City to provide wholesale water.

Wholesale of water shall not directly or indirectly adversely affect the City's water system operation or conflict with the City's general policies, direction, standards, and/or interests.
The quantity of water removed from the City's system shall be metered and/or estimated with equipment and methods approved by the City prior to water distribution.
Water shall only be removed from the City's water distribution system at City pre-approved locations.
Reimbursement to the City shall be based on the full value of the water as determined by the City.

On a case-by-case basis, the City may consider requests for long-term wholesaling of water on their merits and subject to DOH approval. The City requires a formal agreement for providing wholesale water on a long-term basis.</td><td>City Policy</td></tr>
</table>

TABLE 1-2 (cont.)

Summary of City Water Service Policies and Requirements

Service Policy/Requirement	Reference
Water Wheeling	
Water wheeling is the practice of transferring water between two agencies/entities whereby one agency/entity uses its system infrastructure to treat and/or convey water that is owned by the receiving agency/entity. No wheeling requests have been made of the City. In general, water wheeling requests will be considered by the City on their merits and on a case-by-case basis.	City Policy
Annexation	
Annexation is not necessarily required for new water service outside the City limits. However, applicants must sign and complete the City's Utility Connection Annexation Covenant for new service outside the City limits (included in Appendix A).	City Policy
Direct Connection, Mandatory Connection, and Satellite/Remote System	
The City requires direct connection to its water system. The party requesting connection is responsible for connecting to the existing system, installing the water system to City standards, and ceding ownership of the constructed facilities to the City. The City does not currently have a mandatory connection policy. Satellite/Remote systems are not allowed.	Chapter 4-2, Municipal Code
Design and Performance Standards	
The City's adopted design and construction standards are required for water system construction.	Chapter 4-2, Municipal Code
Local Improvement Districts (LID) Formation Outside Legal Boundaries	
The City supports LID formation as one method of financing water system facility construction inside and outside legal boundaries. The City's cost associated with the forming and administrating any LID shall be included in the LID's total project cost.	City Policy
Latecomer Agreements	
The City works with requesting parties to develop latecomer agreements on proposals to extend the City's water system. These agreements are developed on a case-by-case basis.	City Policy
Oversizing	
All system improvements needed to accommodate new water infrastructure are at the requesting party's cost. The City may share these costs with the requesting party if the City desires oversized facilities.	City Policy
Cross-Connection Control (CCC) Program	
The City adopted and implemented a CCC Program and has a CCC Specialist on staff. All new service requests are reviewed for compliance with the program. CCC requirements are set as a condition of service.	Chapter 4-2, Municipal Code

TABLE 1-2 (cont.)

Summary of City Water Service Policies and Requirements

Service Policy/Requirement	Reference
Extensions of the Water System to New Services	
Extensions of the water system to new services are allowed provided the connection is in exchange for a necessary property right (i.e., a required easement, dedication of right-of-way, property transfer) or is advantageous to the City. The party requesting the extension is responsible for the cost. The City will provide new water service to customers above 1,675 feet mean sea level (MSL) elevation and below 1,560 feet MSL only if a new pressure zone is created. To create the pressure zone above 1,675 feet elevation, a City-owned booster pump station and isolation valves are required at a minimum. Installing a new reservoir tank may also be required. For the pressure zone below 1,560 feet MSL, pressure reducing valve(s) (PRV) installation is required within the new distribution system. The party requesting the service in these areas must pay for the separate pressure zone. • Service Within the UGA - Extensions outside City limits and within the UGA are allowed. • Service Outside the UGA - The City does not allow water service connections outside the UGA (see Resolution No. 1133 included in Appendix A). However, the City will continue to serve those customers currently connected. The City and County have no formal agreement or policy at this time.	City Policy/ Resolution No. 1133
Water Pressure Considerations	
Above 1,675 feet MSL and below 1,560 feet MSL elevations, the City will provide new water service only if a new pressure zone is created (see above, Extensions of the Water System to New Services). Above 1,675 feet MSL elevation, a City-owned booster pump station and isolation valves are required at a minimum. Below 1,605 feet MSL elevation, the City recommends the applicant provide and maintain an individual PRV in accordance with the provisions of the International Plumbing Code. The PRV should be installed between the water meter and the house connection and have appropriate isolation valves for easing PRV removal. The applicant or customer is responsible for the installation, maintenance, and repair/replacement of the PRV.	City Policy

Duty to Serve

According to the Municipal Water Law as codified in Revised Code of Washington (RCW) 43.20.260, a municipal supplier has a duty to serve new water service (including individual connections) with the identified retail service area if:

- The utility can provide water service in a timely and reasonable manner.
- The utility has sufficient water rights or uses water from a source with a water right.
- The utility has sufficient capacity to serve the water in a safe and reliable manner as determined by DOH.
- The service is consistent with the requirements of any comprehensive plans or development regulations adopted under Chapter 36.70A RCW or any other applicable adopted comprehensive plans, land use plans, or development regulations.

Table 1-3 shows a summary of the City's process and procedures utilized in responding to requests for new water service within the City's service area.

TABLE 1-3

Summary of City's Process and Procedures for New Water Requests

Request Element	Typical Timeframe
Process for Service Requests	
1. Contact City staff at City Hall to coordinate a pre-application conference to discuss the proposed project, project location, and the desired schedule. City staff will outline the process and fees, and explain which development requirements will likely be necessary.	Dependent Upon Applicant for Requesting the Conference and Both Parties for Establishing a Mutually Agreeable Meeting Time
2. Submit completed City application for water service connection (included in Appendix A) to City Superintendent of Water and Streets (i.e., Public Works Director) which includes the following information: • Property location by lot, block, addition, and street number • Purposes for water use (type of usage, permanent/temporary) • Number of service pipes required and number and types of buildings to be supplied • Location of City main to be tapped • Water service size • Development requirements as outlined by City staff at the pre-application conference and required in the City's *Development Standards, Specifications, and Standard Plans* (2008, revised April 2012) • Signature and agreement to abide by the water department rules and regulations and pay for water service connection and meter	Dependent Upon Applicant
2a. Submit $50.00 service application fee to City Clerk. 2b. Applicants for properties outside the City limits must also notarize and submit the City's Utility Connection Annexation Covenant (included in Appendix A).	Dependent Upon Applicant
3. The City Public Works Director reviews and approves or disapproves an application for service request with respect to the following: • Completeness of the application and Utility Connection Annexation Covenant (if applicable) • Proposed service, service location, and required connections to the existing system • Adequacy of the City's water system capacity to handle the new service • The need for public easements and rights-of-way • Review of the proposed project's plans and specifications	3 to 15 Days without, and 17 to 30 Days with, Plans and Specifications
3a. If a public easement is needed, the applicant will provide the City the easement/right-of way for the new water service connection as required by the City Public Works Director and/or City Attorney.	Dependent Upon Applicant
3b. For services 2 inches in diameter and greater that the City agrees to install, the applicant will provide the City with written approval authorizing the City to proceed with the connection and charge the applicant the cost of the connection based on a time and materials basis.	Dependent Upon Applicant
3c. If the application is not tentatively approved, the Public Works Director will notify the applicant verbally of his or her decision and the reasons for this decision.	Same as Under Paragraph 2

TABLE 1-3 (cont.)

Summary of City's Process and Procedures for New Water Requests

Request Element	Typical Timeframe
Process for Service Requests (cont.)	
4. If the City installs new service, a water connection fee will be assessed and must be paid in full prior to installing the connection. This connection fee includes all City charges (materials and labor) related to installing the water service connection. For all services not installed by the City, the City Public Works Director or his/her designated representative must inspect the water service connection and piping prior to placing the connection into service.	3 to 15 Days
Determination of Adequate System Capacity	
The City's Public Works Director will determine the adequacy of the City's water system to handle the new proposed service by evaluating the service location, type of demand (i.e., residential, commercial, industrial), and the proposed demand with the City's current and future water demand capacity. The City's system will have sufficient capacity and be capable of providing new water service if the proposed service is not anticipated to exceed the City's water system capacity in areas including the following: Non-fire flow (peak day and annual average demand), fire flow (peak and duration), storage capacity, adequate pressure under peak and emergency conditions, and treatment. The City's Public Works Director may consult with the City Engineer to confirm that the City has sufficient water system capacity to handle the proposed new water service and review the proposed project plans and specifications. The applicant will be responsible for reimbursing the City for the engineer services related to the new service application.	3 to 15 Days without, and 17 to 30 Days with, Plans and Specifications
Non-Technical Conditions Related to New Service Request	
1. The applicant agrees in writing to conform to and be governed by the rules and regulations of the water department and the provisions of Chapter 4-2 of the Municipal Code at all times and pay the costs of making the connection and supplying the water meter.	Dependent Upon Applicant
2. The applicant secures and provides the necessary easements and rights-of-way for new water service.	Dependent Upon Applicant
3. The applicant secures a permit from the City for water piping installed between the new water meter and the house connection. The permit for water piping inside the house must be obtained from Building Codes (Columbia County).	3 to 10 Days
Procedures for Granting/Requesting Time Extensions	
The City does not currently have time restrictions on the installation of new services once they have been granted.	N/A
Procedures for Handling Disputes and Appeals of Denied Water Service Request	
Disputes and appeals of denied water service requests are submitted in writing for consideration first by the Mayor. The Mayor reviews the appeal and consults with the Public Works Director and other City staff or consultants prior to issuing a written finding.	7 to 14 Days
If the applicant disputes the Mayor's findings, the applicant may appeal the matter, in writing, to the City Council. Timing of the City Council's consideration depends on the applicant's submission date of the written appeal in relation to the establishment of the Council agenda for one of its regularly scheduled meetings.	7 to 14 Days

Local Government Consistency

In addition to the duty to serve requirement, the Municipal Water Law also requires a Water System Plan to be consistent with local adopted plans, regulations, and policies (including coordinated Water System Plans). Local government consistency must be obtained before the plan is submitted to DOH. For this *Water System Plan*, Columbia County was contacted and requested to review the relevant water system planning information and provide a signed consistency statement to the City for submittal to DOH. Signed copies of the consistency statements from Columbia County and the City of Dayton are provided in Appendix B.

Satellite Management Agencies

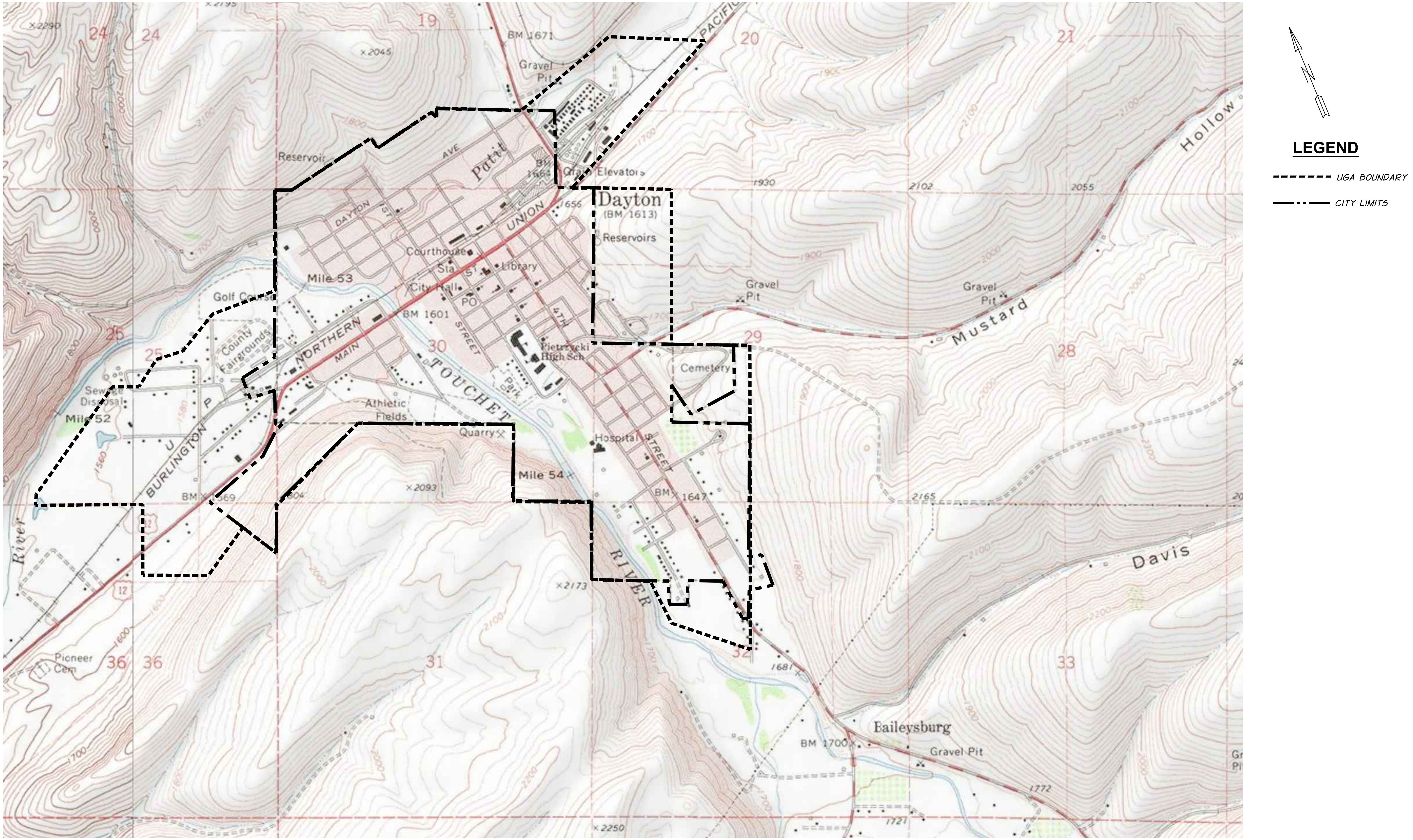
The City has no plans for becoming a Satellite Management Agency.

Complaints

The City documents individual complaints as they occur. The complaints are typically received by City Hall staff who then pass the information to the Public Works Department for investigation. Observations, findings, and actions taken during the investigation are documented and filed for future reference. This documentation is available for inspection by DOH staff. A copy of the most recent complaint report is included in Appendix A.

Correspondence

Relevant correspondence with the Washington State Department of Ecology (Ecology) and DOH is presented in Appendix B.



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CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN
VICINITY MAP

FIGURE
1-1

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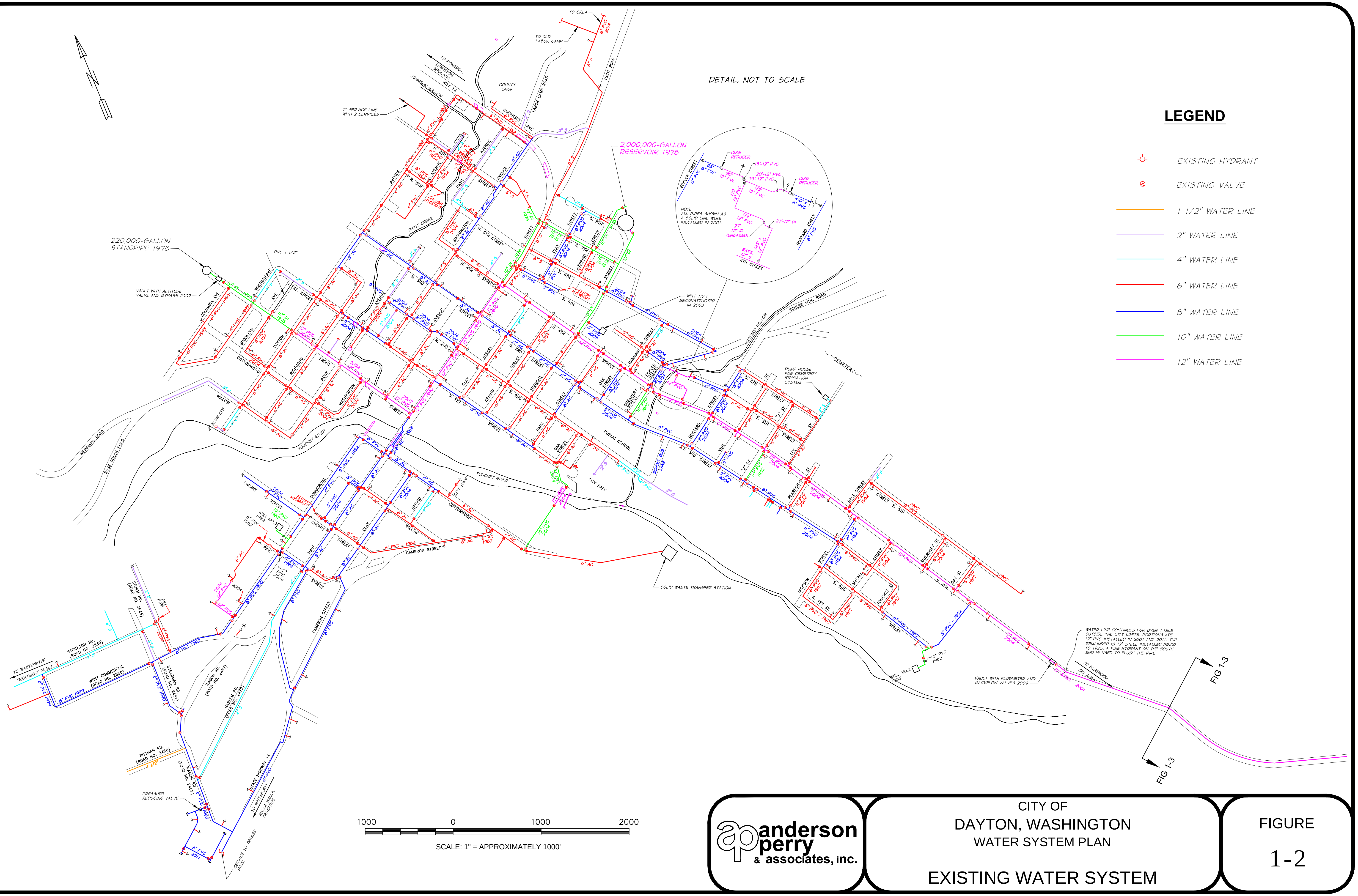

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CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN

EXISTING WATER SYSTEM

FIGURE
1-2

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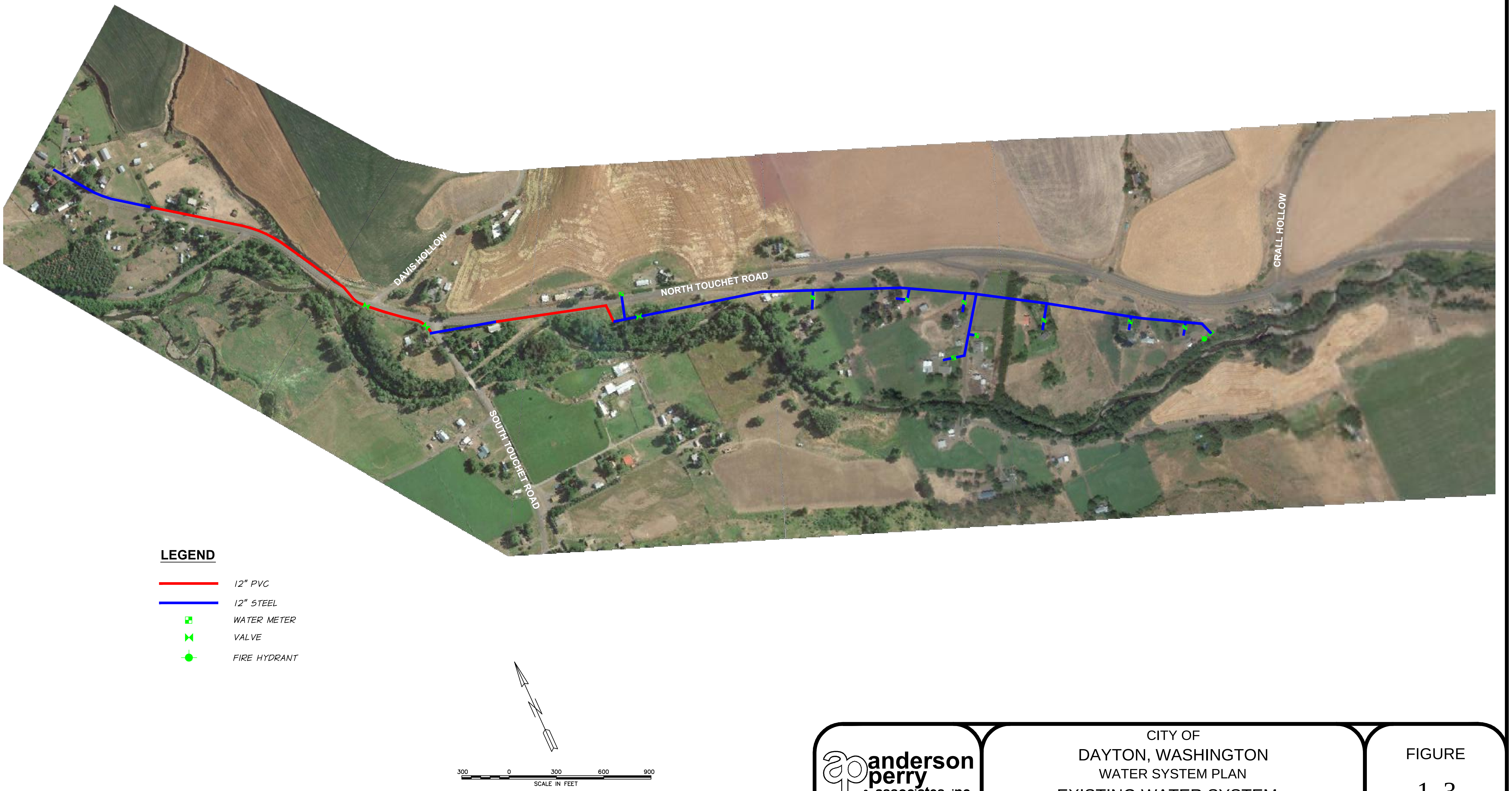

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CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN

EXISTING WATER SYSTEM - AREA SOUTH OF CITY LIMITS

FIGURE
1-3

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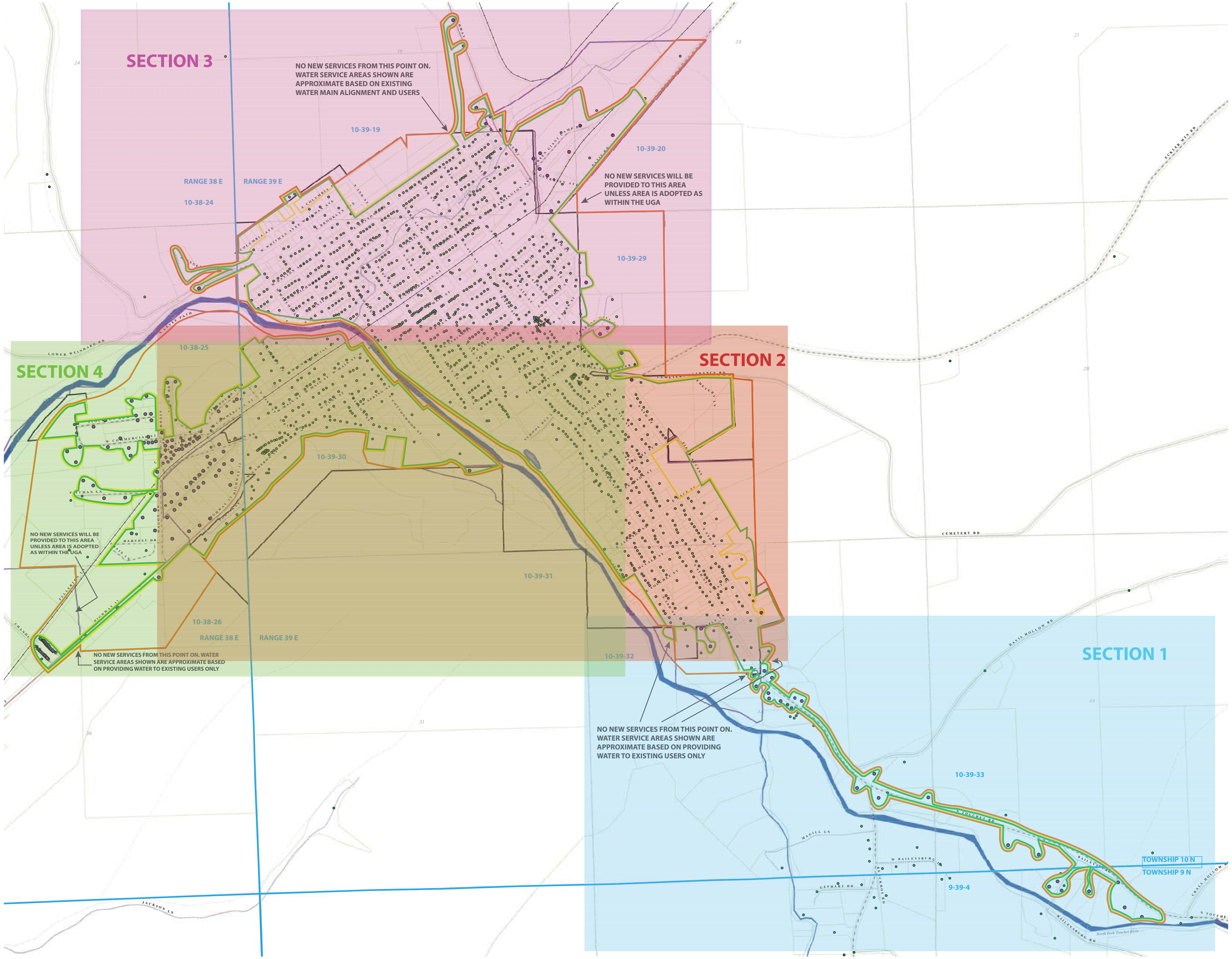

LEGEND

🟨 EXISTING SERVICE AREA (ESA)

🟩 RETAIL SERVICE AREA (RSA)

⬛ CITY LIMITS

🟪 URBAN GROWTH AREA (UGA)

🟧 FUTURE SERVICE AREA (FSA) AND WATER RIGHTS PLACE OF USE SERVICE AREA (WRPOUSA)

10-39-32 TOWNSHIP - RANGE - SECTION

NOTE: CITY LIMITS AND UGA BOUNDARY LINES ARE SHOWN UNDER THE SERVICE AREA LINES AND MAY NOT ALWAYS BE VISIBLE

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CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN

WATER SERVICE AREA MAP
OVERALL VIEW

FIGURE
1-4

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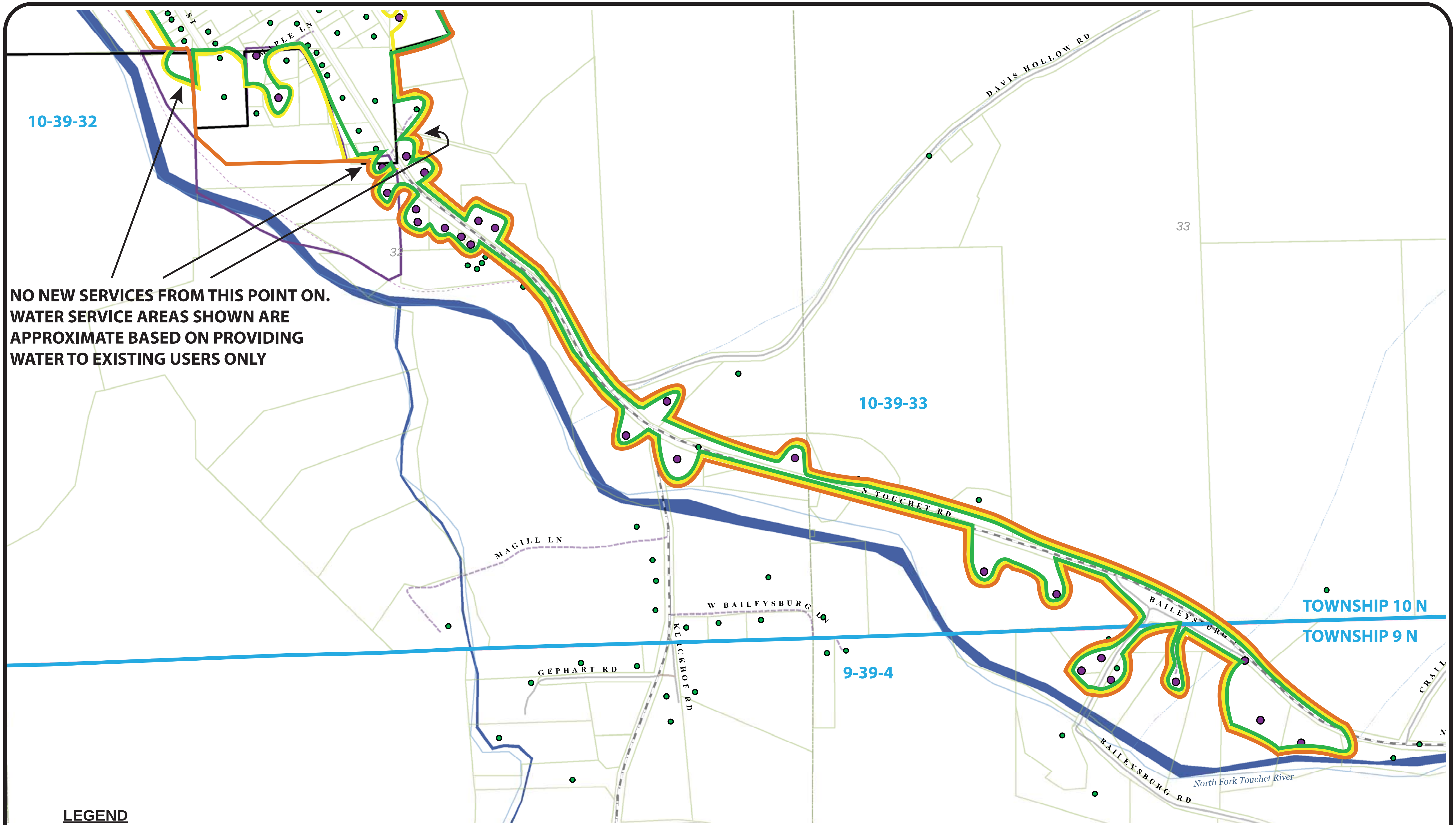

NO NEW SERVICES FROM THIS POINT ON. WATER SERVICE AREAS SHOWN ARE APPROXIMATE BASED ON PROVIDING WATER TO EXISTING USERS ONLY

LEGEND

🟨 EXISTING SERVICE AREA (ESA)
🟩 RETAIL SERVICE AREA (RSA)
⬛ CITY LIMITS
🟪 URBAN GROWTH AREA (UGA)
🟧 FUTURE SERVICE AREA (FSA) AND WATER RIGHTS PLACE OF USE SERVICE AREA (WRPOUSA)
10-39-32 TOWNSHIP - RANGE - SECTION

N

NOTE: CITY LIMITS AND UGA BOUNDARY LINES ARE SHOWN UNDER THE SERVICE AREA LINES AND MAY NOT ALWAYS BE VISIBLE

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CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN

WATER SERVICE AREA MAP
SECTION 1

FIGURE
1-5

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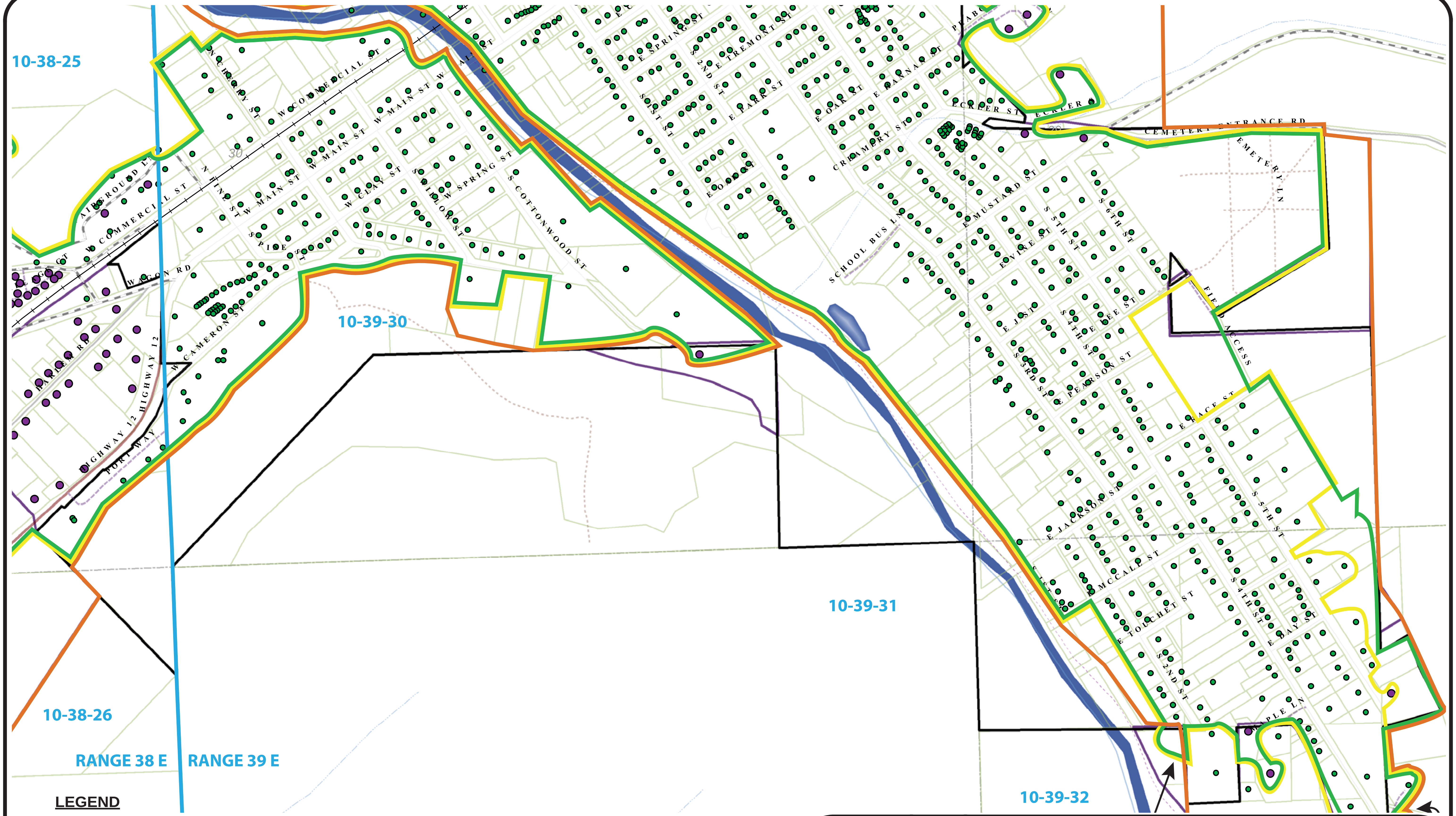

LEGEND

🟨 EXISTING SERVICE AREA (ESA)

🟩 RETAIL SERVICE AREA (RSA)

⬛ CITY LIMITS

🟪 URBAN GROWTH AREA (UGA)

🟧 FUTURE SERVICE AREA (FSA) AND WATER RIGHTS PLACE OF USE SERVICE AREA (WRPOUSA)

10-39-32 TOWNSHIP - RANGE - SECTION

NOTE: CITY LIMITS AND UGA BOUNDARY LINES ARE SHOWN UNDER THE SERVICE AREA LINES AND MAY NOT ALWAYS BE VISIBLE

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CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN

WATER SERVICE AREA MAP
SECTION 2

FIGURE
1-6

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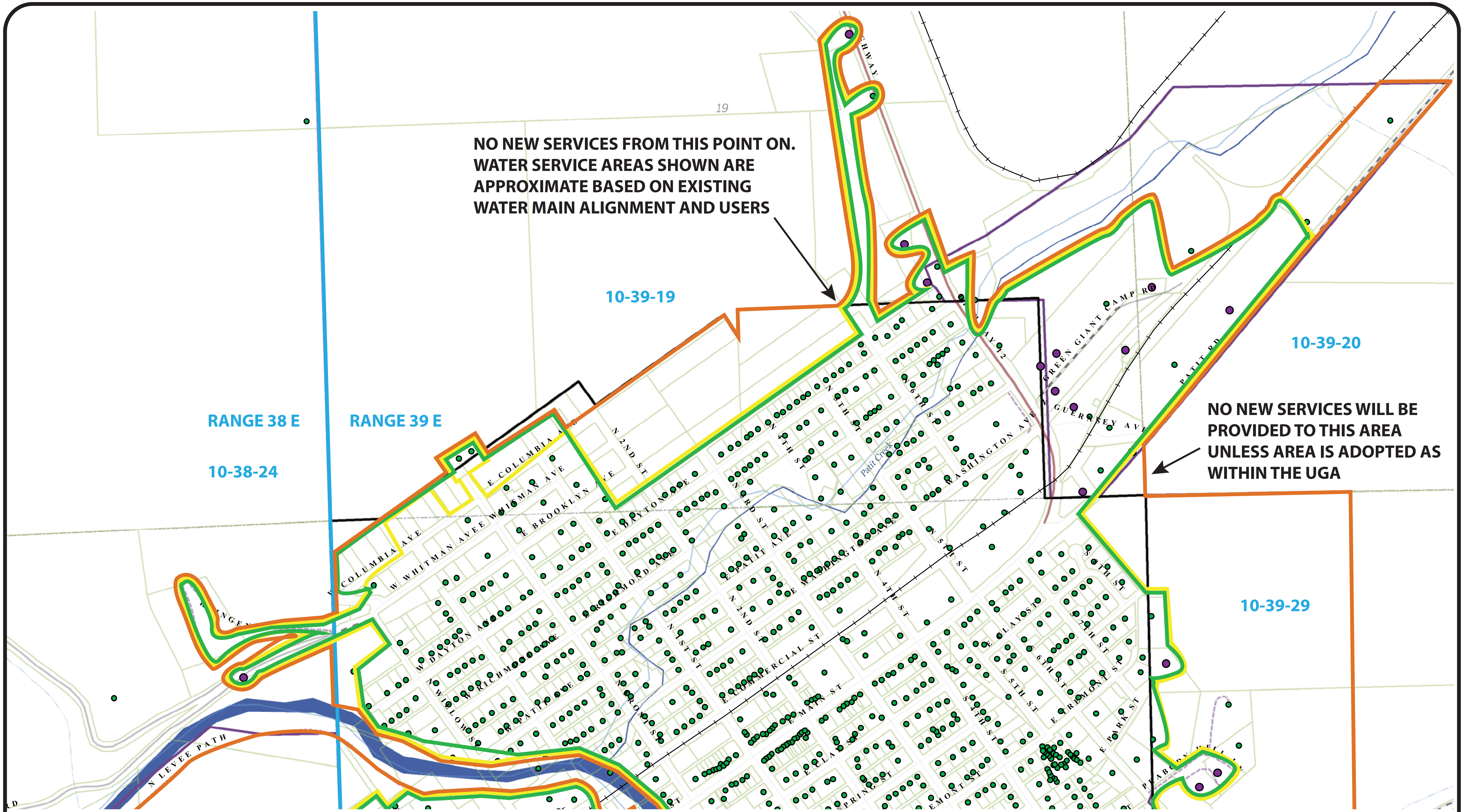

NO NEW SERVICES FROM THIS POINT ON. WATER SERVICE AREAS SHOWN ARE APPROXIMATE BASED ON EXISTING WATER MAIN ALIGNMENT AND USERS

NO NEW SERVICES WILL BE PROVIDED TO THIS AREA UNLESS AREA IS ADOPTED AS WITHIN THE UGA

LEGEND

- 🟨 EXISTING SERVICE AREA (ESA)
- 🟩 RETAIL SERVICE AREA (RSA)
- ⬛ CITY LIMITS
- 🟪 URBAN GROWTH AREA (UGA)
- 🟧 FUTURE SERVICE AREA (FSA) AND WATER RIGHTS PLACE OF USE SERVICE AREA (WRPOUSA)
- 10-39-32 TOWNSHIP - RANGE - SECTION

N

NOTE: CITY LIMITS AND UGA BOUNDARY LINES ARE SHOWN UNDER THE SERVICE AREA LINES AND MAY NOT ALWAYS BE VISIBLE

anderson perry & associates, inc.

CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN

WATER SERVICE AREA MAP
SECTION 3

FIGURE
1-7

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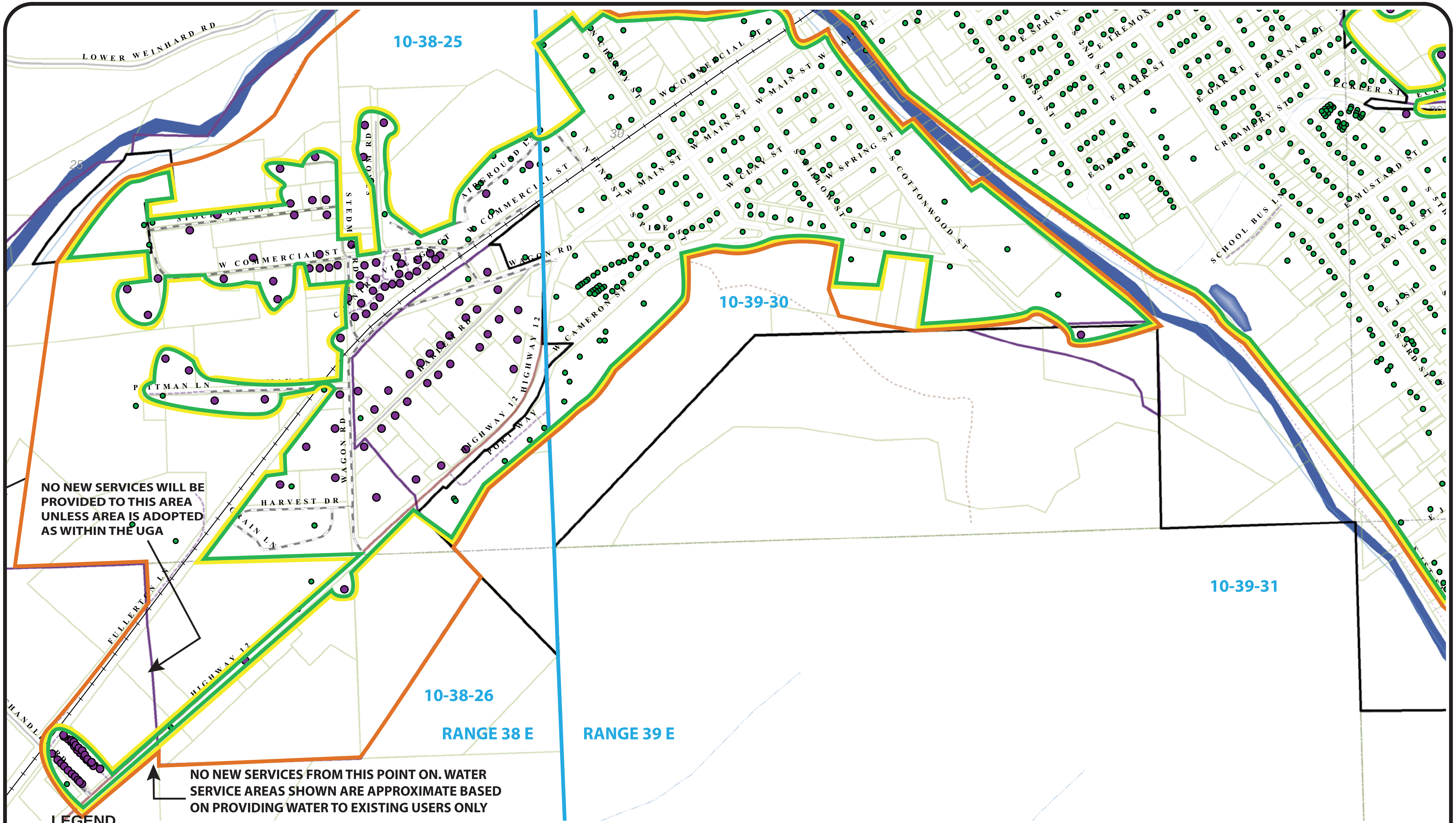

NO NEW SERVICES WILL BE PROVIDED TO THIS AREA UNLESS AREA IS ADOPTED AS WITHIN THE UGA

NO NEW SERVICES FROM THIS POINT ON. WATER SERVICE AREAS SHOWN ARE APPROXIMATE BASED ON PROVIDING WATER TO EXISTING USERS ONLY

LEGEND

🟨 EXISTING SERVICE AREA (ESA)
🟩 RETAIL SERVICE AREA (RSA)
⬛ CITY LIMITS
🟪 URBAN GROWTH AREA (UGA)
🟧 FUTURE SERVICE AREA (FSA) AND WATER RIGHTS PLACE OF USE SERVICE AREA (WRPOUSA)
10-39-32 TOWNSHIP - RANGE - SECTION

NOTE: CITY LIMITS AND UGA BOUNDARY LINES ARE SHOWN UNDER THE SERVICE AREA LINES AND MAY NOT ALWAYS BE VISIBLE

anderson perry & associates, inc.

CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN

WATER SERVICE AREA MAP
SECTION 4

FIGURE
1-8

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Chapter 2 - Basic Planning, Data, and Water Demand Forecasting

In this chapter, basic planning data essential for assessing the City's water demands is provided. This planning information is used to evaluate the existing system and determine future needs based on projected demographic trends for the next 6 and 20 years. The water system analysis uses information including historical water system demand and population projections as established in the *City of Dayton's Comprehensive Plan* (1999) and the Office of Financial Management (OFM). The historical water system demand is used with City population projections to forecast the City's future water demand.

Current and Historical Water System Data

The current and historical water system data is described in this section, including the current and historical population and service connections, source water production, service water use, equivalent residential units (ERU), and water rates. Source water production and water use data was collected and compiled consistent with DOH's Conservation Planning Requirements (March 1994). In this plan, water data is reported primarily with respect to gallons to allow for comparisons to other communities and design standards and with respect to cf to stay consistent with the City's current measurement devices.

In this plan, the following water demand terms are used:

- **Average Annual Demand (AAD)** – The total volume of water delivered to the system in a full year expressed in gallons.
- **Average Daily Demand (ADD)** – The total volume of water delivered to the system over a year divided by 365 days. The average use in a single day expressed in gallons per day (gpd).
- **Maximum Monthly Demand (MMD)** – The average gpd during the month with the highest water demand. The highest monthly usage typically occurs during a summer month.
- **Maximum Daily Demand (MDD)** – The largest volume of water delivered to the system in a single day expressed in gpd. The MDD is commonly used to size facilities to provide capacity for periods of high demand. The MDD usually occurs during the warmest part of the year when agriculture, irrigation, and recreational uses of potable water are at their greatest, commonly associated with a holiday such as the Fourth of July or during an event such as a County Fair.
- **Peak Hourly Demand (PHD)** – The maximum volume of water delivered to the system in a single hour expressed in gpd. Distribution systems should be designed to adequately handle the PHD. During this peak usage, storage reservoirs supply the demand in excess of the MDD. PHD is commonly experienced during the early morning hours when many water users are bathing, cooking, and engaging in other activities that require widespread water use.

The demands expressed in gpd above can be divided by the population served to determine a demand per person or a per capita demand expressed in gallons per capita per day (gpcd). Per capita demands can be multiplied by future population projections to determine future water demands.

In addition to water demand parameters, various terms are used and values calculated that relate to water conservation. These water conservation terms are described below.

- **Authorized Consumption** – The volume of water authorized for use by the water system. If authorized uses are tracked and estimated, these volumes of water can be added into the authorized consumption category.
- **Unmetered Authorized Consumption** – The authorized uses of water that are not typically metered, including maintenance flushing of the water system, fire-fighting (hydrants), cleaning water tanks or reservoirs, and street cleaning. An estimate of the volume of unmetered authorized consumption is needed to include this volume into the authorized consumption value.
- **Distribution System Leakage (DSL)** – All water that is not authorized consumption. DSL is the water lost from the distribution system, including both apparent and real losses. Since neither apparent nor real losses are authorized uses of water, these losses are considered leakage even if they are not actual leakage.
- **Apparent Losses** – The non-physical losses that occur in utility operations due to customer meter inaccuracies, systematic data handling errors in customer billing systems, and unauthorized consumption. In other words, this is water that is consumed but is not properly accounted for, paid for, or measured. These losses cost utilities revenue and distort data on customer consumption patterns. Water theft is also considered an apparent loss.
- **Real Losses** – All physical losses from the distribution system. Real losses include reservoir overflows, leaky valves and water mains, and water main breaks. These losses inflate the water utility's production costs and stress water resources since the lost water is extracted and treated, yet is never used beneficially.

Current and Historical Population and Service Connections

Based on OFM's population estimate, the City of Dayton's current population (Year 2014) is 2,545. Compared to the 1990, 2000, and 2010 census populations of 2,551, 2,655, and 2,526, respectively, the City's population has slightly increased since 2010 but has experienced overall decline since 1990. Dayton's decreased population is partially attributable to the closing of the Seneca Food Corporation's asparagus processing plant in 2005, which resulted in the loss of 28 full-time and approximately 1,000 seasonal jobs.

The historical number of service connections and units served by the City's water system is summarized in Table 2-1.

TABLE 2-1

Water System Service Connections and Units Served

User/Year	2005 - 2006 July - June	2010 - 2011 November - October	2011 - 2012 November - October	2012 - 2013 November - October
Service Connections				
Inside Residential	1,026	1,040	1,028	1,033
Inside Business	181	164	164	161
Outside Residential	91	88	87	89
Outside Business	18.5	18	18	18
County Standpipe	0	0	1	1
Total Connections	**1,316.5**	**1,310**	**1,298**	**1,302**
Units Served				
Inside Residential	1,116	1,108	1,095	1,100
Inside Business	234	223	220	220
Outside Residential	102	106	103	104
Outside Business	46	31	32	32
Total Units Served	**1,498**	**1,468**	**1,450**	**1,456**

In 2013, the City's water system averaged a total of 1,302 billable connections. The majority of these billable connections (1,194) are inside the City with 1,033 residential connections and 161 nonresidential (commercial, government, and industrial) connections. A slight decrease in the number of water system connections has occurred since 2005 to 2006, with approximately 14 less service connections.

The City's water retail service area also includes 108 water connections located outside the City limits (89 residential and approximately 19 non-residential). These services are primarily located either west (near or west of the fairgrounds) or south of town off the City's old transmission main that transported water from the City's Water Treatment Plant (decommissioned) to the City along the Touchet River.

An estimated total of 1,204 dwelling units are currently being served by the City's water system. Approximately 91 percent of the dwelling units served by the City are inside residential. Of the 89 residential connections outside the City limits, City staff believes that approximately 104 residential dwellings are served. Based on representative Year 2010 census data for Columbia County, the average of number of persons per household is 1.90. Assuming 1.90 persons per connection and 104 residential connections with water service outside the City, the estimated population of potable water users outside the City limits is 198.

The total estimated population served by the City's water system (2,545 inside and 198 outside) is 2,743.

Current and Historical Source Water Production

A summary of source water production data from 2001 through 2005 and 2009 through 2013 is presented in Table 2-2. The data from 2001 through 2005 is from the City's previous *Water System*

Plan (Anderson Perry & Associates, Inc., 2007) and was reviewed for any long-term trends. A more detailed summary of this data is provided in Appendix C.

TABLE 2-2

Summary of Source Water Production Data
(2001 to 2005 and 2009 to 2013)

Year	AAD (gpy)(1)	AAD (ac-ft/yr)(2)	ADD (gpd)	MMD (gpd)	MDD (gpd)
2001	329,492,008	1,011.2	902,718	1,543,229	2,649,364
2002	301,703,120	925.9	826,584	1,597,366	2,801,076
2003	304,995,924	936.0	835,605	1,691,413	2,373,504
2004	273,413,044	839.1	749,077	1,504,581	2,091,000
2005	300,391,000	921.9	822,989	1,688,032	2,306,000
2009	267,387,000	820.6	732,567	1,432,355	1,875,000
2010	248,397,000	762.4	680,540	1,384,000	1,969,000
2011	264,357,000	811.3	724,266	1,462,806	1,654,000
2012	286,276,000	878.6	784,318	1,474,839	2,474,000
2013	305,170,000	936.6	836,082	1,565,452	2,069,000
Averages					
2001-2005	301,999,019	926.8	827,395	1,604,924	2,444,189
2009-2013	274,317,400	841.9	751,555	1,463,890	2,008,200

(1) – *Gallons per year*

(2) – *Acre-feet per year*

From 2009 to 2013, the City's source water ADD production increased from an AAD of approximately 712,460 gpd in 2009 through 2011 to approximately 810,200 gpd in 2012 and 2013. This 14 percent ADD increase is primarily attributed to improved economic conditions in the City and surrounding region. In comparison, the ADD from 2009 to 2013 was less than observed in 2001 through 2005 (827,395 gpd), and substantially less than observed from 1994 through 1998 (955,000 gpd). In the City's previous *Water System Plan*, the ADD appeared in decline as a result of the closing of the Seneca Food Corporation canning facilities and the distribution system improvements completed by the City in 2004. The ADD flow observed in 2013 is similar to the ADD observed in 2002 and 2003.

The overall 5-year average MDD has decreased from approximately 2,444,000 gpd in 2001 through 2005 to approximately 2,008,000 gpd from 2009 through 2013. The highest MDD in the last 5 years was 2,474,000 gpd observed in 2012. This value appears to be an outlier as compared to the second highest MDD value in 2012 (1,804,000 gpd) and for the remaining years (2009 to 2011 and 2013). The MDD value of 2,069,000 gpd from 2013 will be used in this plan.

Peaking factors are commonly used to develop relationships between the ADD and the other planning criteria. These factors are used primarily for calculating future water demand. A summary of the calculated flow peaking factors is presented in Table 2-3.

TABLE 2-3

Summary of Peaking Factors for Source Water Production

Year	MMD/ADD	MDD/ADD
2009	1.96	2.56
2010	2.03	2.89
2011	2.02	2.28
2012	1.88	3.15
2013	1.87	2.47
Average	**1.95**	**2.67**

The current average peaking factor for MMD/ADD is lower than the average peaking factor for 2001 through 2005 (1.95 versus 2.02), and the current peaking factor for MDD/ADD is substantially lower than the average peaking factor for 2001 through 2005 (2.67 versus 3.05).

PHD is another water production parameter typically calculated and used in water system analysis. For this calculation, the number of ERUs within a water system is determined and used in an equation developed by DOH (2009) to estimate the PHD. This calculation of the number of ERUs and system PHD is discussed later in this chapter.

A summary of the current source water production is given in Table 2-4. These water demand values were based primarily on 2013 data, which is the most recent annual information. This current water production data will serve as the basis for this plan's planning criteria.

TABLE 2-4

Summary of Current Water Production

Demand Parameters	Total (gpd)	Peaking Factor	Per Capita Demand (gpcd)*
ADD	836,000	1.00	305
MMD	1,565,500	1.87	570
MDD	2,069,000	2.47	754

** – Based on a water service population of 2,743*

The ADD for Year 2013 at 305 gpcd is higher than the ADD for the 2005 to 2006 time period of 257 gpcd.

Current and Historical Service Water Use

Three years of annual service water use data (2010 to 2013, November through Ocotober) was also compiled and analyzed. Due to the City's previous customer billing program, service water use data analysis was limited to inside residential, inside non-residential, outside residential, outside non-residential, and County standpipe user groups. The service water use data for 2005 to 2006 and the last 3 years are summarized in Table 2-5.

TABLE 2-5

Summary of Annual Service Water Use

User/Time Period	Water Use (gallons)			
	2005-2006	**2010-2011**	**2011-2012**	**2012-2013**
Inside				
Residential	112,618,364	111,377,671	112,208,295	124,796,402
Non-Residential	88,292,357*	60,169,322	76,791,460	75,241,417
Subtotal	**200,910,721***	**171,546,993**	**188,999,756**	**200,037,819**
Outside				
Residential	10,049,335	10,606,775	10,670,183	12,488,369
Non-Residential	22,918,047	6,982,640	6,047,760	6,465,353
County Standpipe	0	0	92,004	193,732
Subtotal	**32,967,382**	**17,589,415**	**16,809,947**	**19,147,454**
TOTAL	**233,878,103***	**189,136,408**	**205,809,703**	**219,185,273**

** – Corrected value – Different than the value shown in the previous Water System Plan (Anderson Perry & Associates, Inc., 2007)*

Though water use within Dayton increased from 2010 to 2013, usage was still less than the annual water use observed in 2005 to 2006. Water use for residential users both inside and outside the City was substantially higher in 2012 to 2013 compared to the usage observed during the 2005 to 2006, 2010 to 2011, and 2011 to 2012 time periods. Non-residential use outside the City from 2010 to 2013 is substantially less than usage observed in the 2005 to 2006 time period.

A list of the top 15 water users in Year 2012 to 2013 is included in Table 2-6. A list of the top 15 users in Year 2011 to 2012 and a comparison with the top 15 users in Year 2005 to 2006 are provided in Appendix C.

TABLE 2-6

Largest Water Users in Year 2012 to 2013

User	Use (gallons)	Percent of Total Usage
City Cemetery	16,914,524	7.72%
Dayton Wastewater Treatment Plant (WWTP)	11,342,223	5.17%
Dayton General Hospital	4,404,359	2.01%
Columbia Courts	2,923,932	1.33%
School District – High School	2,596,308	1.18%
Dayton Youth Sports Complex	2,567,510	1.17%
Dayton Pietrzycki City Park	2,457,629	1.12%
Cameron Court	2,256,118	1.03%
Seneca Food Corporation	2,161,047	0.99%
County Fairgrounds - Youth Building	1,848,540	0.84%
County Fairgrounds - Horse Barn	1,740,252	0.79%
McGregor Company	1,710,452	0.78%
School District - Irrigation	1,556,289	0.71%
Trails West	1,483,636	0.68%
Ag Link	1,448,876	0.66%
Total of Top 15 Users	**57,411,695**	**26.19%**
Total Water Consumed in Year 2012 to 2013	**219,185,273**	

The City Cemetery and the City WWTP are by far the largest water users in the City, utilizing a total of approximately 13 percent of the annual amount of water used in the City's water system. Together, the top 15 users consume approximately 26 percent of the water used in the City. In comparing the top 15 water users for 2011 to 2012 and 2012 to 2013 with the top users for 2005 to 2006 (see Appendix C), the following general trends were observed.

- Water usage at the City WWTP, Columbia Courts, School District – High School, County Fairgrounds – Youth Building, County Fairgrounds – Horse Barn, Trails West, and Ag Link were not reported in 2005 to 2006, but were substantial in 2011 to 2012 and 2012 to 2013.
- Significant decreases in water usage were observed at the Seneca Food Corporation, Dayton Pietrzycki City Park, and the School District's High School.
- Significant increases in water usage were observed at the Dayton General Hospital and Columbia Courts.

Current and Historical DSL

Water use efficiency (WUE) rules require a DSL standard of 10 percent or less based on a 3-year rolling average. A water system meeting this requirement is considered in compliance. If a water system does not meet this standard, a Water Loss Control Action Plan (WLCAP) must be developed and implemented. Refer to Chapter 4 for additional details and discussion on the WLCAP and other WUE rules.

All water that is not authorized consumption is considered DSL. Authorized consumption is defined as the volume of water authorized for use by the water system. All unauthorized uses and any water, whether authorized or unauthorized, that cannot be tracked is also considered DSL. Consequently, all authorized water use should be thoroughly documented. Some examples of water use that can be considered authorized use if they are tracked, metered, or estimated include the following:

- Maintenance flushing of the water system
- Fire-fighting (flow from hydrants)
- Water used for hydrant flow testing
- Cleaning water tanks or reservoirs
- Water sold or given to contractors or government agencies

DSL should be calculated in terms of both percentage and total volume. At a minimum, calculating the DSL requires collecting 1) the amount of water purchased, diverted, or pumped from the source, 2) the amount of water purchased from another supplier, and 3) the amount of authorized consumed water. Unless an alternative methodology is submitted and approved by DOH, the DSL will be calculated as follows:

Percent DSL = [(TP – AC) / TP] X 100 Percent
Volume DSL = TP – AC

Where
DSL = Distribution System Leakage (percentage or gallons)
TP = Total Water Produced and Purchased (gallons)
AC = Authorized Consumption (gallons)

The current DSL (2013) is 11.2 percent, and DSL values for 2007 to 2013 range from 11.2 to 13.4 percent. The calculated rolling DSL average for the past 3 years (2011 through 2013) is 12.5 percent. Since this average is above the State standard of 10 percent, the City will need to compile and implement a WLCAP (see Chapter 4).

Equivalent Residential Units (ERU)

An ERU is used to equate non-residential or multi-family residential usage to a specific number of family residences. The number of ERUs in a water system is also used to project future water demand and calculate the average cost for water services to a typical residence. The average cost per residential connection is used to inform the system users and assist regulatory and funding agencies in comparing costs with other communities. Since a water system typically consists of multi-family, commercial, governmental, industrial, and agricultural users, the most common method of calculating the average residential user cost is to evaluate each non-residential source on the basis of water consumption relative to the typical residential account or ERU.

Residential usage is determined by subtracting commercial and industrial contributions from the total water usage. The water usage per ERU is calculated by dividing the single-family residential water usage by the total number of single-family dwelling units within the City. The total number of ERUs is determined by dividing the total water usage by the average water usage per ERU.

For the ERU calculation, the different sources or sectors within the City were divided into residential (including single- and multi-family) and non-residential (commercial, governmental, and industrial). In Year 2012 to 2013, the estimated average annual residential water consumption per ERU was approximately 114,024 gallons per ERU per year. The estimated number of ERUs for these categories served by the City in the Year 2012 to 2013 is summarized in Table 2-8 (based on 114,024 gallons per ERU per year or 312.4 gpd per ERU). The average water consumption of 312.4 gpd per ERU for the Year 2012 to 2013 is approximately 13 percent higher than the 2005 to 2006 value of 275.9 gpd per ERU.

TABLE 2-8

Estimated Number of ERUs Based on Water Consumption (Year 2012 to 2013)

Source	No. of Units	Water Usage (gpy)	ERUs	Percent of Usage
Residential				
Inside	1,100	124,796,402	1,100	57.0%
Outside	104	12,488,369	104	5.7%
Subtotal	**1,204**	**137,284,771**	**1,204**	**62.7%**
Non-Residential				
Inside	220	75,241,417	660	34.3%
Outside	31	6,659,085	58	3.0%
Subtotal	**251**	**81,900,502**	**718**	**37.3%**
Total	**1,455**	**219,185,273**	**1,922**	**100.0%**

Residential sources comprised approximately 63 percent of all water consumed in the City, while non-residential sources utilized the remaining 37 percent. Approximately 91 percent of the water was consumed within the City limits, and approximately 9 percent was consumed outside the City limits. Since Year 2005 to 2006, the water use has shifted toward higher residential use and higher use inside the City limits. The net effect of higher water usage per ERU and overall lower water usage is that a smaller number of ERUs (approximately 17 percent less) were calculated for the system.

The total number of ERUs for the City's system includes not only the amount of authorized consumption but also the amount of water attributed to DSL and unmetered authorized consumption. The difference between the calculated 2012 to 2013 source water production (303,359,000 gpy) and the authorized consumption (219,185,273 gpy) is 84,173,278 gpy. This difference is the amount of DSL and unmetered authorized consumption. The total number of ERUs for this value is 738 ERUs. In other words, the amount of annual DSL and unmetered authorized consumption in the City's system is equivalent to the water used by 738 ERUs. The total number of ERUs currently being served by Dayton is 2,660.

Peak Hourly Demand (PHD)

PHD is often used in the computer modeling process to ensure the storage and distribution system will continue to function during short peak demand situations. Given the lack of documented information, Equation 5-1 of DOH's *Water System Design Manual* (2009) was used to determine PHD flows.

PHD = (MDD / 1,440) X [(C X N) + F] + 18

Where
PHD = Peak Hourly Demand (gpm)
MDD = Maximum Daily Demand (gpd per ERU)
C = Coefficient Associated with Ranges of ERUs
N = Number of ERUs
F = Factor Associated with Ranges of ERUs

The total number of ERUs used for the PHD determination was 2,660, which is the sum of the number of ERUs currently on the system (1,922) and the number of ERUs representative of DSL and unmetered authorized consumption (738). Using an MDD of 2,069,000 gpd, the calculated MDD per ERU is 777.8 gpd per ERU. With an ERU value of 2,660, the coefficients "C" and "F" for Equation 5-1 are 1.6 and 225, respectively. A summary of Equation 5-1 calculations is given below.

PHD = (777.8 / 1,440) X [(1.6 X 2,660) + 225] + 18
= (0.54) X (4,481) + 18
= 2,438 gpm (rounded) or 3,510,700 gpd

Current Water Rates

The City currently utilizes a base rate with an inclining block rate structure for consumption above the base amount. Overall, this water structure provides fair revenue stability and equality, is an excellent conservation tool, and is relatively simple to administer and explain. The effectiveness of water rates for conservation and WUE is dependent on pricing and volume allowances for each block rate. A summary of the current rate structure is given in Table 1-2. The existing water rate structure is discussed further in Chapter 4 under the Water Conservation Rate Pricing section and in Chapter 9 as part of Rate Assessment section.

Projected Water System Data

Future water demands are projected using the past records of water produced and sold, along with projected land use, population estimates, and anticipated additional water demand (i.e., non-residential needs). The goal of projecting future water demand is not to build larger facilities to accommodate excessive water consumption, but rather to evaluate the existing components' capability and size new facilities for reasonable demand rates. Large amounts of leakage and excessive water consumption should not be projected into future estimates. Instead, efforts should be made to reduce leakage and lost water to a reasonable level and utilize lower, more acceptable demand rates for planning efforts. Water demand projections should be based on acceptable water loss quantities, reasonable conservation measures, and the community's expected water use characteristics.

For any community, future water demand projections are associated with a degree of uncertainty. Uncertainties in projections exist as a result of the estimates used to define the community's current water use, the built-in assumptions made with respect to anticipated community growth, and the difficulty of predicting the impact of water conservation measures on a community's future water consumption.

This section addresses the City's projected land use, economic trends, and population, along with the water system's projected non-residential water needs and projected DSL. This information is utilized to forecast the future water demand within the City for the next 6 and 20 years.

Projected Land Use, Economic Trends, and Population

The City's existing and future land use/zoning designations, consistent with the City's *Comprehensive Plan* (1999), are presented in Appendix A. Although the City's population has slightly increased from 2010 to 2013, the population has experienced overall decline since 1990. This decline is partially due to the closing of Seneca's asparagus processing plant in 2005. Although Seneca still operates and maintains its seed processing facility, the loss of the processing plant significantly impacted the local economy and City growth. If the processing plant is purchased or reopened, future growth within the City will be more likely.

Population projections were compiled based on information provided by City staff. Overall, City staff projects the City to see a modest growth from 2,545 in Year 2014, to 2,580 in Year 2020, followed by a decline in population to 2,490 by Year 2035. The OFM projects Columbia County's population to decline from 4,080 in Year 2014, to 4,013 in Year 2020, and to 3,800 in Year 2035. The City's population projections are higher than OFM's due to the anticipated growth which may result from the construction of a new straw processing plant near Starbuck. The proposed straw processing plant would be located on the Snake River near Lyons Ferry. The facility is anticipated to generate 130 new jobs. The City of Dayton's proximity to the plant may entice workers to live in Dayton, thereby increasing Dayton's population. However, while a portion of the new employees would likely relocate to Dayton, many would likely choose to commute from other communities such as Waitsburg, Walla Walla, Pomeroy, Connell, or even the Tri-Cities.

In the previous *Water System Plan* (Anderson Perry & Associates, Inc., 2007), an increase in the water system population was anticipated due to new water connections outside City limits. Since the number of outside City connections in 2012 to 2013 is essentially the same as in 2005 to 2006, no increase in the water system population outside the City is assumed in this plan.

The current and future population is summarized in Table 2-9.

TABLE 2-9

Current and Future Population

Population	2014	2020	2034
Inside City Limits	2,545	2,580	2,490
Outside City Limits	198	198	198
Total	**2,743**	**2,778**	**2,688**

Projected Non-Residential Water Needs

With a growing population, future non-residential water usage generally increases to support the needs and desires of the general population. At this time, the City does not anticipate that a major non-residential water user will move into the City's service area, or that an existing customer will significantly expand operations during the planning period. Consequently, the projected non-residential water use in the City is anticipated to mirror the City's projected population growth as described above.

Considerable speculation has taken place regarding whether or not the Seneca facilities will be sold and/or brought into full operation, and what type of agriculture product will be processed.

Currently, the fate of the Seneca facilities and their water needs can only be speculated. This plan assumes the most conservative approach that the Seneca facilities will be placed back into full production sometime in the future with water usage similar to historical demands. If the Seneca facilities eventually consume more water than anticipated, the projected water demand and the resources available to meet this demand may need to be reconsidered.

The historical water usage at the Seneca facilities is summarized in Table 2-10.

TABLE 2-10

Historical Water Usage at the Seneca Facilities

Year	Annual Use (cf)	Average Day (cf per day)	Maximum Month (cf per day)
2002-2003	5,200,753	14,303	52,285
2003-2004	4,423,292	12,119	50,564
2004-2005	3,436,883	9,416	36,016
2005-2006	3,458,731	9,476	45,841
2011	278,805	764	899
2012	416,968	1,142	1,145
2013	359,558	985	1,106

Based on historical flows, the Seneca facilities at or near full production (2002 to 2003) utilized an average of approximately 5.2 million cf per year, or 38.9 million gpy. This annual value is equal to an average of approximately 106,600 gpd. Maximum month consumption was approximately 52,000 cf per day or 389,000 gpd. Current annual water use at Seneca is over an order of magnitude lower than during the time of full production. Current maximum monthly water use at Seneca is approximately 40 times less than the historic full production water usage. For this plan, Seneca's water use is assumed to remain at the current level. If a substantial change in the operating characteristics of the Seneca facility is proposed, anticipated changes in the facility's water consumption should be evaluated, along with any increased water usage from associated projected population growth within the City.

Projected DSL

Responsible water planning should not include the propagation of high lost water levels into water demand projections. According to Washington Administrative Code (WAC) 246-290-820, a water system should endeavor to reduce DSL to 10 percent or less of the total water diverted from their water sources. As shown previously, DSL within the City is currently 11.2 percent. To comply with WAC 246-290-820 and improve system efficiency, the City should strive to reduce this level to 10 percent.

ERUs

The projected number of overall ERUs was based on any population changes (positive or negative) and reduction of DSL. The projected number of authorized consumption ERUs was based on a water demand value of 312.4 gpd per ERU and any population changes.

Water Demand Forecasting

Water demand forecasts were prepared in accordance with the guidelines contained in DOH's Conservation Planning Requirements (March 1994). All system forecasts include projections of future water demand for the next 6 and 20 years for both PHD and total AAD. The basis for the water demand forecasts includes the following:

- The projected population was based on information provided by City staff.
- The non-residential water use is anticipated to increase in proportion to the projected residential growth.
- The existing water production demand parameters, as presented in Table 2-4, are the basis for water demand forecasts.
- Water demand forecasts are based on 11.2 percent DSL (Year 2013).
- With the measures described in the City's WUE Plan (see Chapter 4), the DSL is anticipated to be 10 percent within 6 years (Year 2020).
- The City's WUE goal of 1 percent reduction in ADD by 2020 is achieved.

Water demand forecasts are presented in Table 2-11.

TABLE 2-11

Water Demand Forecasts

Parameter/Year	2014	2020	2034
Service Population (capita)	2,743	2,778	2,688
DSL	11.2%	10%	10%
Water Demand			
ADD (gpd)	836,000	827,000	800,200
ADD (ac-ft/yr)	936	926	896
MMD (gpd)	1,565,000	1,564,300	1,513,200
MDD (gpd)	2,069,000	2,067,500	2,000,500
PHD (gpd)	3,510,700	3,508,100	3,394,400
ERUs			
Overall	2,660	2,695	2,608
Authorized Consumption	1,922	1,936	1,896

Chapter 3 - System Analysis

The City's water system was evaluated on the basis of criteria established by the City, the State of Washington, and the drinking water industry to determine whether the existing system facilities are capable of supplying sufficient water quantity and quality to satisfy the existing and projected water demands given in Chapter 2.

System Design Standards

A summary of the City's system design standards is given in Table 3-1.

TABLE 3-1

City of Dayton's System Design Standards

Parameter	City Standard
Water Quality Parameters	As a minimum, water quality is monitored to meet the requirements of WAC 246-290-300.
ADD and MDD	Demands calculated per Equations 5-1 and 5-2 in DOH's *Water System Design Manual* (2009) and with actual recorded system data.
PHD	WAC 246-290-221/DOH *Water System Design Manual* (2009).
Storage Requirements	WAC 246-290-235 (9)/DOH *Water System Design Manual* (2009).
Fire Flow Rate and Duration	International Fire Code (2012).
Minimum System Pressure	WAC 246-290-230 (5 through 6) – Maintain minimum pressure of 30 psi in the system under PHD conditions and 20 psi under MDD and fire flow conditions where design volume of fire suppression (FSS) and equalizing storage (ES) are depleted.
Minimum Pipe Size	WAC 246-290-230 – Minimum 6-inch diameter for distribution and fire flow unless justified by hydraulic analysis.
Telemetry Systems	Telemetry systems are to be designed to meet the City's requirements for system operating parameters and data collection. New telemetry systems must be compatible with the City's existing system.
Backup Power Requirements	WAC 246-290-420 (5, 7, 9, and 10), DOH *Water System Design Manual* (2009) – On-site backup power equipment or gravity standby storage (SB) shall be provided unless the power grid meets the minimum reliability criteria. On-site backup power facilities shall be provided for closed system booster pump stations.
Valve and Hydrant Spacing	Valves – Chapter 8, DOH *Water System Design Manual* (2009) – Sufficient valving should be placed to keep a minimum of customers out of service when water is turned off for maintenance, repair, replacement, or additions. Hydrants – WAC 246-290-230, 650 – Hydrants shall be installed on not less than 6-inch diameter mains, located along roadside intersections where possible, and with a distance between them no further than 900 feet.
Other System Policies	New pressure zones shall be created above an MSL elevation of 1,675 feet and below an MSL elevation of 1,560 feet. Above an MSL elevation of 1,675 feet, a City-owned booster pump station and isolation valves are required. Below 1,605 feet MSL elevation, the City recommends the user install and maintain a PRV on the house-side of the meter. Water main piping shall be looped where feasible.

Water Quality Analysis

Historically, the City has, with a few exceptions, complied with the water quality provisions of the Safe Drinking Water Act and WAC 246-290. The City's comprehensive monitoring program is discussed in Chapter 6.

While water from the City's wells does not require treatment, all source water is continuously dosed with chlorine for disinfection purposes. In the mid-1990s, the City experienced a number of coliform violations that persisted despite intermittent chlorination of the City's source water. In late 1998, the City initiated continuous dosing of its source water with chlorine. Since continuous chlorination began, no coliform violations have occurred.

The last exceedance of drinking water quality criteria was observed in 2002 for high conductivity (3,600 micromhos per centimeter (umhos/cm)) and total dissolved solids (TDS, 850 mg/L) in Well No. 1.

Historical nitrate concentrations in the source water were reviewed. A summary of the range of nitrate concentrations observed at each well is summarized in Table 3-2.

TABLE 3-2

Historical Nitrate Concentrations in the City's Wells

Year	No. of Samples	Nitrate Concentration Range (mg/L)
Well No. 1		
1994	2	1.60 – 1.70
2002-2006	3	1.40 – 1.60
2007-2013	3	1.30 – 2.00
Well No. 2		
1983	1	0.20
1994-1998	2	0.56 – 0.61
2000-2006	6	0.60 – 1.70
2007-2013	7	0.62 – 0.70
Well No. 3		
1994-1998	3	0.52 – 0.62
2000-2002	3	0.50 – 0.88
2003-2006	3	0.70 – 1.10
2007-2013	7	0.60 – 0.93

All of the nitrate concentrations observed in the City's wells have been below the State and Federal nitrate MCL of 10 mg/L NO_3 as nitrogen. Based on the historical nitrate concentrations, there does not appear to be any clear trends of nitrate concentrations in the City's wells.

Chlorine Residual in Distribution System

City staff maintains, periodically samples, and analyzes for chlorine residual in the City's water distribution system. The City maintains residual chlorine concentrations of at least 0.2 mg/L at the City's WWTP and a trace amount in the last residential connection located on the 12-inch main off

North Touchet Road (southernmost connection on this dead-end main). The City's chlorine injection and maintenance of chlorine residual in the distribution system has been successful as evidenced by no coliform violations since initiating continuous chlorination.

Corrosion

The City has not observed or experienced any major corrosion issues in the recent past. Copper and lead concentrations in samples taken from the City's distribution system have been in compliance with drinking water standards.

Evaluation of Water Quality Related Complaint Records

All water quality complaints are reviewed and investigated by two City staff members, typically the Public Works Director and Assistant Public Works Director. The investigations of the water quality complaints are documented in the Public Works' logbook, which is kept at the Public Works shop. City staff indicated that the majority, if not all, of the water quality complaints are related to taste and odor. City staff has not identified the reason for these taste and odor complaints.

System Description and Analysis

The following sections describe the major components of the City's water system including sources, treatment, storage reservoirs, and the distribution system. Each section includes a general description and capacity analysis of the water system component. System deficiencies are noted and discussed in each section along with analyses and discussions of potential improvements that may resolve or eliminate existing and anticipated deficiencies. The identified deficiencies, proposed improvements, and anticipated costs are provided below in the System Deficiencies and Proposed Projects section.

Source

The City relies on three groundwater wells to supply potable water to its users. Wells No. 1 and 2 are located on the east side of the Touchet River, and Well No. 3 is located on the west side of the Touchet River. The characteristics of the City's wells are summarized in Table 3-3.

TABLE 3-3

City Well Characteristics

Characteristic	Well No. 1	Well No. 2	Well No. 3
Status	Primary	Primary	Primary
Date Drilled or Re-Drilled	1936/1968(1)	1981	1981
Wellhead Elevation (feet)	1,620	1,655	1,590
Well Depth (feet)	1,303	1,425	1,180
Rated Capacity (gpm)(2)	700	1,100	1,100
Static Water Level (feet)	568	613	644
Well Diameter (inches)	12 inches to 50 feet 10 inches from 50 to 661 feet	15.25 inches	15.25 inches
Casing Description	Welded to 661 feet	Welded to 702 feet	Welded to 702 feet
Surface Seal Description	Cement Seal	Cement Seal	Cement Seal
Pump Type	Submersible	Submersible	Submersible
Pump and Motor Characteristics	Crown 8 M7000STD Stage 7b 175 Hp	Byron Jackson 12MQH 300 Hp	Byron Jackson 12MQH 300 Hp

(1) – *Well No. 1 was re-drilled in 1968 to improve production.*

(2) – *Based on 1996 Water Right Self-Assessment Form.*

A trailer-mounted generator is stored at Well No. 3 and is capable of providing backup power to either Well No. 2 or 3. All of the wells are metered. Copies of the well logs are provided in Appendix D.

The wells appear to be in good hydraulic and operational condition. With proper care and maintenance, the well equipment and facilities are anticipated to remain in service over the 20-year planning period.

Source Capacity Assessment

In this section, the ability of the City's existing sources to meet current and projected demands is evaluated. Evaluation of the City's source capacity for current and projected water demands is shown in Table 3-4. For this evaluation, the maximum source production from all three of the City's wells is limited to 18 hours per day. Having excess source capacity allows the pumps to cease operation for a portion of the day, an action that prolongs the life of the pump and aquifer.

TABLE 3-4

Source Capacity Evaluation without Conservation

Parameter/Year	2014	2020	2034
Percent Unaccounted for Water	11.2%	10%	10%
No. of Overall ERUs	2,660	2,695	2,608
Water Demand Without Conservation			
Annual Source Production (gpy)	305,140,000	301,855,000	292,013,000
ADD (gpd)	836,000	827,000	800,200
MDD (gpm)	1,437	1,436	1,389
MDD (gpd)	2,069,000	2,067,500	2,000,500
PHD (gpm)	2,438	2,436	2,357
Source Capacity			
All pumps (gpm)	2,900	2,900	2,900
Capacity Surplus over MDD (gpm)	1,463	1,464	1,511
Gpd Based on 18 Hours Per Day Pumping	3,132,000	3,132,000	3,132,000
Capacity Surplus over MDD (gpd)	1,063,000	1,064,500	1,131,500
Water Rights			
Gpm	2,700	2,700	2,700
Water Rights Surplus over MDD (gpm)	1,263	1,264	1,311
Gpy	1,419,120,000	1,419,120,000	1,419,120,000
Water Right Surplus over Annual Production (gpy)	1,113,980,000	1,117,265,000	1,127,107,000

Based on the source capacity analysis, the City's wells are capable of satisfactorily meeting the projected 6- and 20-year water demands both without and with water conservation. The total capacity of the City's three wells is substantially higher than the projected water demand. In reality, the City is capable of meeting the MDD with a combination of two well pumps in operation: 1) Wells No. 1 and 2, 2) Wells No. 1 and 3, and 3) Wells No. 2 and 3.

Likewise, the City's water rights are considered adequate to meet the City's future water demand (see Chapter 4 for a more detailed discussion).

While the wells do not currently have deficiencies, the existing capacities at Wells No. 2 and 3 are much greater than their pumping capabilities. Proposed improvements include installing new booster pumps at Wells No. 2 and 3 to increase their capacities from 1,100 gpm to 1,350 gpm. The booster pumps would give the City additional capacity and versatility in operating the system.

Water Treatment

The only treatment provided to the City's source water is disinfection. The City's disinfection system includes a tablet chlorination system that dissolves solid calcium hypochlorite tablets in the source water to form a hypochlorite solution hypochlorous acid. This hypochlorite solution is then pumped back into the source water main for disinfection.

The tablet chlorination systems are relatively new and appear to be in good working order. For the most part, the service life of the tablet system components should equal or exceed the planning period; however, the hypochlorite metering pump will likely need to be replaced within the planning period.

Water Treatment Capacity Analysis

The capacity of the City's disinfection system was evaluated by comparing the existing and projected chlorine system demand with the existing capacity of the tablet chlorination system. The City utilizes the Accu-Tab Chlorinator Model 3012 with a maximum chlorine delivery rate of approximately 14 pounds of chlorine per day. Since the City has a chlorinator at each well, the total capacity of the system is 42 pounds of chlorine per day. With this total capacity, the chlorinators have the ability to provide a 1.6 mg/L dose of chlorine at the full capacity of the City wells (2,900 gpm) for 18 hours per day, which is considerably less than the design source water chlorine demand concentration of 0.3 mg/L.

Total Chlorine Demand = 2,900 gpm X 60 min/hr X 18 hrs/day X 8.34 X 10^{-6} (conversion factor) X 1.6 mg/L chlorine

= 41.7 pounds of chlorine per day

Consequently, the City's tablet chlorinators appear to have sufficient capacity to handle its projected water demand.

Storage

The City's water distribution system includes two welded steel reservoirs for potable water storage: A 2.0-MG reservoir and a 220,000-gallon standpipe. A summary of relevant reservoir data is provided in Table 3-5.

TABLE 3-5

Potable Water Reservoirs*

Parameter	Reservoir	Standpipe
Status	Active	Active
Date Constructed	1978	1978
Storage Capacity (gallons)	2,000,000	220,000
Type of Construction	Welded Steel with Concrete Base	Welded Steel with Concrete Base
Diameter (feet)	90	28
Height (feet)	44	49
Base Elevation (feet above MSL)	1,750	1,745
Overflow Elevation (feet above MSL)	1,792	1,792
Overflow Height (feet)	42	47

** – These values are based on data contained in the Water System Operation and Maintenance Manual; Record Drawings were unavailable.*

Both of these reservoirs were constructed in 1978 and recoated in 2003. Both reservoirs appear to be in good condition. With proper maintenance, the typical service life of welded steel tanks varies from 50 to 100 years. With continued proper care and maintenance, the service lives of these reservoirs should extend well beyond the 20-year planning period.

Storage Capacity Analysis

In this section, the ability of the existing storage reservoirs to meet current and projected water storage needs is evaluated. A system's storage capacity analysis consists of five parts: 1) operational, 2) equalizing, 3) standby, 4) fire suppression, and 5) dead storage (if any). To be conservative, the storage calculations were performed with water demand forecasts without conservation.

Operational Storage (OS) – The water volume corresponding to the band of storage between the supply pump on and off levels within the tank. For the City's reservoirs, this band is 7 feet of storage. Based on the reservoir diameters, the OS volume of the City's reservoirs is the sum of 333,333 gallons (2.0-MG reservoir) and 32,766 gallons (220,000-gallon standpipe), or a total of 366,100 gallons (rounded).

Equalizing Storage (ES) – The water required when the source capacity cannot meet the system's PHD. ES is either calculated as follows or in no case less than zero:

ES (gallons) = PHD (gpm) – Sum of Normal Source Capacity (gpm) X 150
= PHD – 2,900 gpm X 150 minutes

The ES capacity for the City was calculated using the PHD of 2,438 gpm, 2,436 gpm, and 2,357 gpm, respectively for Years 2014, 2020, and 2034. For all these years, the ES component was calculated to be zero.

Standby Storage (SB) – The amount of storage should sources fail or when unusual conditions impose higher demands than anticipated. Minimum amount of SB is 200 gallons per ERU. SB for multiple sources is calculated as follows:

SB (gallon) = (2 days X ADD) – (1,440 minutes X (Sum of All Sources – Largest Capacity Source))
or 200 gallons/ERU

When using the projected ADD flows, sum of all sources (2,700 gpm – water right limit), and removal of the largest capacity well (1,100 gpm), the calculated SB was less than zero. Consequently, the minimum SB was calculated as the product of 200 gallons per ERU, minimum 2 days of SB storage, and the projected ERUs of 2,660, 2,695, and 2,608 for Years 2014, 2020, and 2034, respectively. The minimum SB volumes are as follows: 1,064,000 gallons (2014), 1,078,000 gallons (2020), and 1,043,200 gallons (2034).

Fire Suppression Storage (FSS) – The volume representing the product of the needed fire flow (gpm) and flow duration (hours). Based on the City's 2001 *Water System Plan*, the largest fire flow demand within the City is projected to be 3,500 gpm for 3 hours. Based on these values, the FSS is calculated as follows.

FSS (gallons) = 3,500 gpm x 3 hours x 60 minutes/hour
= 630,000 gallons

Dead Storage (DS) – The volume of stored water not available to all consumers at the minimum design pressure in accordance with WAC 246-290-230 (5 and 6). In other words, DS is the amount of water needed to provide adequate pressure to all the City's water users. The dead volume is excluded from volume provided to meet the OS, ES, and/or FSS volumes. Local community standards apply as to whether or not some DS volume may be used to provide SB volume to meet minimal community expectations during unusual operating conditions.

Calculation of the actual water surface elevations for the reservoir storage components was performed for Years 2014 and 2020. Since the population is projected to decline in Year 2034, the projected flow demand for Year 2020 is the greatest within the study period. Details of the calculations are presented in Appendix D, along with figures depicting each reservoir storage component's elevations. With respect to reservoir levels, two scenarios were examined based on WAC 246-290-230 (5 and 6). A description and findings for each scenario are described below. These scenarios were based on an estimated elevation of 1,725 feet for the highest residence served.

1. **Minimum 30 psi with Depletion of ES and OS** – The calculated reservoir water surface elevation for these conditions ranged from 1,784.47 to 1,785 feet. The calculated range of static pressure at the highest residence served is 25.4 to 26.0 psi. These static pressures are below the 30 psi given in WAC 246-290-230 (5). The DS volume with this scenario would essentially be the entire tank, since the calculated static pressure of 30 psi at the highest served residence would be 1,792 feet, which is 2 feet over the reservoir's overflow.

2. **Minimum 20 psi with Depletion of ES, OS, and FSS** – The calculated reservoir water surface elevation for these conditions ranged from 1,772.47 to 1.772.95 feet. The calculated range of static pressure at the highest residence is 20.5 to 20.8 psi. These static pressures are slightly above the 20 psi given in WAC 246-290-230 (6). The DS volume for this scenario would be at an essential elevation of 1,772 feet and would include SB and additional storage.

The lack of minimum design pressures from the storage reservoirs is due to the relative elevation of the highest served residence with respect to the reservoir elevations. These low pressure areas are considered to be a high public health risk due to the possibility of creating backflow conditions. The pressure deficiencies around the City's reservoirs are not a recent issue, as this condition has existed for well over 25 years (the life of the reservoirs). The system pressures within the City's system that are below minimum design standards (i.e., those at higher elevations) are mitigated with the use of individual booster pumps. This practice is allowed under WAC 246-290-230 on an interim basis for existing systems or for additions to existing systems until system improvements are made to resolve pressure deficiencies. Management and control of pre-existing individual booster pumps can remain with the individual residences until system improvements are made. To comply with WAC 246-290-230 (8), the City will need to manage and control any new individual booster pumps installed in the City. The low pressure zones and proposed improvements are further discussed under the Distribution System section below.

Resolution of the low pressures around the storage reservoirs would reduce or eliminate the amount of DS in the City's reservoirs. DS within the City could be eliminated if the highest served residence resided below an elevation of 1,675 feet, or if a centralized pressure system was installed. Without DS, the total required storage within the City is equal to the sum of the calculated OS, ES, SB, and FSS capacities. A summary of the City's storage requirements without DS over the 20-year planning period is provided in Table 3-6.

TABLE 3-6

Total Storage Requirements Without DS

Year	Storage Volume (gallons)						
	OS	ES	SB	FSS	Total Required*	Total Available	Surplus
2014	366,100	0	1,064,000	630,000	2,060,100	2,220,000	159,900
2020	366,100	0	1,078,000	630,000	2,074,100	2,220,000	145,900
2034	366,100	0	1,043,200	630,000	2,039,300	2,220,000	180,700

** – Rounded*

Without DS, the City appears to have surplus storage capacity within its water system through the 20-year planning period.

Distribution System

An overview of the City's water distribution system is presented in Chapter 1 and shown in Figure 1-2. The distribution system is a combination of pipe materials and sizes, consisting of 2- to 12-inch diameter lateral pipe with residential service lines mostly consisting of 3/4- and 1-inch diameter pipe. The most prevalent pipe within the distribution system (40 percent) is 6-inch diameter pipe.

In addition to varying by diameter, the water distribution system is also composed of a variety of pipeline materials. The material used to construct water lines over the years depended primarily on the accepted and available materials of the time. In the 1940s and 1950s, cast iron and steel piping were commonly used, while in the 1960s and 1970s, AC piping was utilized for water main construction. Today, ductile iron, PVC, HDPE, or polyethylene (PE) pipe materials are used by a number of communities to construct new water lines. The City's piping consists primarily of AC and PVC pipe for lateral pipes and copper and galvanized (older services) pipe for service lines. A summary of the distribution system pipe size and material inventory (not including service lines) is given in Table 3-7.

TABLE 3-7

Distribution System Size and Material Inventory

Pipe Diameter (inches)	Materials of Construction/Length (linear feet, LF)							
	AC	Cast Iron	Ductile Iron	HDPE	PVC	Steel	Total	Percent of Total
1.5	-	-	-	-	424	-	**424**	**0.3%**
2	-	107	-	-	443	4,828	**5,378**	**4.0%**
4	839	305	-	-	500	7,874	**9,518**	**7.1%**
6	27,552	-	24	-	19,982	6,126	**53,684**	**40.3%**
8	12,260	-		-	30,097	-	**42,357**	**31.8%**
10	83	-	5,028	-	2,651	-	**7,762**	**5.8%**
12	129	-		251	13,399	453	**14,232**	**10.7%**
Total	**40,863**	**412**	**5,052**	**251**	**67,496**	**19,281**	**133,355**	**100%**
Percent of Total	**30.6%**	**0.3%**	**3.8%**	**0.2%**	**50.6%**	**14.5%**	**100%**	**-**

Current materials of choice for replacement are PVC pipe for lateral mains and copper pipe for service lines. PE pipe is being considered for future service lines. An inventory of the service lines was not compiled due to insufficient information and the actual service lines at each water connection.

The distribution system's existing condition depends greatly on the construction materials, age of the pipe since installation, and level of workmanship at the time of construction. In general, steel pipe is considered the most susceptible to corrosion and leakage. In 2004, water system improvements replaced much of the undersized steel pipe with larger diameter PVC pipe. However, a significant amount of steel pipe ranging from 2 to 12 inches in diameter remains in service. The 2004 water system improvements also included installing an additional water main crossing (a combination of 14-inch HDPE and 12-inch PVC pipe) at the Touchet River's pedestrian bridge located south of Highway 12 (Main Street).

Hydraulic Capacity Analysis

The City's water distribution system was previously evaluated for its hydraulic capacity using a computer model in the 2007 *Water System Plan*. Since the projected MDD flows are lower and the projected PHD flows are slightly higher (approximately 50 gpm) than the projected flows in the previous plan, and because no significant improvements have been made to the City's distribution system in the past 7 years, the basis and findings of the model from the 2007 *Water System Plan* are still relevant and applicable to this plan. The following is a discussion of the existing computer hydraulic model and analysis.

The computer hydraulic model was compiled and based on the known system layout and anticipated operating conditions. The model was created using Water CAD® v.7.0 by the Haested Methods Solution Center of Bentley Systems, Inc. Water CAD®, a state-of-the-art software tool primarily used in analyzing and modeling water distribution systems. This program employs mathematical algorithms based on hydraulic principles to predict system pressures and flow rates within a water system. Fire flows are of particular interest since the magnitude of these flows typically dictates the necessary hydraulic capacity of the water system.

The distribution system was defined using an existing water system map completed in 2004 following the major system improvements project. The information included pipe diameters, materials, and locations. Reservoir and junction elevations were defined using topographic data supplied by 3Di, LLC under subcontract with Anderson Perry & Associates, Inc. City staff provided other system information such as valve conditions, hydrant locations, and reservoir details. The compiled model contained 959 pipe elements and 859 nodes or junctions. A copy of the map used for the model (showing the pipe elements and nodes) is included in a separate document titled *Hydraulic Modeling Documentation for the City of Dayton's Water System* (Anderson Perry & Associates, Inc., 2015).

In modeling the distribution system, a few assumptions were made. Using the topographic data from 3Di, the junction elevations were set at ground level. Assuming water main pipes are typically buried 3.0 feet below the ground surface, water pressures predicted by the model should be within 1.3 psi of the actual pressure within most water mains, which is sufficiently accurate for water modeling purposes.

Nominal pipe diameters are used to model the distribution system. Hazen-Williams roughness coefficients are used to account for the head loss through the pipe generated by friction with the wall and the reduction in diameter based on the material type and buildup. This method generally gives conservative values. Individual minor losses from valves and fittings are included with the roughness factors in the pipes.

Scenarios simulating various water demand conditions including fire flow and PHD were performed and areas with low pressure were identified. Higher elevation areas were segregated into separate pressure zones from the rest of the distribution system. Three flow scenarios were evaluated using the hydraulic computer model: 1) Calibration, 2) PHD, and 3) Fire Flow under MDD conditions. These flow scenarios are discussed below with additional documentation presented in a separate document titled *Hydraulic Modeling Documentation for the City of Dayton's Water System* (Anderson Perry & Associates, Inc., 2015). The City's pressure zones and fire hydrant coverage are illustrated on Figures 3-1 and 3-2, respectively.

Scenario No. 1 – Calibration

Since a model is a representation of an existing system used to predict the system's response to change, a model is only useful if it can be calibrated and validated. The accuracy of the City's water system model output with existing conditions was checked, or calibrated, using water pressures and flows observed and collected in the field with the hydraulic model. Pressures and flows available in the main lines were calculated. Pressures were calibrated for the system first by adjusting friction factors until the pressures in the model closely approximated measured pressures in the real system. In general, calibration is within approximately ±10 percent, which is considered a reasonable level of accuracy given the uncertainties in the model data.

To calibrate the model, fire hydrant flow tests were conducted on October 5, 2006 at six specific locations in the system, and the data was used to adjust the modeling parameters to more accurately represent the actual system. During the test, all the wells were off, and the reservoir level started at 35 feet and ended at 33.3 feet. At each hydrant, the static pressure was measured at both the hydrant being tested and a nearby reference hydrant. When the hydrant was opened, the residual pressure and flow rate were measured as well as the residual pressure at the reference hydrant.

Static and residual pressures were measured with 0 to 160 psi pressure gauges marked in 2 psi (for the flowing hydrant) and 5 psi increments (for the reference hydrant). The pressure gauges used for measurement were compared with each other to verify their accuracy. Flow rates from the hydrants were calculated from the quotient of the cumulative flow (in gallons) from a 2-1/2-inch diameter Sparling fire hydrant meter and the flow time period. The hydrant flow rates from the Sparling meter were compared to the City's hydrant flowmeter, and the flow was found to be within 10 percent of the City's flowmeter. Flow measurement with a pitot tube was performed, and the flow adjusted to 20 psi residual was found to be approximately 20 percent less than the flows observed with the hydrant meters. Due to difficulties in holding the pitot tube steady in the flowing stream, this method of measurement was not utilized during the hydrant tests. A summary of the hydrant flow data collected on October 5, 2006 is shown in Table 3-8.

TABLE 3-8

Fire Flow Test Data – October 5, 2006

Test No.	Location		Pressure (psi)				Flow Rate (gpm)
	Flowing Hydrant	Reference Hydrant	Flow Static	Flow Residual	Reference Static	Reference Residual	
1	2nd and Park Streets	Northwest Corner, 3rd and Park Streets	75	71	70	70	571
2	Southeast Corner, 3rd and Main Streets	Northwest Corner, 3rd and Main Streets	73	73	75	74	627
3	3rd and J Streets	4th and J Streets	65	62	65	64	554
4	5th and Clay Streets	Northeast Corner, 5th and Clay Streets	60	58	57	56	504
5	6th Street and Dayton Avenue	Hose Bib at 702 Dayton Avenue	68	63	66	64	600
6	West End of Fairgrounds by Track	West End of Fairgrounds by Stands	90	86	90	85	694

Using the measured reservoir level and assuming the ADD with the wells off, the model was run with no hydrant flows to give a "static" system measurement. Next, the measured flow rate was placed at each hydrant, and the system response was calculated. Based on the outcome of the initial run, some of the system parameters were updated to more accurately reflect the real system. These results are shown in Table 3-9.

TABLE 3-9

Hydraulic Model Calculations Based on Fire Flow Test Data

Test No.	Nodes		Pressure (psi)			
	Flow Hydrant	Reference Hydrant	Flow Static	Flow Residual	Reference Static	Reference Residual
1	H-198	H-850	74	72	72	71
2	H-608	H-398	74	73	74	73
3	H-445	H-539	65	64	63	62
4	H-748	V-744	57	57	57	57
5A	H-657	J-658	66	63	66	63
6A	H-70	H-73	90	86	89	85

The difference between the actual and predicted pressures for both the static and residual values was within ±5 percent. Due to uncertainties in the model data, this level of accuracy is considered sufficient.

Scenarios No. 2 and 3 – Peak System Flows

The second scenario evaluated the system's response under the PHD condition. Demands for major water users were placed in appropriate locations, and the remaining demand was distributed evenly throughout the system. Under this condition, the model was run with the ES in the reservoirs depleted. In accordance with the WAC 246-290-230 (5), the pressure throughout the distribution system must be at least 30 psi under PHD.

The final scenario evaluated the system's response under fire flow conditions at each hydrant during MDD conditions. For the fire flow condition, DOH requires the FSS in the reservoirs to be depleted. A maximum demand of 6,000 gpm was placed at each hydrant, one at a time, and the system response was determined. If any location in the pressure zone was below 20 psi, the demand was reduced and the simulation repeated. This procedure continued until all of the locations were supplied with a minimum of 20 psi. The hydrant either passed or failed the flow test based on the calculated fire flow requirement for that particular hydrant. In general, the minimum fire flow required was 1,000 gpm. Three areas were selected for increased fire flow demand. In the 2001 *Water System Plan* (Gray & Osborne Inc.), the fire flow requirements were 2,500 gpm for the hospital, 3,000 gpm for the high school, and 3,000 gpm for the fairgrounds. The same requirements were used in this simulation.

The results of Scenarios No. 2 and 3 were used to identify three pressure zones (see Figure 3-1): Low pressure (less than 20 psi), acceptable pressure (20 through 80 psi), and high pressure (greater than 80 psi). Of these zones, the low pressure zone is of most concern due to potential backflow conditions.

Five areas were identified as experiencing lower than the required minimum pressures for one or more of the demand conditions. Four of the five low pressure areas are a result of the relative difference in elevations between the City's water reservoirs and the service area locations. In general, the simulations indicated that areas above 1,675 feet in elevation would require a booster pump or gravity reservoir system to maintain pressure during fire flow conditions. The five areas are discussed in detail below.

Hydraulic Distribution System Deficiencies and Improvements

The following is a brief summary of the low pressure zones identified from the hydraulic modeling and proposed improvements.

Area 1: Upper Syndicate Hill – This low pressure area is near the 2.0-MG reservoir and includes the area north of South 8th Street, between 7th and 8th Streets, east of Clay Street, and between 6th and 7th Streets from the intersection of 6th and Spring Streets to East Park Street. Due to the elevation difference between this area and the 2.0-MG reservoir (approximately 20 to 70 feet from the reservoir base), the anticipated low and high static pressures are approximately 10.6 psi (the bottom of the reservoir tank and the highest residence, 1,725 feet) and 50 psi (overflow level and elevation 1,675 feet). This area was predicted to experience low pressures under all of the simulated system demand conditions. Under sustained fire flow conditions, the entire area is anticipated to experience pressures below 20 psi. The total number of affected water services in this area is approximately 40 to 50.

Short-term solutions for low pressures during high flow conditions in the Upper Syndicate Hill area include: 1) imposing a moratorium on water connections in the affected area or 2) installing individual booster pumps at each connection. Moratoriums do not solve the low pressure situation, but do prevent further pressure reductions created by additional system users. However, moratoriums are typically unpopular since the restrictions affect whether individual property owners can develop their properties. For the Upper Syndicate Hill area, the vast majority of the taxable lots are already developed. Since the area is near full development, imposing a moratorium would not likely be an effective means of correcting low pressures.

Several water users in the Upper Syndicate Hill area (especially near the 2.0-MG reservoir) already have individual booster pumps to maintain satisfactory pressures at their residences. The installation of these individual booster pumps likely dates back to either when the original residences were constructed or with the construction of the 2.0-MG reservoir in 1978. In either case, installing individual booster pumps has been the historical measure for correcting low water pressures in this area. The use of individual booster pumps appears to be the best short-term solution. Since the area is almost fully developed, the connection of additional users is not anticipated to adversely affect water service. To comply with WAC 246-290-230 (8), the City will need to manage and control any new individual booster pumps installed in the area. First, the City should survey users within the Upper Syndicate Hill area to identify specific users within the low pressure area, whether these users have individual booster pumps and appropriate fittings (e.g., backflow prevention, isolation valves, emergency shutoff controls, pressure relief valves, etc.), and the extent of service and maintenance performed on the pumps. The City will need to bring any deficient systems into compliance with respect to CCC.

Potential long-term solutions include constructing an upper level reservoir with a booster pump station to feed the reservoir, installing individual groundwater wells, and constructing a regional booster pump station. Since a new upper level reservoir would need to be located a considerable distance from Upper Syndicate Hill to achieve the necessary elevation and corresponding static water pressure for adequate water service, constructing a new reservoir is not considered a cost-effective option. Additionally, a new upper level reservoir would require constructing a new booster pump station and water main to convey water to and from the reservoir, property acquisition for the reservoir site, and easements for the new water main.

Installing individual groundwater wells in this area is also not considered a viable option due to the anticipated groundwater depth, cost, close proximity of the properties, and the fact that the users are within the City and are connected to the City's water system.

The best long-term solution for the Upper Syndicate Hill area is to install a new, regional booster pump station and a network (3,500 LF) of smaller diameter (4- and 6-inch) water mains at the 2.0-MG reservoir site. The existing 12- and 10-inch water mains would remain in place to continue to provide fire flows, while the new small diameter water mains would provide higher-pressure water service to the existing users.

Area 2: North Hill – This area is near the 220,000-gallon standpipe and includes the area northwest of Whitman Avenue. Due to the relative elevation differences between this area and the 200,000-gallon standpipe, the estimated low and high static pressures are approximately 8.5 psi (the bottom of the reservoir tank and the highest residence, 1,725 feet) and 50 psi (overflow elevation and elevation 1,675 feet), respectively. This area was predicted to experience low pressure under fire flow conditions.

Potential short- and long-term solutions for low pressures in the North Hill area are essentially the same as those identified for the Upper Syndicate Hill area. The North Hill area differs from the Upper Syndicate Hill area in two main ways: 1) The area has a limited number of existing water services currently affected by low pressures and 2) the area was recently platted and is in the development process. Since imposing a moratorium would likely result in legal action against the City, installing individual booster pumps is the best short-term solution for correcting low pressures. The City will need to manage and control any new individual booster pump systems installed in this area.

For the same reasons indicated for the Upper Syndicate Hill area, the most viable long-term solution is installing a regional booster pump station. Though this area will experience future growth, the total number of services is anticipated to be approximately 15, which is not thought to adversely affect reservoir capacity or line pressure. Due to the steep topography and the lack of usable space at the 220,000-gallon standpipe site, the booster pump station would be located downhill of the standpipe. A combination of 4- and/or 6-inch water mains (1,400 LF) would be installed to provide the higher pressure service (without fire flow) to this area.

Area 3: Cemetery – This area is above the South 6th and East Lee Streets intersection. Under fire flow conditions at the hospital, this area dropped below the minimum allowable pressure in the computer model. The estimated low and high static pressures at this water service is 19.5 psi (the bottom of the reservoir tank and elevation of 1,705 feet) and 38 psi (overflow elevation and elevation of 1,705 feet), respectively. The cemetery is served by an existing 4-inch diameter steel water line and backflow preventer.

As water at the cemetery is used exclusively for irrigation, proposed improvements (East Lee Street water line) include replacing the existing 4-inch steel pipe with approximately 250 LF of new 6-inch PVC water main using the existing backflow preventer and installing a combination air valve (to prevent vacuum in the pipe and release air).

Area 4: North Touchet Road (Outside City Limits) – Due to this area's elevation relative to the City's water reservoirs, this area typically experiences low water pressure (less than 30 psi). Estimated low and high static pressures are approximately 20 psi (the bottom of the reservoir tank) and 38 psi (overflow elevation) at an elevation of 1,704 feet, respectively. Under fire flow conditions, services above elevation 1,675 feet (approximately at the south end of the City limits) are anticipated to drop below the minimum allowable pressure. A total of 23 connections are serviced through the existing 12-inch diameter line, approximately 15 of which are believed to be in the low pressure zone during fire flow events.

The North Touchet Road area that experiences low pressure has a number of characteristics that are distinct from the Upper Syndicate Hill and North Hill areas including the following:

- Located outside City limits
- Some, but not considered high, growth potential
- A small number of existing users (23 total)
- Fire flow is not currently available
- Served by a dead-end, relatively long-run (approximately 7,500 LF) 12-inch diameter water main constructed out of a combination of PVC and steel (majority) pipe

Short-term solutions for low pressures include imposing a moratorium on new connections and/or installing individual booster pumps at each service. Potential long-term solutions include constructing an upper level reservoir with a booster pump station to feed the reservoir, constructing a regional booster pump station, or installing individual groundwater wells.

The biggest obstacles to both short- and long-term solutions are: 1) The relatively small number of users in the affected area, 2) the existing oversized main's size and anticipated condition (12-inch diameter, steel pipe), and 3) the existing main's long length (over 7,500 LF). The best short-term solution depends on the proposed long-term solution. The most viable long-term options are either constructing a booster pump station and installing a new, smaller diameter water main (4- to 6-inch) or installing an individual groundwater well for each service. Installing a new water main to serve the low pressure area of North Touchet Road will be challenging due to the existing main's location (underneath a paved County Road, on limited shoulders, through private property, with portions of steep topography) and length (approximately 4,600 LF of steel pipe needs to be replaced). Installing individual groundwater wells is appealing, since it eliminates the improvements needed to replace the existing steel water main and construct a booster pump station.

Since both potential long-term solutions have merit, selecting the best long-term solution will likely depend on which option is most cost-effective for the City and acceptable to the existing users. Timing of any proposed improvements will depend on the amount of water leakage and pressures observed in the existing water main.

In 2008, the City imposed a moratorium on any new water system connections outside the City's UGA and installed a master flowmeter and backflow preventer at the south end of South 4th Street for the 12-inch water main serving users off North Touchet Road. The enacted moratorium prevents new additional water demand from further reducing the available pressure on the North Touchet Road main. The master meter and backflow preventer installation allows flow measurement on this line and protects the City's main distribution system from potential backflow from this lower pressure area. Based on a comparison of the master meter and individual service meter readings, the 12-inch main has a significant leak downstream of the City's master meter. City staff isolated the leak to a section of the main that includes the Baileysburg area, but have been unable to detect the leak source primarily due to the low pressures in this portion of the main. Repairing and/or replacing this section of the water main will depend in part on the type, extent, and location of the leak(s).

The best short-term solution for the low pressure area on North Touchet Road is to keep the moratorium for new connections and continue to maintain and operate the existing water main. Additional investigation (i.e., North Touchet Road water service evaluation) is needed to determine the best long-term solution for possible water in this area.

Area 5: 2nd Street Southeast of the Public Schools – Under fire flow conditions at the public schools (the hydrant southeast of the 2nd and Oak Streets intersection), this area is anticipated to experience low pressures. The residual pressure at this hydrant is shown on the model to reach the minimum allowable pressure at less than 2,100 gpm. Design fire flow for the high school is 3,000 gpm. The low pressure is attributed to the existing water main not being looped with the 8-inch diameter main on South 3rd Street. The other fire hydrants adjacent to the schools have capacities that meet or exceed the required desired fire flows.

Two options for improving fire flow on the 2nd Street side of the public schools include installing a new water main in 2nd and School Bus Streets, or looping the water mains on both these streets at 2nd and 3rd Streets. The City's preferred choice is to replace 950 LF of 6-inch AC pipe in South 2nd Street (East Park Street to halfway between the gym and shop) and East Oak Street (between South 1st and South 2nd Streets) with 12-inch diameter pipe. The City's preferred pipe improvement would replace ±60-year old pipe and galvanized steel pipe services that are already in need of replacement.

Other Distribution System Deficiencies and Improvements

In addition to the distribution system deficiencies identified by the computer hydraulic modeling, other system deficiencies or improvements include suspected leaking water main sections, replacing existing steel mains with newer pipeline material (i.e., PVC), and undersized water mains from general system design standards (e.g., 2-inch mains). Solutions for the majority of the deficiencies are obvious (e.g., replace old, undersized pipe with new, larger diameter pipe). Brief descriptions, analyses, and evaluations of the more complex projects are below.

Note: Of the improvements identified in the City's 2007 *Water System Plan,* only the North Cherry Street Drain Line project was completed.

North 5th Street and Patit Avenue – This project will complete improvements in this area initiated in 1982 and 2004. Previous work consisted of connecting the two services north of Patit Creek to a new water main and installing a flush hydrant. An attempt was made to abandon the line at Patit Avenue and North 5th Streets. However, in 2004, due to the depth of the existing main (approximately 12 feet) and a lack of funding, this work was never completed. The project will involve replacing the existing 2-, 4-, and 6-inch water mains in North 5th Street from Washington Avenue to Patit Avenue and in Patit Avenue from North 5th Street to Highway 12. The total length will be approximately 1,300 LF of 8-inch water main.

Front Street Drain Line – The overflow and drain line for the 220,000-gallon standpipe follows the Front Street right-of-way down the hill to Dayton Avenue and then continues on to a discharge point in Patit Creek. The pipe section from the standpipe to Dayton Avenue is 10-inch and is thought to be the old transmission line to the standpipe. The section from Dayton Avenue to Patit Creek is 8-inch, thin-walled pipe that is thought to be the original drain line. The section of pipe between Dayton Avenue and Patit Creek is within the street section, shallow, has very little slope, and is in extremely poor condition. The condition from the standpipe to

Dayton Avenue is unknown, but is thought to be in better condition. These pipes were apparently used when the original ground-level open reservoirs were in place, and thus likely date back to the early 1900s. The section of pipe from Dayton Avenue to Patit Creek that needs to be replaced to provide sufficient hydraulic capacity with minimum slope is approximately 1,100 LF of 12-inch pipe.

Brooklyn Avenue, North 1st Street, and Whitman Avenue – Replace the existing 1-1/2-inch water line in Brooklyn Avenue from North 1st Street to North Front Street, the 2-inch water line in North 1st Street from Dayton Avenue to Whitman Avenue, and the existing 4-inch steel line in Whitman Avenue from North 1st Street to North Front Street. The length of new 8-inch diameter pipe will be approximately 1,600 LF.

Clay Street – Work involved in this project includes replacing the existing 4-inch steel line in Clay Street between South 3rd and South 4th Streets with approximately 420 LF of new 8-inch water line.

Patit Avenue – During the 2004 construction improvements, the existing line in Patit Avenue from North 2nd to North 3rd Streets was confirmed to be a 2-inch steel line in very poor condition. This 2-inch steel line also extends on Patit Avenue east of North 3rd Street. From North 2nd to North 3rd Streets, pipe will be replaced with approximately 500 LF of new 6- and 8-inch water main, and the existing 2-inch steel line to the east of North 3rd Street will be replaced with approximately 250 LF of 2- or 4-inch new pipe.

Tremont Street – This project includes replacing the existing 6-inch steel line between South 3rd and South 4th Streets with approximately 420 LF of new 8-inch water main.

Hannah Street – This project involves replacing the existing 4-inch steel pipe in Hannah Street between South 5th and South 6th Streets with new 6-inch diameter pipe. Part of this water line is 6-inch AC pipe expected to be in good condition. The actual length of the 4-inch steel pipe is unknown. The anticipated length of new 6-inch pipe is 350 LF. Most of the pipe to be replaced is in a steel hillside without a street.

South Cottonwood Street – In 2004, a new water line consisting of 12-inch HDPE and 10-inch PVC was installed between South 1st and South Cottonwood Streets on the pedestrian bridge to provide another water main crossing of the Touchet River. On the South Cottonwood Street side, the 10-inch PVC main was connected to an existing 6-inch AC water main that connects two existing 6-inch AC mains at the Cameron and South Cottonwood Streets intersection. To improve the hydraulics along these streets and to the southwest portion of the City, a new 8-inch main will be installed from the connection point with the existing 10-inch PVC main and with two 8-inch mains on South Cottonwood Street to West Spring Street and on Cameron Street south to Willow Street. The total length of these water mains would be approximately 2,000 LF. The pipe replacement in South Cottonwood Street (approximately 850 LF) would improve system hydraulics and replace pipe that has had numerous leaks in the last few years.

North Willow Street – Work on this project includes replacing the existing 2-inch steel water line in North Willow Street from Dayton Avenue to the City limits and connecting the water line to the existing 6-inch PVC pipe in West Whitman Avenue with approximately 500 LF of 8-inch water main.

Washington Avenue – This project replaces approximately three blocks of existing 6-inch steel water line with new 8-inch PVC water main on Washington Avenue between North 1st and North 4th Streets. An 8-inch diameter main was proposed to match the 8-inch diameter main on Washington Avenue between North 4th Street and Highway 12. The total length of this pipe replacement is approximately 1,500 LF.

North 1st Street – This project includes installing approximately 800 LF of new 8-inch water main on North 1st Street between Washington Avenue and Main Street. The new water line will replace the existing 6-inch diameter AC pipe along this two-block section.

South 6th Street – This project includes replacing three blocks of existing 6-inch steel water line on South 6th Street between Main and Tremont Streets. Approximately 1,150 LF of new 8-inch pipe will be installed.

East Main Street (South 5th to 7th Streets) – With this project, the existing 6-inch steel water main will be abandoned along the south side of Main Street between South 5th and 7th Streets and the existing services will be reconnected to the existing 10-inch cast iron main on the north side of Main Street.

East Main Street (South 7th Street to Patit Road) – This project replaces an existing 6-inch steel water main with an 8-inch or greater diameter main along East Main Street from South 7th Street east to and along Patit Road to the Columbia REA site. The area north of Highway 12 and along Patit Road is within the City's water service area and has the potential for future growth. A minimum 8-inch diameter pipe is recommended for this alignment; however, a larger diameter pipe may be needed depending on the water service demand required by future development. For this plan, installing a new 8-inch diameter main is assumed. The total estimated length of the new main is approximately 2,500 LF.

South 8th Street – This project will replace approximately 750 LF of existing 4-inch steel and 6-inch AC water line with a 10-inch water main between Spring and Main Streets. This 10-inch main will provide a large diameter pipe for the area served by the proposed Main Street-Patit Road Water Line Replacement project.

Harlem Road and Highway 12 – This project will replace an existing 4-inch steel water line on Harlem Road between Main Street and Wagon Road (Road No. 2457) with 2,000 LF of 8-inch water main and abandon 700 feet of existing 4-inch steel pipe from Harlem Road to North Pine Street.

Stockton Road – With this project, the existing 4-inch steel water line on Stockton Road from the WWTP to Stedman Road will be replaced with an 8-inch main. An 8-inch diameter pipe design is proposed for this replacement due to the existing system looping and high pressures in this area. The total anticipated length is 1,200 LF.

Stedman Road and Strom Road – This project will replace approximately 400 LF of existing 2-inch steel pipe with a new 8-inch water main on Stedman Road from Commercial Road to Stockton Road and approximately 500 LF of existing 2-inch steel pipe with a new 8-inch water main on Strom Road.

East Race Street – This project will include replacing the existing 2-inch steel water main on Race Street, east of South 5th Street, with 250 LF of 6-inch PVC pipe.

West Dayton Avenue – This project includes replacing 400 LF of existing 4-inch cast iron pipe on West Dayton Avenue from North Willow Street to the west end with 6-inch pipe. The existing 4-inch pipe would be abandoned in place.

Labor Camp Road Loop – Improvements include completing the water main loop on Labor Camp Road from North Guernsey Avenue to the end of the Patit Road water main; approximately 1,300 LF of 8-inch main.

Pittman Road (West of Wagon Road (Road No. 2457)) – The project includes replacing approximately 1,100 LF of 1-1/2-inch steel pipe with a combination of 4- and 8-inch pipe and eliminating several long distance services.

Physical Capacity Analysis

The physical capacity analysis is based on the water system's ability to meet the MDD for the entire water system, including source, treatment, storage, transmission, and distribution system components. The physical components of a water system, when properly operated, provide the infrastructure for the water system's physical capacity to serve its customers under peak demand conditions.

The basic unit of a water system's physical capacity is the ERU (WAC 246-290-222). The number of ERUs a water system can accommodate is based on physical and legal constraints. Physical capacity calculations were based on guidance given in Chapter 6 of DOH's *Water System Design Manual* (2009). The physical capacity of the City's overall water system is summarized in Table 3-10. Detailed bases and calculations for the physical capacity analysis are provided in Table D-1 of Appendix D.

TABLE 3-10

Overall System Physical Capacity in ERUS

Component	ERUs
Present ERUs	2,660
Source, Water Rights Annual Volume	10,313
Source Capacity, Peak Day Based	4,027
ES	Unlimited
SB	3,059.7
Total Capacity Related Storage	3,015.3
Distribution System	See "System Deficiencies and Proposed Projects" for more information.

System Deficiencies and Proposed Projects

The system deficiencies noted in the above sections, proposed improvement projects to correct these deficiencies, and anticipated capital costs are summarized in this section. Analyses and discussions of potential improvements to resolve or eliminate existing and anticipated deficiencies were addressed in the above sections.

The identified water system improvements were assigned into one of three priority groups with Priority 1 being the most critical projects and Priority 3 being long-term projects. Improvements were assigned into priority groups based on considerations of the following: Identified health concerns, regulatory non-compliance, potential improvements to WUE (i.e., reducing leakage) and system operation, coordination with other infrastructure improvement schedules (i.e., repaving or chip sealing a street), improvement financing, and projected growth. Higher priority was given to improvements that address identified health concerns and regulatory non-compliance.

Brief descriptions of each priority group and the types of projects within that group are below.

- **Priority 1** projects are considered the most critical and should be undertaken as soon as funding can be made available. These projects are scheduled for completion within the next 6 years and include improvements to maintain system quality and health guidelines, bring the system into regulatory compliance (both short-term and/or long-term solution), and increase fire flow and/or WUE.
- **Priority 2** projects should be completed as funding becomes available. These projects include further system improvements to upgrade the existing system, bring the system into regulatory compliance, and increase fire flow and/or WUE.
- **Priority 3** projects should be implemented as needed to improve WUE, address new development, and upgrade the existing system's operation and function. These projects include improvements that may not be considered critical but improve system efficiency and operation.

The priority groups were established with input from City staff and Council.

The system deficiencies and proposed improvement projects are summarized by functional group in Table 3-11 and shown in Figure 3-3. The improvements are prioritized within each functional group. These and other program improvements are summarized in Chapter 8, Improvement Program.

TABLE 3-11

Summary of System Deficiencies and Proposed Projects

No.*	System Improvement	Reason
PRIORITY 1 IMPROVEMENTS		
D-1	North 5th Street (Washington Avenue to Patit Avenue) and Patit Avenue (North 5th Street to Highway 12) – Replace existing 2-, 4-, and 6-inch steel pipe with 1,300 LF of 8-inch pipe.	Replace undersized 2-, 4-, and 6-inch steel pipe and eliminate a water main crossing of Patit Creek.
D-2	High School Water Main – Replace existing 6-inch AC pipe in South 2nd Street (East Park Street to halfway between the gym and shop) and in East Oak Street (South 1st Street to South 2nd Street) with 950 LF of 12-inch pipe.	Insufficient fire flow capability at High School and replacement of undersized mains.
D-3	Front Street Drain Line – Replace approximately 1,100 LF of 12-inch main from Dayton Avenue, and to Patit Creek for discharge.	The section of pipe from Dayton Avenue to Patit Creek is in extremely poor condition.
D-4	North Touchet Road Area Water Line – Repair leak and add valves as needed.	Substantial leak identified on this water main that needs to be repaired.
PRIORITY 2 IMPROVEMENTS		
D-5	Brooklyn Avenue (North 1st Street to North Front Street), North 1st Street (Dayton Avenue to Whitman Avenue), and Whitman Avenue (North 1st Street to North Front Street) – Replace the existing 1-1/2-, 2-, and 4-inch steel pipe with 1,600 LF of 8-inch pipe.	Replace undersized 1-1/2-, 2-, and 4-inch steel pipe.
D-6	Clay Street (South 3rd to South 4th Streets) – Replace existing 4-inch steel pipe with 420 LF of 8-inch pipe.	Replace undersized 4-inch steel pipe.
D-7	Patit Avenue (North 2nd Street to dead end east of North 3rd Street) – Replace existing 2-inch steel pipe with 500 LF of 6- and 8-inch pipe and 250 LF of 2- or 4-inch pipe east of North 3rd Street.	Replace undersized 2-inch steel pipe.
D-8	Tremont Street (South 3rd to South 4th Streets) – Replace existing 6-inch steel pipe with 420 LF of 8-inch pipe.	Replace undersized 6-inch steel pipe.
D-9	Hannah Street (South 5th to South 6th Streets) – Replace existing 4-inch steel pipe with 350 LF of 6-inch pipe.	Replace undersized 4-inch steel pipe.
D-10	North Hill Pressure System – Install a new booster pump station and 1,400 LF of 4- and/or 6-inch water main.	Potential low system pressure in this area from low water level in the reservoir or high flows (e.g., fire flow) due to its proximity to the 220,000-gallon standpipe.
D-11	Upper Syndicate Hill Pressure System – Install a new booster pump station and 3,500 LF of 4- and 6-inch water main.	Potential low system pressure in this area from low water level in the reservoir or high flows (e.g., fire flow) due to its proximity to the 2.0-MG reservoir.

** – D - Distribution*

TABLE 3-11 (CONT.)

Summary of System Deficiencies and Proposed Projects

No.*	System Improvement	Reason
PRIORITY 3 IMPROVEMENTS		
D-12	South Cottonwood Street (West Spring Street to 650 LF south of Cameron Street) – Replace existing 6-inch AC main with 2,000 LF of 8-inch pipe.	Replace undersized 6-inch AC water main.
D-13	North Willow Street (Dayton Avenue to the City limits and connecting to the line in West Whitman Avenue) – Replace existing 2-inch steel pipe with 500 LF of 8-inch pipe and complete a loop.	Replace undersized 2-inch steel pipe and loop system by connecting to the 6-inch main on West Whitman Avenue.
D-14	Washington Avenue (North 1st to North 4th Streets) – Replace existing 6-inch steel pipe with 1,500 LF of 8-inch pipe.	Replace undersized 6-inch steel pipe.
D-15	North 1st Street (Washington Avenue to Main Street) – Replace existing 6-inch AC pipe with 800 LF of 8-inch pipe.	Replace undersized 6-inch AC pipe.
D-16	South 6th Street (Main to Tremont Streets) – Replace existing 6-inch steel pipe with 1,150 LF of 8-inch pipe.	Replace undersized 6-inch steel pipe.
D-17	East Main Street (South 5th to South 7th Streets) – Abandon existing 6-inch steel pipe and transfer services to the existing 10-inch pipe.	Abandon old pipe and put services on newer 10-inch pipe.
D-18	East Main Street (South 7th Street to Patit Road) and Patit Road (from East Main Street to Columbia REA) – Replace existing 6-inch steel pipe with 2,500 LF of 8-inch pipe.	Replace undersized 6-inch steel pipe.
D-19	South 8th Street (Spring to Main Streets) – Replace existing 4-inch steel pipe and 6-inch AC pipe with 750 LF of 10-inch main.	Replace undersized 4-inch steel pipe and 6-inch AC pipe.
D-20	Harlem Road and Highway 12 (Wagon Road (Road No. 2457) to North Pine Street) – Replace 2,700 LF of 4-inch steel pipe with 2,000 LF of 8-inch pipe and abandon 700 LF of pipe.	Replace and abandon undersized 4-inch steel pipe.
D-21	Stockton Road (WWTP to Stedman Road) – Replace existing 4-inch steel pipe with 1,200 LF of 8-inch pipe.	Replace undersized 4-inch steel pipe.
D-22	Stedman Road (Commercial Road to Stockton Road) and Strom Road – Replace existing 2-inch steel pipe with 900 LF of 8-inch pipe.	Replace undersized 2-inch steel pipe.
D-23	East Lee Street (South 6th Street to the cemetery pumphouse) – Replace existing 4-inch steel pipe with 250 LF of 6-inch pipe.	Replace undersized 4-inch steel pipe.

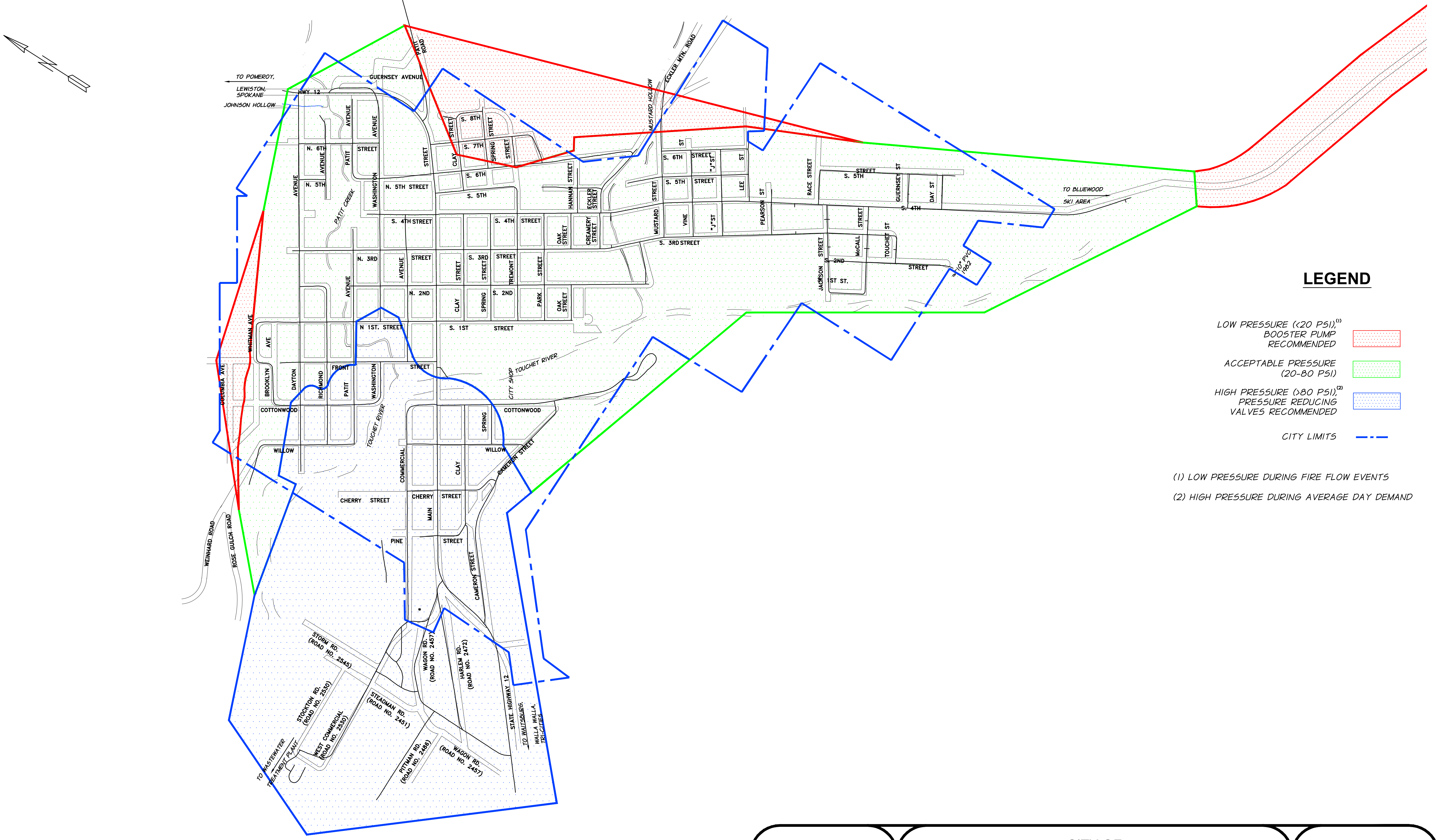
** – D - Distribution*

TABLE 3-11 (CONT.)

Summary of System Deficiencies and Proposed Projects

No.*	System Improvement	Reason
PRIORITY 3 IMPROVEMENTS (CONT.)		
D-24	East Race Street (East of South 5th Street) – Replace existing 2-inch steel pipe with 250 LF of 6-inch pipe.	Replace undersized 2-inch steel pipe.
D-25	West Dayton Avenue (North Willow Street to west end) – Replace existing 4-inch cast iron pipe with 400 LF of 6-inch pipe.	Replace undersized 4-inch cast iron.
D-26	Labor Camp Road Loop – (North Guernsey Avenue to the end of the Patit Road line) – Complete loop and install 1,300 LF of 8-inch main.	To complete water main system loop in the area.
D-27	Pittman Road (west of Wagon Road (Road No. 2457)) – Replace approximately 1,100 LF of 1-1/2-inch pipe with 4- to 8-inch pipe and eliminate several long service lines.	Replace undersized 1-1/2-inch steel pipe and eliminate several long distance service lines.

** – D - Distribution*



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SCALE: 1" = APPROXIMATELY 1200'

anderson perry & associates, inc.

CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN
PRESSURE ZONES

FIGURE
3-1

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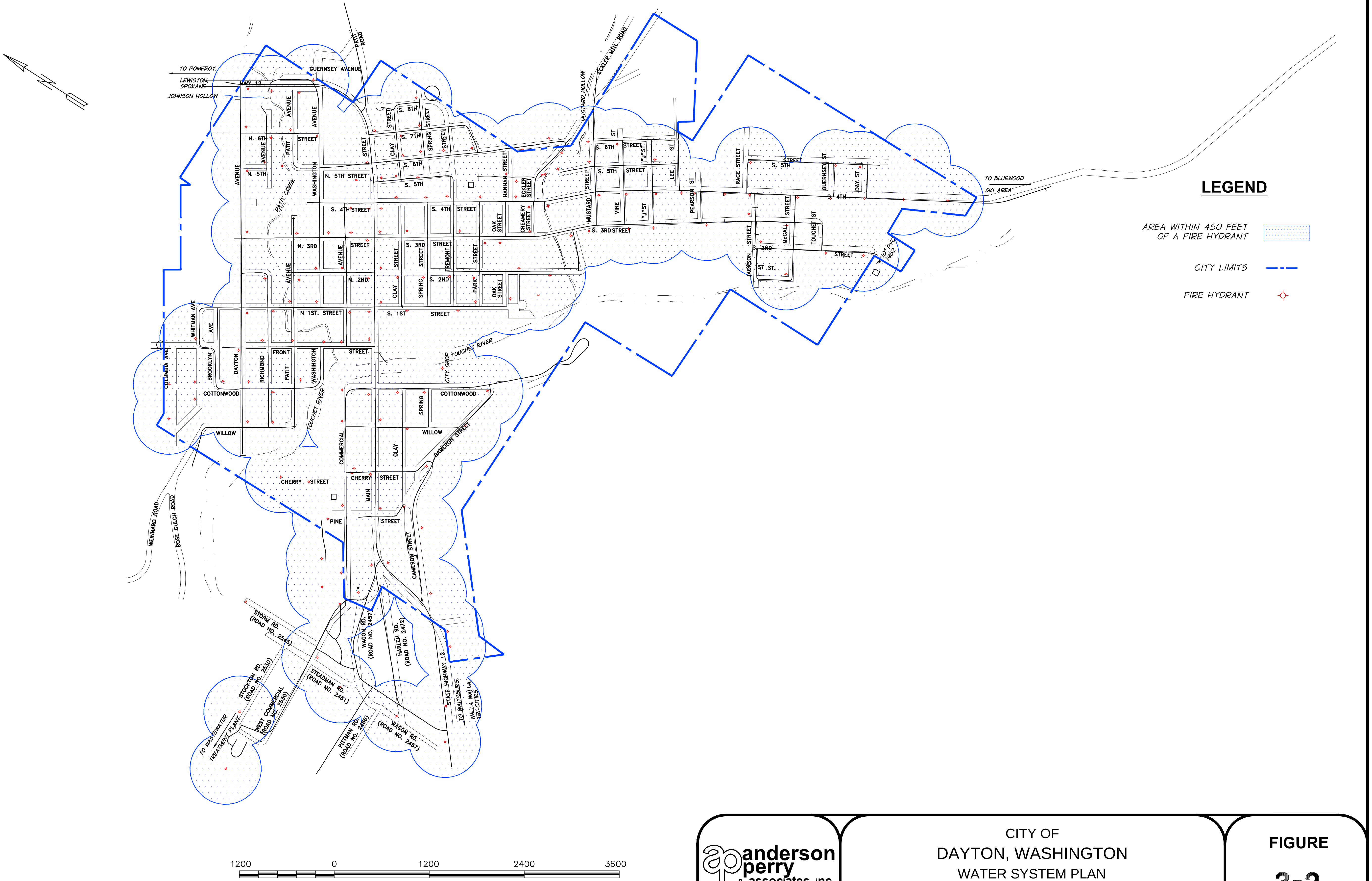

LEGEND

AREA WITHIN 450 FEET OF A FIRE HYDRANT	▨
CITY LIMITS	— · —
FIRE HYDRANT	⌖

SCALE: 1" = APPROXIMATELY 1200'

anderson perry & associates, inc.

CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN

FIRE HYDRANT COVERAGE

FIGURE
3-2

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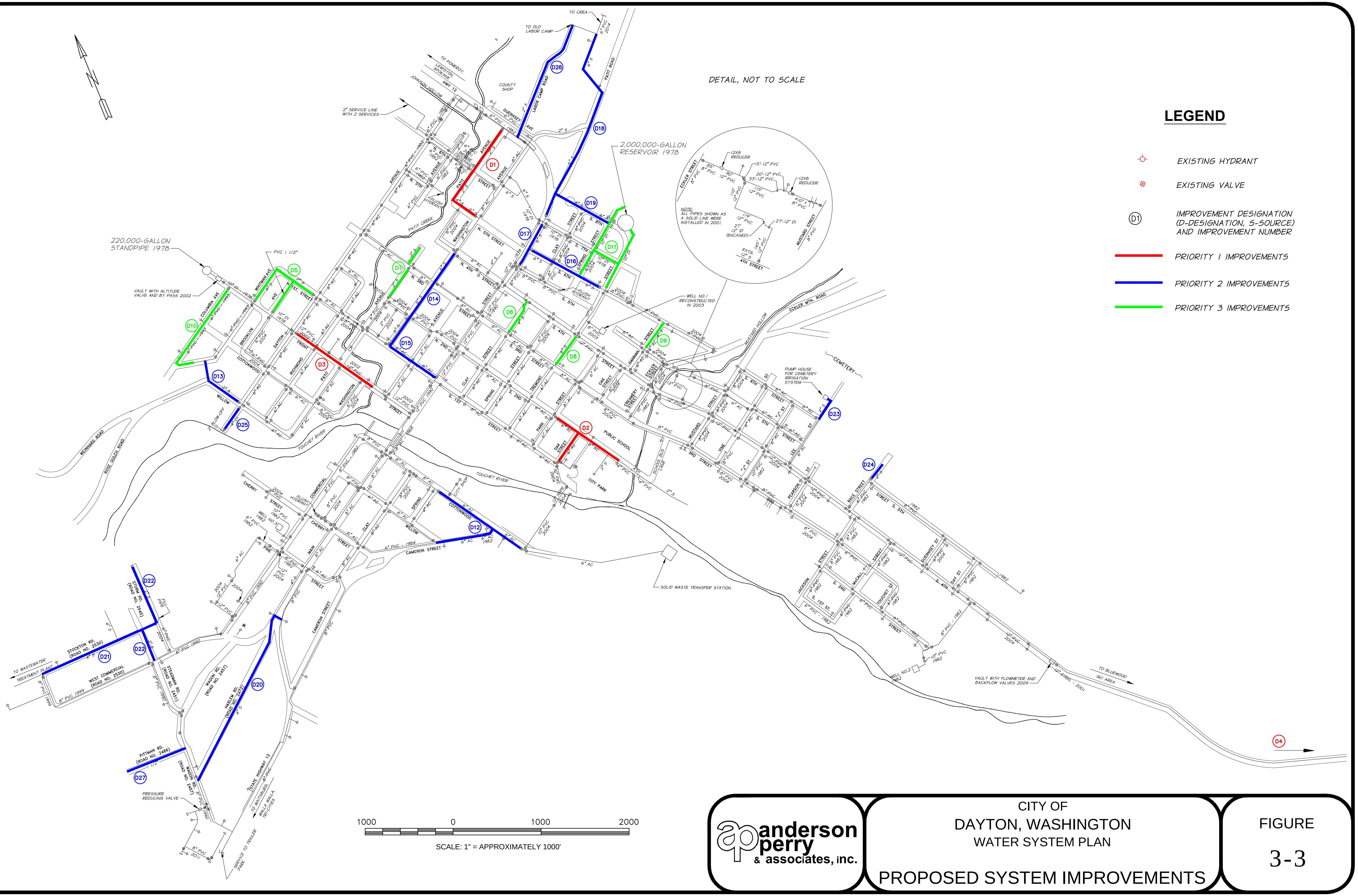


LEGEND

⌖	EXISTING HYDRANT
⊗	EXISTING VALVE
Ⓓ1	IMPROVEMENT DESIGNATION (D-DESIGNATION, S-SOURCE) AND IMPROVEMENT NUMBER
🟥	PRIORITY 1 IMPROVEMENTS
🟦	PRIORITY 2 IMPROVEMENTS
🟩	PRIORITY 3 IMPROVEMENTS

anderson perry & associates, inc.

CITY OF
DAYTON, WASHINGTON
WATER SYSTEM PLAN
PROPOSED SYSTEM IMPROVEMENTS

FIGURE
3-3

R:\Clients\Dayton\918-120 Water System Update\020 Plan Update\Water System Figure 3-3.dwg, 3/17/2015 10:19:05 AM

Chapter 4 - WUE Program, Source of Supply and Water Right Analyses, System Reliability, and Interties

The objective of this chapter is to develop a WUE program that will promote efficient water use, review source of supply, ensure adequate water rights for future needs, and promote system reliability and function.

WUE Program

WUE measures consist of practices and activities that result in any beneficial reduction in water losses, waste, use, or demand. Efficient water use benefits the water purveyor, customers, and environment by improving water quality, reducing water system expenses, reducing the need for upgrades, and protecting water resources.

WUE requirements for the State of Washington are described in DOH's *Water Use Efficiency Guidebook* (2011). The main elements of these rules include:

- Current Water Conservation/WUE Activities
- Water Metering and Data Collection Requirements of Production and Consumption Meters
- Water Supply Characteristics
- Water Demand Forecasting
- DSL Standard
- WUE Program Elements and Goals
- Submission of Annual Performance Reports

Each of these elements and how they pertain to the City's water system are discussed below.

Current Water Conservation/WUE Activities

The City is currently adhering to the Water Conservation Program outlined in the City's previous *Water System Plan* (Anderson Perry & Associates, Inc., 2007). This program and the status of the City's current water conservation measures are summarized in Table 4-1.

TABLE 4-1

Status of Current Water Conservation Measures

Measure/Activity	Status
Program Promotion - Provide water conservation brochures and pamphlets at City Hall and the library.	Brochures are currently available at City Hall. Library management is no longer under City administration.
Source Meters - Test and calibrate source well meters once every 5 years, or as needed.	Installation of new flowmeter at Well No. 2 and reconditioned flowmeters at the other wells is proposed for 2014.
Customer Assistance - Provide conservation literature and limited technical assistance.	Three guides for using water efficiently are available on the City's website: • Ideas for Lawn Watering and Maintenance • Ideas for Indoor Water Usage • Ideas for Gardening and Landscaping
Bill Showing Consumption History - Show percentage increase/decrease in water consumption on customer water bills.	The City recently upgraded its billing software to a program capable of providing this service. The City is currently implementing this software.
Service Meters - Replace an average of 130 new water meters each year and compile a service meter inventory.	Installed approximately 526 new meters since 2007 and compiled the service meter inventory.
Unaccounted for Water/Leak Detection - Budget annually for regular leak detection in the system and install a master meter on the 12-inch main serving users south of the City.	Performed periodic leak detection; master meter was installed in 2007.
Single-Family/Multi-Family Kits - Conduct survey of customers on the potential participation and type of desired kit items; review findings with the Council and decide a course of action.	Survey was not conducted.
Landscape Management, Playfields – Xeriscaping - Continue current WUE irrigation practices.	Existing practices have been maintained. Underground sprinkler and timer system was installed at Little League park.
Conservation Pricing - Periodically review adopted conservation rates (inclining block rate).	Rates are reviewed annually during the budget process.
Water Audit - Perform annual and monthly water audits of the water produced and used.	Performed annual audits in conformance with WUE rules.
Survey Customers About Potential Rebates - Conduct a customer survey on potential participation in a utility rebate program for items such as ultra-low flow toilets, front-loading washers, and toilet valve flappers.	Survey was not conducted.
Reevaluation of Reclaimed Water Opportunities - Reevaluate reclaimed water opportunities with respect to the WWTP's effluent discharge.	Started work on the Wastewater Facilities Plan, which will include an evaluation of reclaimed water use opportunities.

Water Metering and Data Collection Requirements of Production and Consumption Meters

WUE rules require that all production and consumption in municipal systems be metered. The City is in compliance with this rule as all active sources and customers are currently metered.

Water Supply Characteristics

The City relies on groundwater from three wells (Nos. 1, 2, and 3) to supply its potable water needs. All three wells are deep (greater than 1,000 feet below ground) basalt wells. The combined instantaneous total well capacity is 2,900 gpm.

The City has a total of two water rights with diversions of up to 2,700 gpm, instantaneous flows, and an annual volume of 3,630 ac-ft/yr.

Water quality from all the City's sources is acceptable and within the State's drinking water standards.

Water Demand Forecasting

Water demand forecasting is typically tied to historical population growth and the region's demographic trends. Most projections are based on the extrapolation of past trends from an area or region. While history may not repeat itself, past trends serve as an initial basis for population projections. Future water demand is also affected by a community's WUE. The ability to conserve and use water efficiently factors into future water demand projections.

DSL Standard

The WUE rules require a DSL standard of 10 percent or less based on a 3-year rolling average. DSL is all unauthorized water and all authorized water that is not tracked or estimated. As discussed in Chapter 2 and Technical Memorandum No. 2 (included in Appendix E), the City's calculated rolling DSL for the past 3 years (2011 through 2013) is 12.5 percent. Since this average is above the State standard of 10 percent, the City is required to compile and implement a WLCAP. Recommendations for this plan are provided in Technical Memorandum No. 2.

WUE Program Elements and Goals

In the 2007 *Water System Plan*, the City adopted unaccounted-for water goals of 15 percent by Year 2012 and 10 percent by Year 2026. Due to inconsistent use and interpretation, the term "unaccounted-for" water is no longer readily used and has been replaced by the term "non-revenue" water. DOH's *Water Use Efficiency Guidebook* (2011) utilizes two terms related to water loss: authorized consumption and DSL. Given the changes in terminology and water loss definitions, the City's unaccounted-for water goals are currently referred to as DSL goals.

With the City's current DSL (2013) of 11.2 percent, Dayton is close to complying with the State's DSL standard of less than 10 percent. The City will likely be able to comply with the standard before Year 2026. Consequently, for this new *Water System Plan*, we recommend the City adopt a supply side goal of a DSL of less than 10 percent by Year 2020.

In addition to a supply side goal, the City also adopted a demand side goal to reduce overall water consumption by 2 percent as defined in average gallons per day over a 6-year period. Because the City adopted this goal at its June 3, 2009 City Council meeting, this goal supersedes the City's conservation objectives presented in the 2007 *Water System Plan*.

The City's historical annual water use for 2005 to 2006 and 2010 to 2013 is summarized in Table 4-2.

TABLE 4-2

Historical Annual Service Water Use, 2005 to 2006 and 2010 to 2013

Year	Water Use (gallons)		
	Inside City	Outside City	Total
2005-2006	200,910,721*	32,967,382	**233,878,103***
2010-2011	171,546,993	17,589,415	**189,136,408**
2011-2012	188,999,756	16,809,947	**205,809,703**
2012-2013	200,037,819	19,147,454	**219,185,273**

* – *Corrected value – Different than the value shown in the previous Water System Plan (Anderson Perry & Associates, Inc., 2007)*

On November 24, 2014, the City held a public hearing to consider questions or comments regarding the following new WUE goals (a copy of the advertisement and minutes for the public hearing are provided in Appendix E).

- One percent reduction in ADD gpd from the current 2014 value by Year 2020 – demand side goal
- DSL of 10 percent or less in Year 2020 – supply side goal

The City adopted these goals for WUE at their City Council meeting on December 15, 2014 (meeting minutes are included in Appendix E).

Implemented and Evaluated WUE Measures

DOH's *Water Use Efficiency Guidebook* (2011) lists the measures that a municipal water purveyor must implement and evaluate. With 1,481 water service connections, the City must implement five mandatory WUE measures, evaluate conservation rates and reclaimed water use opportunities, and evaluate or implement five additional WUE measures. These steps are summarized as follows:

- Install and operate production meters on all sources
- Install and operate consumption meters on all services
- Perform meter calibration
- Implement a WLCAP to control leakage
- Educate customers about WUE practices
- Evaluate consumer rates that encourage water demand efficiency
- Evaluate reclaimed water use opportunities (for systems with 1,000 or more service connections)
- Evaluate or implement five additional measures

These proposed WUE measures are discussed further below, and the City's proposed WUE program is summarized at the end of this section.

Install and Operate Production and Consumption Meters and Perform Meter Calibration

Since production meters are already installed and operating at all of Dayton's current production sources, the City is in compliance with this WUE requirement. However, the City has not had a formal, scheduled testing of the well production meters because they are unable to test the meters without leaving the wells unmetered. The City has proposed purchasing a new flowmeter for Well No. 2 and reconditioning this well's existing meter. The reconditioned meter would then be installed in Well No. 3. The flowmeter from Well No. 3 would be reconditioned and installed in Well No. 1. The flowmeter from Well No. 1 would be reconditioned and serve as a spare meter. This meter would start the flowmeter replacement and reconditioning cycle again in approximately 6 years.

Consumption meters are installed and operating on all of the City's services in accordance with the WUE requirement. The City is in the process of replacing meters, with approximately 42 percent of the meters replaced since 2007. Continued meter replacement is planned depending on the number of meters that fail, available time for staff to install the meters, and budget.

Implement a WLCAP to Control Leakage

Since the City's 3-year DSL rolling average (12.5 percent) is above the 10 percent DSL standard, the City is required to compile and implement a WLCAP. The main elements of the plan are summarized below. See Technical Memorandum No. 2 in Appendix E for more information.

- Establish a WUE Supply Side Goal of a DSL Less than 10 Percent
- Install New and Refurbished Source Water Production Meters
- Better Documentation and Tracking of Unbilled Authorized Consumption
- Leak Detection
- Continued Water Meter Replacement
- Locate and Repair Water Main Leak off North Touchet Road
- Water Main Repair and Replacement

Customer Education about WUE Practices

Under the State's WUE rules, customer education on WUE measures is required at least once per year. Implementing customer education measures more than once a year is considered an additional WUE measure.

The goal of WUE education is to inform customers about the importance of efficient water use. Customer education may take the form of mailers, workshops, or individual WUE reviews. Education topics can range over a wide variety of conservation issues including the following:

- Detecting and fixing leaks
- Low water use landscaping (Xeriscape™) and irrigation practices
- Efficient water use when washing cars or other outdoor uses

- Potential curtailment activities
- General conservation awareness

The AWWA and DOH have developed a significant amount of education materials such as pamphlets, videos, CD-ROM computer programs, and other materials to assist water providers in their customer education efforts. Information is available on a variety of topics, and materials can be obtained for practically any age group, demographic, or purpose at little or no cost to the water provider.

The effectiveness of customer education measures on water conservation is difficult to predict. During periods of drought, public awareness is high and education may result in significant water consumption reductions, while at other times effectiveness may depend on the program.

Presently, the City's public education efforts primarily consist of messages included in the annual Consumer Confidence Reports, guides for using water efficiently on the City's website (http://www.daytonwa.com/index.php/city-hall/public-works), and WUE brochures displayed at City Hall. We recommend the City continue these existing customer education efforts.

Water Conservation Rate Pricing

A proper water rate structure supports and encourages water conservation. The ideal conservation rate structure encourages maximum participation in WUE efforts while simultaneously providing revenue stability, user equality, and easy implementation and administration. The City currently uses the rate structure shown in Table 4-3, with prices shown in terms of $/cf and $/gallon.

TABLE 4-3

City's Water Rates

Tier	Volume (cf)	Price	Volume (gallons)	Price
Base	0 to 800	$33.60	0 to 5,984	$33.60
1	801 to 50,000	$0.00772/cf	5,985 to 374,026	$1.03/1,000 gallons
2	50,001 to 100,000	$0.00849/cf	374,027 to 748,052	$1.135/1,000 gallons
3	>100,000	$0.00882/cf	>748,053	$1.179/1,000 gallons

While this rate structure provides excellent revenue stability, we recommend the City consider adjusting the prices and volume allowances of the inclining block tiers to provide incentive for users consuming water over the base rate to conserve water. An overwhelming majority of the City's water customers fall within the first tier block with consumption from 801 to 50,000 cf. The range of water usage within this tier is too large to promote WUE. This first tier should be divided into at least two, or maybe three tiers.

The ranges of the remaining two existing tiers for usage above 50,001 cf could remain the same. To remain an inclining block rate structure, the prices of these two upper tiers would need to be revised to reflect any price changes made to the lower block rate tiers.

The price difference in the City's existing tiered rates is relatively small, with only a 10 percent difference between Tiers 1 and 2 and an approximately 4 percent difference between Tiers 2 and 3. To effectively promote WUE with tiered rates, the rate difference typically ranges between 25 and 100 percent. Preliminary recommendations on the City's tiered rates are presented in Chapter 9, Financial Program and Implementation. We recommend performing a water user rate study once the City's new accounting program is in place and at least 1 year of reliable data is collected with the new program. The estimated cost of this rate study is approximately $10,000.

The City may also wish to revisit how much water is provided with the base rate. Currently, the base rate allowance includes 800 cf of water, or 5,984 gallons per month. A number of cities and small towns in Eastern Washington provide a volume allowance with their base water rate to assist lower income residents. Most communities provide a monthly base rate volume allowance between 3,000 and 5,000 gallons per month. The City's current allowance of 5,984 gallons is thus on the upper end of the monthly volume allowances of most communities in the area.

The City attempted to reduce the monthly volume allowance from 800 to 400 cf (2,992 gallons), but restored the 800 cf allowance after significant public opposition. The reduction in the base volume allowance likely failed because the move was viewed as a rate increase. City customers may be willing to accept a reduction in the monthly volume allowance if this change was made in conjunction with a reduction in the base rate charge and the addition of a new tier rate that did not increase their monthly water bills for usages under 800 cf (i.e., a rate revenue neutral change).

Reclaimed Water

Under the State's WUE rules, evaluating reclaimed water opportunities and the use of three element cost-effectiveness evaluation criteria are required for water systems with 1,000 or more service connections. This evaluation was completed and discussed in Technical Memorandum No. 1 (included in Appendix E).

While opportunities for reclaimed water use in Dayton exist, the capital costs associated with the infrastructure needed to produce, store, and convey reclaimed water to the areas of use are significant. Given this substantial cost and the anticipated minimal savings of potable water, at this time, we believe the City and its resources would best be served by concentrating efforts on reducing the system's DSL through its WLCAP.

Additional WUE Measures

In addition to the above mandatory WUE measures, evaluating or implementing five additional measures is required. The City has already implemented the following three additional measures:

- Implementation of a Water Conservation Rate Structure – As discussed above, the City's current rate structure is a base rate (800 cf allowance) with three inclining blocks.

- WUE Information on the City's Website – Three WUE guides are available on the City's website.
- Customer Notification of Possible Leak – The City notifies customers when unusual or abnormally high meter readings may indicate a possible leak on the house side of the meter.

The City reviewed the following list of potential measures to implement as its final additional WUE measures. This list is not exhaustive, but represents typical measures that would assist the City in achieving its WUE goals. A brief comparison of proposed measures in terms of the water system, cost sharing, and societal perspectives is provided in Technical Memorandum No. 3 in Appendix E.

- **Additional WUE Information Handouts** – The City would provide additional informational handouts in the customers' bills (over the once per year requirement).
- **Consumption History on Customer Water Bills** – The City has recently acquired a new utility billing program. This new program is capable of including a customer's 12-month consumption history on the bill.
- **Notification of Annual Top 15 Water Users** – The City would notify the top 15 water users in a given year of their total annual use and their ranking as one of the City's top water users. Suitable WUE information would be included with the notification. This measure would inform the City's top water users of their annual water consumption compared to other top users and the City's total annual water consumption.
- **New Customer Water System Informational Packets** – The City would give packets to new water system customers with information on WUE measures, system policies, user rates, cross-connection control, and other helpful information.
- **WUE Educational Display Board(s)** – The City would compile a display board showing the importance and benefits of efficient water use. This board could be displayed at City Hall, the library (with permission), or public events.

Summary

The City's proposed WUE program, including start dates, budget, comments, and additional potential measures, is summarized in Table 4-4. These measures and activities are intended to help the City meet its WUE goals outlined above.

TABLE 4-4

Summary of Dayton's Proposed WUE Program

Measure/Activity	Start Date	Budget	Activity
Install and Operate Production and Consumption Meters			
Production meters already installed	N/A	N/A	In compliance
Test and calibrate production meters at each well once every 6 years or as needed • Well No. 2: New flowmeter head • Well No. 3: Reconditioned Well No. 2 head • Well No. 1: New flowmeter head	October 2014 February 2015 August 2015	$25,000	Flowmeter heads will be reconditioned and recalibrated; reconditioned head from Well No. 1 will be used as a spare
Consumption meters already installed	N/A	N/A	In compliance
Implement a WLCAP to Control Leakage (from Technical Memorandum No. 2)			
Establish a WUE Supply Goal of a DSL of less than 10 percent	October 2014	N/A	Recommended for adoption as a 6-year goal
Install New and Refurbished Source Water Production Meters	See above		
Better Documentation and Tracking of Unbilled Unauthorized Consumption	January 2015	N/A	Initiate education and correspondence of WUE requirements with Fire Department
Leak Detection	January 2015	$3,500	Annually, as needed, until DSL is less than 10 percent
Continued Water Meter Replacement	Ongoing	$5,000	
Locate and Repair Water Main Leak off North Touchet Road	Ongoing	Uncertain	Cost dependent on the location and extent of leak
Water Main Repair and Replacement	Ongoing	Repairs as needed. Replacement as needed, or as shown in Chapter 8.	
Customer Education about WUE Practices			
Education materials sent to customers annually	Ongoing	$50	
Water Conservation Rate Pricing			
Conservation rate structure in place; recommend adding an additional tier block and adjusting the blocks' quantity allowance	January 2016	N/A	Start implementation with budget meetings in October 2015
Additional Measures (Five Mandatory)			
Implement a Water Conservation Rate Structure	Existing	N/A	Already in place
WUE Information on the City's Website	Existing	N/A	Already in place
Customer Notification of Possible Leak	Existing	N/A	City notifies customers based on unusual meter readings
Consumption History on Customer Water Bills	June 2015	N/A	The City recently acquired a new accounting program capable of providing this information
New Customer Water System Informational Packets	June 2015	$25	Estimated cost for materials and printing

Submission of Annual Performance Reports

WUE rules require the submission of an annual performance report on the City's water use and WUE program implementation. This report must include information on how much water is produced, how much water is lost in the distribution system, and what progress has been made toward achieving the annual water savings goals. The City has submitted annual performance reports since 2008 and is thus in compliance with this requirement.

Source of Supply Analysis

The purpose of the source of supply analysis is to evaluate opportunities to obtain or optimize the use of existing sources already developed and evaluate other innovative methods to meet water needs. As discussed in Chapter 3, and in more detail below in the Water Right Evaluation section, the City has sufficient water rights to meet the 6- and 20-year water demands with and without conservation. though not required, a source of supply analysis was performed for the City's system. As part of this analysis, purveyors are required to develop a written analysis of the feasibility and cost-effectiveness of implementing the alternatives listed below.

Conservation Measures

Conservation measures are addressed in the above WUE Program section.

Water Rights Changes

The City uses existing water rights to supply its water system needs. We do not anticipate that the City will need any additional water rights in the next 20 years.

Interties

Opportunities for interties between the City's water system and other water systems are limited due to the City's proximity to other water system purveyors. No interties with other systems are currently planned.

Artificial Recharge

No opportunities for artificial recharge with surface or other available water in the project area currently exist.

Use of Reclaimed Water, Reuse, and Other Non-Potable Sources

The City does not currently use reclaimed water, reuse, or other non-potable sources for domestic or non-domestic uses. An evaluation of reclaimed water use was performed as part of the WUE program analysis, and the results of this evaluation are included in Technical Memorandum No. 1 (Appendix E).

Treatment

As discussed in Chapter 3, the water quality of the source water is acceptable and not considered to be an issue.

Water Right Evaluation

In this section, the City's existing water rights are identified, discussed, and compared to existing and projected water demand. A brief summary of the City's existing water rights is given below, and copies of the City's water rights are presented in Appendix E.

- **Certificate No. 31-D** – This water right authorizes the withdrawal of 700 gpm and 1,130 ac-ft/yr for municipal use within the City of Dayton with a priority date of April 1936. The original certificate was issued for Well No. 1 on March 12, 1946 (Gray & Osborne, Inc., 2001). The superseding certificate, issued August 25, 1993, identifies two additional withdrawal locations (Wells No. 2 and 3). Consequently, this water right is available for use at any of the City's three wells.
- **Certificate No. G3-26587C** – This water right authorizes the withdrawal of 2,000 gpm and 2,500 ac-ft/yr for municipal use with a priority date of July 1, 1980. This water right was originally authorized for Wells No. 2 and 3, but was modified on September 30, 2002 to include Well No. 1 as an additional withdrawal location. Under this water right change, "the total amount of water withdrawn and used for municipal supply under this authorization, and Ground Water Certificate No. 31-D shall not exceed 2,700 gpm, 3,630 ac-ft/yr from the three wells" (Ecology's 2002 Report of Examination, included in Appendix E).
- **Certificate No. 3566A** – This water right authorizes the withdrawal of 278 gpm and 214.2 ac-ft/yr for municipal supply with a priority date of July 21, 1959. This right has not been exercised in recent memory and has been intentionally abandoned by the City. Circa 1996 to 1997, the City apparently signed voluntary relinquishment forms to formalize the fact that this right was no longer used; however, these forms cannot be found (Ecology's 2002 Report of Examination, included in Appendix E). To date, this water right has not been formally relinquished.

Prior to 2002, the City also held Water Right Adjudicated Certificate No. 10. This water right allowed the withdrawal of 1.55 cfs (696 gpm) and 1,115 ac-ft/yr as a primary groundwater water right with the stipulation that if the developed water source could not provide 1.55 cfs, the City could divert the amount deficient from the Touchet River. On January 29, 2002, the City relinquished this water right due to lack of use.

A summary of the City's existing water rights status, without Certificate No. 3566A, is presented in Table 4-5. Certificate No. 3566A was excluded from this analysis as the City abandoned the use of this water right. The existing consumption data presented in this table originates from Chapter 2. Based on the analysis presented in Table 4-5, the City has sufficient water rights to satisfy current water demands within its water system (without conservation).

A summary of the City's forecasted water rights status, without Certificate No. 3566A, is given in Table 4-6. The projected water consumption data presented in this table is from Chapter 3. As shown in Table 4-6, the City's existing water rights are anticipated to meet the 20-year forecasted demands.

TABLE 4-5

Existing Water Rights Status

Certificate No.	Date	Source Wells	Use	Existing Water Rights		Existing Consumption		Current Water Right Status	
				Max. Instant. Flow Rate	Max. Annual Volume	Max. Instant. Flow Rate	Max. Annual Volume	Max. Instant. Flow Rate	Max. Annual Volume
				Qi, gpm	**Qa, ac-ft**	**Qi, gpm**	**Qa, ac-ft**	**Qi, gpm**	**Qa, ac-ft**
31-D	4/1936	1, 2, and 3	Primary	700	1,130	2,438	936	Excess 262	Excess 2,694
G3-26587C	7/1/1980	1, 2, and 3	Primary	2,000	2,500				
			Total	**2,700**	**3,630**				

TABLE 4-6

Forecasted Water Rights Status

Certificate No.	Date	Source Wells	Use	Existing Water Rights		20-Year Consumption		Forecasted Water Right Status	
				Max. Instant. Flow Rate	Max. Annual Volume	Max. Instant. Flow Rate	Max. Annual Volume	Max. Instant. Flow Rate	Max. Annual Volume
				Qi, gpm	**Qa, ac-ft**	**Qi, gpm**	**Qa, ac-ft**	**Qi, gpm**	**Qa, ac-ft**
31-D	4/1936	1, 2, and 3	Primary	700	1,130	2,357	896	Excess 343	Excess 2,734
G3-26587C	7/1/1980	1, 2, and 3	Primary	2,000	2,500				
			Total	**2,700**	**3,630**				

Water System Reliability Analysis

The purpose of this analysis is to ensure an adequate quantity and quality of water can be provided at all times.

Source Reliability

Source reliability is the dependability of drinking water sources to provide an adequate or desired quality and quantity of water over a given period of time. The City has three well sources to provide water to its customers. Wells No. 1 and 2 are located on the east side of the Touchet River, and Well No. 3 is located on the west side of the Touchet River.

All three wells have acceptable water quality. The only water quality concern is a slight trend for increasing nitrate concentrations in Wells No. 2 and 3, but these trends are not statistically significant.

Current (Year 2013) static and pumping water levels in the City's wells are similar to those observed in Years 2001, 2004, and 2006. Consequently, the City does not appear to be depleting its source water aquifer (see description below under Well Level Monitoring).

Water Rights Adequacy

As shown above, the City's existing water rights are sufficient to satisfy the City's current and projected 20-year water demand.

Facility Reliability

Facility reliability is the dependability of the public water system facilities, such as pumps, storage tanks, and water mains, to deliver the desired quantities of water over given periods of time.

Generator – A trailer-mounted generator, typically stored at Well No. 3, is capable of providing backup power at Wells No. 2 and 3.

Reservoirs – The City has some built-in redundancy in its water storage system due to its two storage reservoir tanks (2.0 MG and 220,000 gallon) located on the east side of the Touchet River. To mitigate the limitation of lacking storage facilities on the west side of the Touchet River, the City. has two separate water main crossing locations of the Touchet River (see Distribution System section below). In an emergency, Well No. 3 could be operated for a short period of time (i.e., 1 or 2 days) to supply water to the west side of the City.

Treatment – Each well has its own tablet chlorination unit to disinfect the water. Each unit has enough capacity to store hypochlorite tablets for 2 to 3 weeks of service.

Distribution System – The majority of the City's distribution system is well looped and adequately sized for handling peak potable water demand and fire suppression flow; however, a few water mains are undersized, and better looping is needed in some areas. The proposed capital improvements address most of these deficiencies. The one area that will be difficult to loop is the service area located south of town along the Touchet River. Supply to users in this area will continue to come from a single main due to site constraints and the narrow service area.

To link the west and east side water systems, the City has two water main crossings of the Touchet River: 1) two 8-inch water mains on the Main Street Bridge and 2) a combination of 10-inch PVC and 12-inch HDPE pipe crossing of a pedestrian footbridge between Cottonwood Street and South 1st Street. These mains provide sufficient water main redundancy between the City's west and east sides.

The City also has five water main crossings of Patit Creek to provide water main redundancy within the northern portion of the City.

Water Shortage Response Planning

If a public water system in Washington experiences a water shortage, or anticipates experiencing a shortage in the next 6 years, WAC 246-290-100(4)(d)(v) requires the water system to prepare a water shortage response plan as part of a *Water System Plan*. Previously, the City implemented some public information and voluntary conservation measures (i.e., times for watering) in anticipation of a potential water shortage that did not materialize. Though the City has not experienced a water shortage and does not anticipate experiencing a shortage in the next 6 years, to ensure preparedness, the City included water shortage response measures in its emergency response planning (see Chapter 6).

Well Level Monitoring

Purveyors with groundwater sources are required to have a monitoring program for well levels. Well level monitoring helps the purveyor determine the extent of any trends showing decreased capability of the aquifer, or a specific well, to provide water for utility services on an ongoing basis.

The City's well monitoring program includes recording the well water level readings daily for all the wells being used. A comparison of static and pumping water levels, pumping rates, and pumping hours of Wells No. 2 and 3 was made of data collected in the Years 2001, 2004, 2006, and 2013. A summary of the data for each well is presented in Table 4-7.

TABLE 4-7

Comparison of Historical Well Data

Parameter	2001/2004(1)	2006	2013
Static Water Level, feet(2)			
Well No. 1	50 - 56	50 - 56	50 - 56
Well No. 2	72 - 79	70 - 77	66 - 68
Well No. 3	97 - 117	99 - 111	113 - 119
Pumping Water Level, feet(2)			
Well No. 1	52 - 54	51 - 60	51 - 54
Well No. 2	68 - 76	69 - 74	60 - 65
Well No. 3	90 - 92	90 - 92	92 - 95
Pumping Rate, gpm			
Well No. 1	656(1)	628 - 641	619 - 629
Well No. 2	1,250 - 1,400	1,120 - 1,164	1,235 - 1,257
Well No. 3	1,050 - 1,200	1,060 - 1,194	1,080 - 1,109
Pump Run Hours, hours			
Well No. 1	112(1)	1,106	2,382
Well No. 2	1,909	1,625	1,552
Well No. 3	2,853	513	1,380

(1) – Data for comparison of Well No. 1 was based on April 2004.

(2) – Level of water above the submersible pump.

Based on the comparison of well data given in Table 4-7, the following observations can be made.

- The City increased its reliance on water production from Well No. 1.
- The range of static water and pumping levels in Well No. 2 decreased, showing a slight drop in this well's water level.
- The pumping rate of Well No. 1 is slightly lower in Year 2013 than Year 2006, but the difference is not significant.

Overall, the well level monitoring gives no indication that the City's water production is depleting the source aquifer.

Interties

The City of Dayton has no interties with other water systems and does not have any current plans to establish interties.

Chapter 5 - Source Water Protection

In this chapter, the City's potable source water protection program is discussed. The purpose of the source water protection program or, in the City's case, the Wellhead Protection Plan is to identify, monitor, limit, and control (to the extent feasible) all facilities and activities that may adversely impact the City's wells. Source water protection for Group A systems is required under WAC 246-290-135, -668, and -690.

Status of Existing Wellhead Protection Plan

The City's Wellhead Protection Plan was compiled as part of the 2001 *Water System Plan* prepared by Gray & Osborne, Inc. A copy of this plan (titled Appendix R - Dayton Wellhead Protection Plan) with an updated inventory of potential contaminant sources is provided in Appendix F. The status of the City's Wellhead Protection Plan in regards to the minimum elements required by WAC 246-290-135 is presented in Table 5-1.

TABLE 5-1

Wellhead Protection Plan Status

No.	Element	Status
1.	Susceptibility Assessment	Wells No. 1 and 2 - Low/moderate susceptibility Well No. 3 - High susceptibility
2.	Wellhead Protection Area (WHPA) Delineation	Calculated Fixed Radius method Map of travel zones plotted, WHPA shown
3.	Inventory of Potential Contaminant Sources	Inventory of Potential Contaminant Sources was compiled, plotted on maps, and updated; this inventory needs to be updated every biennial
4.	Notification Documentation to Owners/Operators of Potential Contaminant Sources	Plan indicates that owners/operators were notified
5.	Notification Documentation to Regulatory Agencies and Local Governments of WHPA Boundaries and Source Contaminant Inventory	City notified the appropriate parties
6.	Contingency Plan of Adequate Supply of Water	The City's Contingency Plan is provided in the Wellhead Protection Plan
7.	Notification Documentation to Appropriate Emergency Response Agencies	City notified the appropriate parties

The City will periodically update its inventory of potential contaminant sources, notify regulatory agencies and local governments of its WHPA boundaries and source contaminant inventory, and notify appropriate emergency response agencies of the findings of the Wellhead Protection Plan (see Table 8-2 for timing).

Chapter 6 - Operation and Maintenance Program

The objective of the operation and maintenance (O&M) program is to assure the satisfactory management of the water system operations in accordance with WAC 246-290-100, -300, -320, -440, -480, and -490 and WAC 246-292-020, -050, and -090.

Water System Management and Personnel

The City's management structure includes the Mayor and City Council. The position of Mayor is an elective office with a 4-year term. The City Council has seven positions. One council position has a 2-year term, and the remaining positions have 4-year terms.

The Public Works Director, or, as referred to in the City's Municipal Code, City Superintendent of Water and Streets, reports to the Mayor and City Council. While the titles Public Works Director and City Superintendent of Water and Streets are synonymous, City staff currently use the Public Works Director title. In the absence of the Public Works Director, the Assistant Public Works Director assumes this role.

The City Clerk-Treasurer handles the record keeping of City policy and Board decisions and is responsible for water service billings. The City's positions and their associated responsibilities for the City's water system are summarized in Table 6-1.

TABLE 6-1

City Water System Management and Personnel

Position	Responsibility
Mayor and City Council	• Overall Management and Policy • Budget Formulation • Public and Press Contact
Public Works Director/ Superintendent of Water and Streets	• Field Engineering and Management • Normal Day-to-Day Operations • Preventative Maintenance • Water Quality Monitoring • Emergency Response • CCC (Operator) • Response to Complaints
Clerk-Treasurer	• Record Keeping of Policies and Council Decisions • Billing

Operator Certification

In accordance with WAC 246-292-050, Waterworks Operator Certification, the City must have one certified Water Distribution Manager-2 (WDM) in responsible charge of the system's daily operational activities (at a level equal to or higher than the water system's classification rating). Additionally, the City is required to have a CCC Specialist in responsible charge for overseeing the CCC Program and performing periodic inspections of the premises for cross-connections. The City is in compliance with these requirements. A summary of the water system personnel certifications is presented in Table 6-2.

TABLE 6-2

City Water System Operator Certification

Personnel	Certification	Certification No.
Jim Costello	WDM-3	4674
Lloyd Fletcher	CCC Specialist	13617

System Operation and Control

In this section, the City's operation and control of the water system is discussed.

Major System Components

The major water system components include a telemetry system, source wells, storage reservoirs, hypochlorinators, and the water distribution system.

Telemetry System – The City's source well operation is controlled by a telemetry system that monitors the water level in either the 2.0-MG reservoir tank or the 220,000-gallon standpipe. The telemetry system's master unit is located at the Public Works Shop. The telemetry system provides staff with multiple operational and data acquisition capabilities including: 1) which reservoir water level (2.0-MG or 220,000-gallon standpipe) will be monitored, 2) the water levels for pump operation (on and off), 3) the lead/lag well source to be placed in operation, 4) data on pump run times and reservoir water levels, and 5) alarm conditions. An autodialer located at the Public Works Shop notifies staff of water system alarm conditions.

Source Wells – The City operates three wells. Well No. 1 has the smallest hydraulic capacity and is typically used in the winter months when demand is lowest. Wells No. 2 and 3 are operated either separately or in combination during the higher demand months. As mentioned above, the well operation is determined by staff selection and by the operating water levels in the reservoirs. The wells are currently operated off the 2.0 MG-reservoir tank water level. The wells contain pump control valves that reduce the potential for water hammer at pump start-up and shutdown and allow for flushing of the well casing. The well is designed to drain the discharge piping into the well when not in use to prevent potential damage from freezing.

One standby backup generator, typically located near Well No. 3, is available for use during a power outage. The generator operates using a manual transfer switch located just inside the wellhouse.

Storage Reservoirs – The City operates two gravity-operated potable water reservoirs: A 2.0-MG reservoir tank and a 220,000-gallon standpipe. The reservoir water levels, which fluctuate with customer demand and well pumping, are utilized for well operation. An altitude valve at the standpipe is utilized to prevent overflow.

Hypochlorinators – As water from the wells is pumped into the distribution system, the water is disinfected with a hypochlorite solution. This solution is made using a tablet chlorinator that dissolves solid calcium hypochlorite tablets into water. The solution is metered into the well pump discharge line by a flow-pacing signal from the source meter at each well.

Water Distribution System – The City's water distribution system consists primarily of 4- to 12-inch diameter PVC and AC pipe. The system is generally well looped and currently has one pressure zone.

Routine System Operation and Preventative Maintenance Program

City staff periodically reviews the water system status and performance. Activities include, but are not limited to, those listed in Table 6-3.

TABLE 6-3

System Performance and Preventative Maintenance Procedures

Schedule	Activity
Telemetry System	
Daily	• Verify and acknowledge alarms from previous day • Check and record water reservoir levels
Annually	• Review operation and perform routine maintenance on system, hardware, and software
Wells	
Daily	• Record pump run times and source meter readings; calculate water production • Record well static and pumping levels and flow rate • Inspect wellheads, control valves, equipment, buildings, and fences
Weekly	• Inspect control valve operation • Check pumping rates • Inspect standby power generation systems
Monthly	• File monthly production data report • Inspect well pumps, motors, and controls • Inspect all wellhouse piping for leaks and corrosion • Read and record electric meter readings at wellhouses
Annually	• Clean and inspect control valves • Exercise all valves at wellhouses • Inspect and prepare facilities for winter operations • Inspect safety equipment; repair and replace as needed • Check running amps on pump motors • Take required water quality sampling as required and scheduled
Every 5 Years	• Inspect and test source meters
Storage Reservoirs	
Weekly	• Conduct security check
Monthly	• Inspect storage tank for sanitary and structural deficiencies and defects
Annually	• Perform reservoir maintenance and cleaning as scheduled • Exercise all valves • Inspect ladders, hatches, floats, vents, and safety equipment
Every 5 Years	• Clean and inspect storage tank interior condition

TABLE 6-3 (cont.)

System Performance and Preventative Maintenance Procedures

Schedule	Activity
Hypochlorinators	
Daily	• Inspect and record the number of hypochlorite tablets in feeder • Inspect piping, feed pump, and control panel
Monthly	• File chlorination report • Maintain 15- to 30-day supply of hypochlorite material
Annually	• Clean and/or flush tablet feeder tubes • Inspect and prepare facilities for winter operations
Distribution System	
Monthly	• Record service meter readings • Inspect meter for damage, leaks, and proper operation • Perform water audit of source production and service consumption • Compare water use to previous months to identify declining meter performance or potential water leaks • Maintain log of repairs to water mains and equipment
Annually	• Flush 1/3 of distribution system and exercise 1/3 of hydrants and valves • Inspect and perform maintenance on fire hydrants and guard posts; ensure hydrants are accessible • Exercise 1/3 of mainline valves; record valve condition and turns to operate • Inspect valve box and lid; maintain access/visibility around valves and markers as needed

Copies of the procedures for generator startup and shutdown and a Flushing and Disinfection Guide are provided in Appendix G.

Equipment, Supplies, and Chemical Listing

The City maintains a list of all hazardous materials and chemicals and associated Material Safety and Data Sheets (MSDS) at the Public Works Shop. These lists are updated periodically as new materials are obtained. The City has an existing O&M Manual for the overall water system, supplemented with O&M Manuals for Well No. 1 and the new telemetry system, which are also kept at the Public Works Shop.

Comprehensive Monitoring Plan

The City conducts regular monitoring of its groundwater wells and distribution system. All water quality analyses are performed by certified laboratories except chlorine residual determinations, which are performed by City staff. A summary of the current requirements is presented in the Water Quality Monitoring Report for Year 2014 in Appendix G.

Coliform Monitoring Program

All Group A public water systems are required by the "Group A Public Water Systems" regulations (WAC 246-290) to collect samples for coliform bacteria analysis. Coliform bacteria sample collection must be based on a written monitoring plan that identifies sampling sites throughout the distribution system. A copy of the City's Coliform Monitoring Plan is provided in Appendix G.

Emergency Response Program

WAC 246-290-415 (2) (d) requires public water systems to have an Emergency Response Plan as part of a *Water System Plan*. A copy of the City's Emergency Response Plan is presented in Appendix G.

Work Hazards

Potential work hazards within the City's water system include the following.

- **Toxic or Flammable Atmospheres** – Respiratory protection is not required in atmospheres with contamination levels below permissible exposure limits/threshold limit values. Atmospheres with contamination levels above the permissible exposure limits, but below values immediately dangerous to life or health (IDLH), may be entered when appropriate respiratory protective equipment is properly worn.

  Except in the event of emergency, atmospheres which contain or could contain flammable gases or vapors shall not be entered if the concentration of gases or vapors in any part of the area is more than 20 percent of the lower explosive limit (LEL). In an emergency, only employees protected by equipment approved for such exposures shall be allowed to enter the area. For some substances, measurements less than 20 percent of the LEL may still be IDLH.

  Typically, toxic and flammable atmospheres develop in confined spaces or buildings. The City's confined space entry procedures and permit are in place to prevent personnel exposure to hazardous atmospheres.

- **Oxygen Deficiency or Excess** – Atmospheres having oxygen content less than 19.5 percent oxygen at sea level (this may deviate at higher elevations) shall not be entered without approved respiratory protective equipment which provides an adequate supply of breathing air. Environments with oxygen content above 23 percent increase the danger of fire and explosions. As with toxic and flammable atmospheres, oxygen deficiency or excess typically occurs in confined spaces or buildings. The City's confined space entry procedures and permit are in place to prevent personnel exposure to oxygen deficient or excess atmospheres.
- **Mechanical and Electrical Hazards** – Confined areas containing parts which may move or which contain agitators, fans, or other power-driven moving parts that could be potential hazards to employees shall not be entered until employees assure such parts cannot cause injury. Electrical circuits that may present a hazard shall be disconnected, locked out, and tagged in accordance with the City's lockout/tagout procedure.

  The unexpected release of energy (air, gas, steam, water pressure, etc.) from devices that may store energy (such as springs, elevated machine members, rotating flywheels, hydraulic systems, etc.) has the potential to cause harm to individuals working on the devices. All such devices must be constrained from unexpected releases (locked out) or must be tagged with appropriate warnings (tagged out). This program is required under WAC 296-24-1100.

- **AC Water Pipe** – AC pipe was a relatively popular pipe material before the health hazards associated with breathing asbestos fibers became apparent. The asbestos fibers in these pipes are released or made "friable" when the pipe is cut or broken. As the City's system has a considerable amount of AC pipe, the City developed an AC Water Pipe Plan (see Safety Procedures below).

- **Noise** – Noise from equipment, tools, and vehicles may be considered hazardous depending on the length of personnel exposure and noise level. The City provides hearing protection devices to its employees as part of its Accident Prevention and Safety Program.
- **Spills/Chemical Contact** – The use and handling of hazardous materials can be a hazard depending on the material and type of contact. As mentioned previously, the City maintains a list of MSDS sheets for hazardous materials that outlines the first aid measures, handling and storage, exposure considerations and personal protection, and the physical and chemical properties of the hazardous materials.

Safety Procedures

The City's safety procedures for potential work place hazards include the following.

- **Accident Prevention and Safety Program** – This program outlines the City's general policies regarding accident prevention and safety including the responsibilities of the employees, supervisors, department director, and safety committee, inspections, investigations, correcting a problem, counseling and discipline, alcohol and substance abuse, basic safety rules, special safety rules for shop and field employees, motor vehicle safety, treatment of injuries, securing an accident site, reporting accidents and injuries, and public incident/accident procedures.
- **Confined Space Entry Procedures and Permit** – These procedures and permit pertain to the City's requirements for entering and securing a confined space area as defined by the Occupational Safety and Health Administration. Confined space entry requirements are defined in WAC 296-62-145. WAC 296-45 governs confined space for electrical work and WAC 296-32-340 governs for telecommunications work.
- **Lockout/Tagout Procedures** – These procedures establish the minimum requirements for the lockout and tagout of energy isolating devices whenever maintenance or servicing is done on machines or equipment.
- **AC Water Pipe Plan** – This plan addresses handling, removing, and disposing of AC water pipe by City personnel. The plan includes respiratory protection and protective work clothing, medical surveillance and records, respiratory program and testing, AC water pipe work procedures, cutting of AC water pipe, repair band installation, and wet (hot) tapping of AC water pipe.

CCC Program

The City developed and implemented a CCC Program as required by WAC 246-290-490. The City's ordinance concerning CCC, a copy of the cross-connection database, and copies of sample CCC correspondence are presented in Appendix G. The status of the City's CCC Program in regards to the minimum elements required by WAC 246-290-490 is presented in Table 6-4.

TABLE 6-4
CCC Program Status

No.	Element	Status
1	Ordinance Establishing Authority	Authority established under Ordinance 1510; operating policies and technical provisions are in accordance with the *Cross-Connection Control Manual Accepted Practices and Procedures*, 6th Edition, December 1995.
2	Procedures for Evaluating New and Existing Connections	New connections – City staff reviews all new plumbing permits and investigates any new irrigation systems for potential cross-connection issues. Existing connections – City staff reviews an existing connection with respect to the CCC program when any complaint or problem is brought to the City's attention.
3	Procedures for Eliminating Cross-Connections	The City utilizes the procedures presented in the *Cross-Connection Control Manual Accepted Practices and Procedures*, 6th Edition, December 1995.
4	Provide CCS on staff	The City has one certified CCS on staff.
5	Procedures for Test Requirements	The City has procedures to track and enforce backflow device test requirements.
6	Assembly Testing Quality Control	The City hires certified testers to perform assembly testing. These testers are required to submit their certification and calibration assembly testing results to the City on an annual basis.
7	Backflow Event Response Procedures	The City has a Customer Complaint Response Program and Backflow Incident Response Plan in place. Background information on backflow incidents, the Backflow Incident Report Form, and the Backflow Incident Response Plan are included in Appendix G.
8	Cross-Connection Education Program	Pamphlets on CCC with new plumbing permits are available at City Hall.
9	CCC Database	The City maintains electronic and paper documentation of cross-connection records. A copy of the current database is provided in Appendix G.
10	Extra Requirements for Reclaimed Water	The City does not distribute reclaimed water.

Customer Complaint Response Program

The City currently has a Customer Complaint Response Program. All customer complaints taken by the City staff are recorded. The Public Works Director, Assistant Public Works Director, and/or designated representative will visit the site of the complaint and investigate to determine the cause of the complaint. For better communication and documentation, the City always utilizes two personnel to investigate a complaint. If the problem is determined and can be solved, the City personnel will proceed with the solution and document any findings in the City's logbook kept at the Public Works Shop. If the problem cannot be determined, or if the problem is the fault of the complainant (i.e., indoor plumbing), the complainant is notified and the findings documented in the City's logbook. A copy of the most recent complaint report is included in Appendix A.

All complaints are documented and kept at the Public Works Shop. The Public Works Director reports substantiated complaints and findings to the City Council at the council meeting immediately following the complaint and/or findings. City Council meeting minutes are stored at City Hall.

Recordkeeping and Reporting

A summary of the records kept and maintained by the City is included in Table 6-5. These records are filed and stored either at City Hall or the Public Works Shop.

TABLE 6-5

Summary of Records Maintained by the City

Type of Record	Minimum Time of Record Storage
Bacteriological results	5 years
Daily chlorine residual readings	10 years
Chemical analysis results	Indefinitely
Lead and copper sampling and results	End of calendar year, plus 12 years
Stage 2 disinfection byproducts rule data	10 years
Daily source meter readings	Indefinitely
Monthly service meter readings	6 years
Copies of sanitary surveys and associated records	10 years
Other O&M records, including records of actions taken to correct MCL violations, water quality complaints, etc.	3 years after the last action taken to correct the violation or complaint
Copies of public notices	3 years after issuance
Customer service agreements and notification of customer to install backflow preventer	Indefinitely
CCC correspondence with DOH and local administrative authority	5 years
CCC annual summary reports	5 years
Backflow incident reports, CCC test records	Indefinitely
Project reports, construction documents, drawings, inspection reports, and approval of system facilities	Life of the facility

DOH reporting requirements for the City of Dayton include, but are not limited to, the following:

- Failure to comply with monitoring requirements or the violation of a primary MCL
- Copies of water quality monitoring results required by DOH
- Copies of information relating to the status of monitoring waivers
- An annual WFI form
- Notification of DOH of any positive coliform samples (reporting requirements are in the Coliform Monitoring Plan in Appendix G)
- CCC annual summary report

O&M Plan Improvements

Improvements to the system's O&M plan are summarized in Chapter 8.

Equipment and Instrumentation

City staff identified the following list of equipment and instrumentation as being useful for the O&M of the water system. The City should strive to acquire this equipment and instrumentation when financial resources are available.

- New Vactor Truck
- New Backhoe
- Trailer for Backhoe
- Multi-Frequency Pipe Locator
- Leak Detection Equipment
- Hydrant Meters

Chapter 7 - Distribution Facilities Design and Construction Standards

The purpose of this chapter is to describe and provide guidance on the project review procedures, design and construction standards, and required project documentation for the design and construction of distribution facilities within the City. The City is seeking DOH approval for submittal exemption for future distribution facilities projects. The following is provided as a guide for developers and their design engineers on the City's project review procedures, policies, and design/construction standards.

The City's design and construction standards for distribution facilities contain five elements:

- Project review procedures
- Policies and requirements for outside parties
- Design standards
- Construction standards
- Construction certification and follow-up procedures

These elements are discussed in further detail below.

Project Review Procedures

To ensure proposed improvements are in conformance with State and City standards, all projects except distribution system improvements will be reviewed by DOH, the City, and the City Engineer. Distribution system improvements will be reviewed by the City and the City Engineer. A summary of the City's water service policies and requirements is discussed in Chapter 1, Table 1-2.

Upon project approval, a pre-construction meeting is scheduled between City staff, the developer, and the contractor. Elements discussed at the pre-construction meeting include, but are not limited to, the construction schedule, communication during construction, City standards, traffic control, and ensuring the necessary permits are obtained and fees paid.

Policies and Requirements for Outside Parties

Developers intending to install water improvements on the City's water system that are not specifically exempt in WAC 246-290-125 need to submit the proposed improvements and a completed City application for water service to the City for review and approval. The policy and procedures for new water requests, and the information required for the City to address a request are summarized in Chapter 1, Table 1-3. The City's development standards are described in the *Development Standards, Specifications, and Standard Plans* (2008, revised April 2012). Plans and specifications must be stamped and signed by a professional engineer registered in the State of Washington and experienced in water system design. The developer is responsible for reimbursing the City for expenses incurred by the City Engineer for reviewing the proposed development. All fees and necessary easements need to be received by the City before approval is granted.

Design Standards (Performance and Sizing Criteria)

The water distribution system design shall be in accordance with DOH's *Water System Design Manual* (December 2009), WAC 246-290, the City's design standards provided in Chapter 3, Table 3-1, and other accepted good engineering criteria and practices.

The system's maximum velocity shall be less than 8 feet per second, and system pressure shall not exceed 80 psi without recommending PRVs to the water users (*Water System Design Manual* Sections 8.1.6 and 8.1.7). The City's southwestern section may require PRVs, to be provided by the homeowner or developer, to reduce water pressure below 80 psi. For anticipated low water pressure, a separate pressure zone will be required as discussed in Chapter 1. At elevations above 1,675 feet, a new pressure zone will be required which may consist of a developer-constructed and City-owned booster pump station, isolation valves, and reservoir tank (if needed); see Table 1-2.

Construction Standards (Materials and Methods)

The City's water system material specifications, construction standards, and standard plans are described in the *Development Standards, Specifications, and Standard Plans* (2008, revised April 2012).

In addition to the above standards, all materials that will be in contact with potable water must be listed in NSF International/American National Standards Institute Additives Standard 61 for potable water service.

All installed pipe shall be pressure and leakage tested in accordance with AWWA standards. New water mains will be disinfected in accordance with AWWA Standard C651.

No cross-connection between the distribution system and any pipes, pumps, hydrants, or tanks of non-potable sources is permitted.

Water services and plumbing will conform to applicable International Plumbing Codes and local and State plumbing codes.

Construction Certification and Follow-Up Procedures

City staff or designated representatives shall observe construction on a regular basis to ensure that the completed work complies with City standards. The contractor is required to keep a record of all pressure and leak tests, disinfection procedures and results, and any changes from approved drawings or specifications. Prior to project completion, a final site visit shall be made to identify those items (i.e., a punchlist) that need to be addressed for the City to consider the project complete. Prior to final acceptance, the following items must be addressed and/or submitted to the City.

- Satisfactory completion of all punchlist items.
- Submission of bonding, insurance, easements, and any other requirements.
- As-built drawings of completed work stamped and signed by the design professional engineer registered in the State of Washington.
- Completed DOH Construction Completion Report Form stamped and signed by the design professional engineer registered in the State of Washington.

- Documentation of pressure test and disinfection results.
- O&M Manual, if applicable, of constructed facilities.
- Project Certification – Submission of certification that the work was supervised, inspected, and constructed in accordance with the plans and specifications.
- Project Warranty – Submission of warranty by the contractor or developer on the project materials and workmanship for a 1-year period.
- All fees paid.

The City typically performs an 11-month review of the constructed facilities to determine if any correction items need to be addressed by the contractor or developer.

Chapter 8 - Improvement Program

In this chapter, the City's water system Improvement Program is summarized. This Improvement Program includes a summary and schedule of all capital improvements and system measures identified in previous chapters and provides the City Council, staff, and residents with a systematic approach to addressing the system's short- and long-term infrastructure needs. WAC 246-290-100 requires that systems identify their planned improvements in the *Water System Plan*. DOH has the legal authority to order specific improvements in certain health threatening situations pursuant to WAC 246-290-050.

The Improvement Program for the proposed capital improvements and system measures is summarized below.

Improvement Priority

The priority of proposed capital improvements and system measures is discussed and developed in Chapter 3. In this chapter, the proposed capital improvements to correct system deficiencies are assigned into one of three priority groups with Priority 1 being the most critical projects and Priority 3 being long-term projects. A summary of the proposed capital improvements to correct system deficiencies and their associated priority groups is given in Table 3-11 and shown in Figure 3-3.

Two capital improvements are identified in Chapter 4 for implementing the City's water conservation plan: 1) annual replacement of new service meters and 2) locate and repair the water main leak off North Touchet Road water system. The replacement of new service meters is considered an ongoing program to be performed on an annual basis. Locating and repairing the water main leak off North Touchet Road water system is considered a Priority 1 item.

Priority of system measures was determined based on discussions with the City staff, available funding, regulatory compliance issues, and other factors.

Project Cost Estimates

The presented cost estimates typically include six components: construction cost; engineering cost; contingency; legal and administrative costs; permits, reports, and investigations; and sales tax. The estimates presented are preliminary and are based on the level and detail of planning presented in this plan. As projects proceed and site-specific information becomes available, the estimates provided will need to be revised accordingly.

Construction Cost

The estimated construction costs, compiled in December 2014, are based on actual construction bidding results from similar work, published cost guides, other construction cost experience, and material prices. Reference was made to system maps of the existing facilities to determine construction quantities and locations of distribution lines.

Future changes in the cost of labor, equipment, and materials will require comparable changes in these cost estimates. The amount of adjustment will depend on such factors as future cost changes and when the improvement is scheduled for construction.

Engineering

The cost of engineering services for major projects typically includes special investigations, a Predesign Report, surveying, foundation exploration, preparation of contract drawings, specifications, and O&M manuals, bidding services, construction management, inspection, construction staking, and start-up services. The cost for engineering services typically depends on the size and type of project as well as the specific services being utilized. In most instances, the cost of engineering is estimated to be 20 percent of the construction cost.

Contingencies

A planning level contingency factor equal to approximately 15 to 20 percent of the estimated construction cost is added to the cost estimates. Since the cost estimates are based on conceptual planning, allowances must be made for variations in final quantities, bidding market conditions, adverse construction conditions, unanticipated specialized investigation and studies, and other difficulties not currently foreseen but which may increase final costs. The amount of contingency applied for a specific cost estimate was based on the amount of information available on the proposed improvement and site conditions.

Legal and Administrative

An allowance of 5 percent of the construction cost is added to the cost estimates for legal and administrative services. This allowance is intended to include internal project planning and budgeting, grant administration, liaison, interest on interim loan financing, legal services, review fees, legal advertising, and other related expenses.

Permits, Reports, and Investigations

Permits, reports, and investigations are required to provide documentation needed for project design and/or identify potential cultural and environmental resources. Documentation needed for design or project construction includes available right-of-way and review/evaluation of subsurface and trench conditions along the proposed water main alignment and other system improvements. The purpose of Cultural and Environmental Reports is to consider any adverse effects the project may have on existing cultural and surrounding environments and to propose mitigation measures to minimize potential impacts.

Sales Tax

A sales tax of 8.1 percent of the construction cost is included as part of the total project costs.

Capital Improvement Program and Schedule

The plan and schedule for the City of Dayton's Water System Capital Improvement Program is provided in this section. The recommended improvements were derived from proposed capital improvements to correct system deficiencies and to perform WUE system tasks as well as from other system measures and recommendations presented in the previous chapters.

A summary of the City's Capital Improvement Program is presented in Table 8-1 (see end of Chapter). This table includes a brief project description, reference page, cost, funding source, and the anticipated year or range of years for construction. Improvements are ordered by priority group. The anticipated construction of each priority group is as follows:

- Priority 1 – Years 2015-2020
- Priority 2 – Years 2021-2027
- Priority 3 – Years 2028-2034

Actual funding and construction of the improvements may change depending on such factors as available grant funding, appropriations for infrastructure improvements, and regulatory mandates.

System Measure Improvement Program

The plan and schedule for the City's System Measure Improvement Program are presented in Table 8-2. This table includes a reference page, anticipated budget, start date, and measure frequency/completion date. Implementing these system measures may vary from the information shown in Table 8-2 depending on factors such as additional information, customer feedback, funding, and regulatory mandates.

In addition to the system plan measures discussed in the previous chapters, the City should plan and budget for updating their *Water System Plan*. DOH requires a *Water System Plan* to be updated every 6 years. The next update is scheduled for 2020 and is estimated to cost $40,000.

TABLE 8-1

Capital Improvement Program

No.[(1)]	**Description**	**Reference**	**Total Cost Estimate**[(2)]	**Anticipated Funding Source**[(3)]	**Year**
PRIORITY 1 IMPROVEMENTS					
D-1	North 5th Street (Washington Avenue to Patit Avenue) and Patit Avenue (North 5th Street to Highway 12) – Replace existing 2-, 4-, and 6-inch steel pipe with 1,300 LF of 8-inch pipe.	3-17 and 3-22	$180,000	Outside/Reserve	2015-17
D-2	High School Water Main – Replace existing 6-inch AC pipe in South 2nd Street (East Park Street to halfway between the gym and shop) and in East Oak Street (South 1st Street to South 2nd Street) with 950 LF of 12-inch pipe.	3-17 and 3-22	$150,000	Outside/Reserve	2015-17
D-3	Front Street Drain Line – 1,100 LF of 12-inch pipe.	3-17, 3-18, and 3-22	$110,000[(4)] or $55,000[(5)]	Outside/Reserve	2018-20
D-4	North Touchet Road Area Water Line – Repair leak and add valves as needed.	3-15 through 3-17 and 3-22	$50,000[(6)]	Reserve	2015-16
		Total Priority 1 Project Costs	**$435,000 or $490,000**	-	-
PRIORITY 2 IMPROVEMENTS					
D-5	Brooklyn Avenue (North 1st Street to North Front Street), North 1st Street (Dayton Avenue to Whitman Avenue), and Whitman Avenue (North 1st Street to North Front Street) – Replace existing 1-1/2-, 2-, and 4-inch steel pipe with 1,600 LF of 8-inch pipe.	3-18 and 3-22	$235,000	Outside/Reserve	2021-27
D-6	Clay Street (South 3rd to South 4th Streets) – Replace existing 4-inch steel pipe with 420 LF of 8-inch pipe.	3-18 and 3-22	$60,000	Outside/Reserve	2021-27
D-7	Patit Avenue (North 2nd Street to dead end east of North 3rd Street) – Replace existing 2-inch steel pipe with 500 LF of 6- and 8-inch pipe and 250 LF of 2- or 4-inch pipe east of North 3rd Street.	3-18 and 3-22	$105,000	Outside/Reserve	2021-27

(1) – *D – Distribution*

(2) – *Total project cost estimates based on December 2014.*

(3) – *Outside – Improvements financed with one of the water infrastructure funding assistance programs outlined in Chapter 9.*
Reserve – Improvements financed through the City's cumulative water resource fund.

(4) – *Based on a standalone project.*

(5) – *Based on being replaced as part of a street.*

(6) – *The cost shown is a placeholder. The actual cost cannot be determined until the sources of the leaks are identified.*

TABLE 8-1 (CONT.)

Capital Improvement Program

No.[1]	Description	Reference	Total Cost Estimate[2]	Anticipated Funding Source[3]	Year
PRIORITY 2 IMPROVEMENTS (CONT.)					
D-8	Tremont Street (South 3rd to South 4th Streets) – Replace existing 6-inch steel pipe with 420 LF of 8-inch pipe.	3-18 and 3-22	$60,000	Outside/Reserve	2021-27
D-9	Hannah Street (South 5th to South 6th Streets) – Replace existing 4-inch steel pipe with 360 LF of 6-inch pipe.	3-18 and 3-22	$60,000	Outside/Reserve	2021-27
D-10	North Hill Pressure System – Install a new booster pump station and 1,400 LF of 4- and/or 6-inch water main.	3-14, 3-15, and 3-22	$385,000	Outside/Reserve	2021-27
D-11	Upper Syndicate Hill Pressure System – Install a new booster pump station and 3,500 LF of 4- and 6-inch water main.	3-13, 3-14, and 3-22	$665,000	Outside/Reserve	2021-27
		Total Priority 2 Project Costs	**$1,570,000**	**-**	**-**
PRIORITY 3 IMPROVEMENTS					
D-12	South Cottonwood Street (West Spring Street to 650 LF south of Cameron Street) – Replace existing 6-inch AC main with 2,000 LF of 8-inch pipe.	3-18 and 3-23	$290,000	Outside/Reserve	2028-34
D-13	North Willow Street (Dayton Avenue to the City limits and connecting to the line in West Whitman Avenue) – Replace existing 2-inch steel pipe with 500 LF of 8-inch pipe and complete a loop.	3-18 and 3-23	$70,000	Outside/Reserve	2028-34
D-14	Washington Avenue (North 1st to North 4th Streets) – Replace existing 6-inch steel pipe with 1,500 LF of 8-inch pipe.	3-19 and 3-23	$225,000	Outside/Reserve	2028-34
D-15	North 1st Street (Washington Avenue to Main Street) – Replace existing 6-inch AC pipe with 800 LF of 8-inch pipe.	3-19 and 3-23	$120,000	Outside/Reserve	2028-34
D-16	South 6th Street (Main to Tremont Streets) – Replace existing 6-inch steel pipe with 1,150 LF of 8-inch pipe.	3-19 and 3-23	$170,000	Outside/Reserve	2028-34
D-17	East Main Street (South 5th to South 7th Streets) – Abandon existing 6-inch steel pipe and transfer services to the existing 10-inch pipe.	3-19 and 3-23	$65,000	Outside/Reserve	2028-34

(1) – *D – Distribution*

(2) – *Total project cost estimates based on December 2014.*

(3) – *Outside – Improvements financed with one of the water infrastructure funding assistance programs outlined in Chapter 9.*
Reserve – Improvements financed through the City's cumulative water resource fund.

(4) *– Based on a standalone project.*

(5) *– Based on being replaced as part of a street.*

(6) *– The cost shown is a placeholder. The actual cost cannot be determined until the sources of the leaks are identified.*

TABLE 8-1 (CONT.)

Capital Improvement Program

No.[1]	Description	Reference	Total Cost Estimate[2]	Anticipated Funding Source[3]	Year
PRIORITY 3 IMPROVEMENTS (CONT.)					
D-18	East Main Street (South 7th Street to Patit Road) and Patit Road (from East Main Street to Columbia REA) – Replace existing 6-inch steel pipe with 2,500 LF of 8-inch pipe.	3-19 and 3-23	$350,000	Outside/Reserve	2028-34
D-19	South 8th Street (Spring to Main Streets) – Replace existing 4-inch steel pipe and 6-inch AC pipe with 750 LF of 10-inch main.	3-19 and 3-23	$110,000	Outside/Reserve	2028-34
D-20	Harlem Road and Highway 12 (Wagon Road (Road No. 2457) to North Pine Street) – Replace 2,700 LF of 4-inch steel pipe with 2,000 LF of 8-inch pipe and abandon 700 LF of pipe.	3-19 and 3-23	$320,000	Outside/Reserve	2028-34
D-21	Stockton Road (WWTP to Stedman Road) – Replace existing 4-inch steel pipe with 1,200 LF of 8-inch pipe.	3-19 and 3-23	$170,000	Outside/Reserve	2028-34
D-22	Stedman Road (Commercial Road to Stockton Road) and Strom Road – Replace existing 2-inch steel pipe with 900 LF of 8-inch pipe.	3-19 and 3-23	$60,000	Outside/Reserve	2028-34
D-23	East Lee Street (South 6th Street to the cemetery pump house) – Replace existing 4-inch steel pipe with 250 LF of 6-inch pipe.	3-15 and 3-23	$35,000	Outside/Reserve	2028-34
D-24	East Race Street (east of South 5th Street) – Replace existing 2-inch steel pipe with 250 LF of 6-inch pipe.	3-20 and 3-24	$35,000	Outside/Reserve	2028-34
D-25	West Dayton Avenue (North Willow Street to west end) – Replace existing 4-inch cast iron pipe with 400 LF of 6-inch pipe.	3-20 and 3-24	$56,000	Outside/Reserve	2028-34
D-26	Labor Camp Road Loop (North Guernsey Avenue to the end of the Patit Road line) – Complete loop and install 1,300 LF of 8-inch main.	3-20 and 3-24	$180,000	Outside/Reserve	2028-34
D-27	Pittman Road (west of Wagon Road (Road No. 2457)) – Replace approximately 1,100 LF of 1-1/2-inch steel pipe with 4- to 8-inch pipe and eliminate several long services lines.	3-20 and 3-24	$180,000	Outside/Reserve	2028-34
		Total Priority 3 Project Costs	**$2,436,000**	**-**	**-**

(1) – *D – Distribution*

(2) – *Total project cost estimates based on December 2014.*

(3) – *Outside – Improvements financed with one of the water infrastructure funding assistance programs outlined in Chapter 9.*
Reserve – Improvements financed through the City's cumulative water resource fund.

(4) *– Based on a standalone project.*

(5) *– Based on being replaced as part of a street.*

(6) *– The cost shown is a placeholder. The actual cost cannot be determined until the sources of the leaks are identified.*

TABLE 8-2

System Measure Improvement Program

Description	Reference	Budget	Start Date	Frequency/Completion
WUE Plan Measures				
Test and Calibrate Production Meters at Each Well - Well No. 2: New Flowmeter Head - Well No. 3: Reconditioned Well No. 2 Head - Well No. 1: New Flowmeter Head	4-5 and 4-9	$25,000	October 2014 February 2015 August 2015	Every 6 years or as needed.
Better Documentation and Tracking of Unmetered Use	4-5 and 4-9	N/A	January 2015	Revise and update as needed.
Leak Detection of Water System	4-5 and 4-9	$3,500	January 2015	Annually until DSL is less than 10 percent
Continued Water Meter Replacement	4-5 and 4-9	$5,000	Ongoing	
Locate and Repair Water Main Leak off North Touchet Road Water System	4-5 and 4-9	Uncertain	Ongoing	See Project D-4 in Table 8-1.
Conservation rate structure in place; recommend adding an additional tier block and adjusting the quantity allowance for the blocks	4-6, 4-7, and 4-9	N/A	January 2016	Recommend annual review starting in October
Consumption History on Customers' Water Bills	4-8 and 4-9	N/A	June 2015	Part of the City's new accounting program
New Customer Water System Informational Packets	4-8 and 4-9	$25	June 2015	Provided with new or revised accounts
Wellhead Protection Program				
Update Inventory of Potential Contaminants	5-1	N/A	December 2016	Biennially
Notify Agencies and Government of Plan	5-1	N/A	December 2016	Biennially
Notify Emergency Response Agencies	5-1	N/A	December 2016	Biennially
Administrative, Management, and Planning Measures				
Water System Plan Update	8-3	$40,000	2020-2021	Budget $20,000 for 2020 and $20,000 for 2021, based on 2014 dollars
Inventory of Individual Booster Pumps in Upper Syndicate Hill, North Hill, and North Touchet Road Areas	3-13 through 3-17	N/A	March 2015	Complete by January 2016
Water User Rate Study	4-7 and 9-9	$10,000	May 2016	Complete by October 2016

Chapter 9 - Financial Program and Implementation

The objectives of a financial program are to identify the total cost of providing water service, assure the utility improvement schedule is implemented, and assist in establishing adequate fees for service. A financially viable system has the capacity to obtain sufficient funds to develop, construct, operate, maintain, and manage a public water system on a continuing basis in full compliance with Federal, State, and local requirements. Statutory authority for a financial program is derived from Chapters 43.20, 70.116, and 70.119A of the RCW. Regulatory authorities include WAC Chapters 246-293, 246-294, and 246-290-100. In this chapter, the City's socioeconomic and financial status are analyzed, a financial strategy for implementing the proposed capital improvements is outlined, and a financial plan is proposed.

Socioeconomic Characteristics

A community's ability to afford and pay user fees for utilities, is dependent primarily on the rates established by the utility and the income and wealth of the utility customers. Select socioeconomic characteristics for the City were compiled to help indicate customers' abilities to afford the existing and projected water rates. While the City's water system does serve outside users, due to accessibility, only the socioeconomic data for users inside the City is summarized in this plan.

TABLE 9-1

Key Socioeconomic Indicators*

Indicator	Dayton	Washington State	U.S.
Year	2013	2012	2012
Median Household Income (MHI)	$38,405	$59,374	$53,046
Percent Unemployment from Civilian Labor Force	5.3%	5.8%	6.0%
Percent not in Labor Force	45.8%	34.3%	35.3%
Percent of All People with Income Below the Poverty Level	17.4%	12.9%	14.9%
Percent with Social Security Income	40.4%	26.0%	28.3%
Percent with Supplemental Security Income	7.6%	4.1%	4.6%
Percent with Cash Public Assistance Income	7.6%	4.1%	2.7%
Percent with Food Stamps/SNAP Benefits	22.1%	12.5%	11.4%

** – Source: American Fact Finder, Income Tab, Selected Economic Characteristics table from American Community Survey (ACS) for Dayton City, Washington, 2013.*

With the exception of percent unemployment from Civilian Labor Force, all the indicators in Table 9-1 show the City of Dayton's socioeconomic conditions to be more stressed than both Washington State and the U.S. as a whole. For example, Dayton's percentage of households requiring public assistance is higher than both the State and nation, and the City's MHI is lower.

MHI is one of the most commonly used indicators of a community's economic need. Many funding programs such as Ecology's Community Development Block Grant (CDBG) or DOH's Drinking Water State

Revolving Fund (SRF) as well as regulatory agencies such as the U.S. Environmental Protection Agency (EPA) rely on a community's overall MHI as an indicator of a community's ability to pay utility fees.

As shown in Table 9-1, the City's overall MHI is $38,405. However, since the MHI is the median of the entire community, it does not identify potentially vulnerable populations within the community and may not truly reflect a community's socioeconomic characteristics. The MHI for different types of households is shown in Table 9-2.

TABLE 9-2

2013 MHI by Household Type*

Household Type	MHI
All Households	$38,405
Young (less than 25 years old)	$16,912
Elderly (greater than 65 years old)	$27,578
Renter-Occupied	$16,896
Owner-Occupied	$44,632

* – *Source: U.S. Census Bureau ACS, 2013, City of Dayton, Washington; File No. B25119: MHI in the Past 12 Months (in inflation-adjusted dollars) by Tenure and File No. B19049: MHI in the Past 12 Months (in inflation-adjusted dollars) by Age of Householder*

The households with the least MHI, and thus most vulnerable to additional utility fee increases, are renter-occupied, young, and elderly households.

Income distribution also provides insight on how water rate increases might impact different economic classes. As shown in Table 9-3, approximately one-third of the City's households have an estimated annual income of less than $25,000.

TABLE 9-3

Household Income Distribution*

Income	No.	Percentage	Cumulative Percentage
Less than $10,000	111	9.5	9.5
$10,000 – $14,999	82	7.0	16.5
$15,000 – $24,999	208	17.8	34.3
$25,000 – $34,999	121	10.4	44.7
$35,000 – $49,999	199	17.0	61.7
$50,000 – $74,499	241	20.7	82.4
$75,000 – $99,999	106	9.1	91.5
$100,000 – $149,999	71	6.1	97.6
$150,000 – $199,999	23	2.0	99.6
Greater than $200,000	5	0.4	100.0
Total	**1,167**	**100.0**	**100.0**

** – Source U.S. Census Bureau ACS, 2013, City of Dayton, Washington; File No. DP-03: Selected Economic Characteristics.*

The affordability of current and future rates to the City's customers is addressed further below.

Financial Status

The financial management of the City's water system was reviewed by examining the current water system charges, number of connections, system revenues and expenditures, debt service, financial sustainability, and reserve funds.

Current Water Rates and Connections

The City collects water system fees to finance and maintain adequate reserves for system operation, maintenance, and replacement. As presented in Table 1-2, the City currently charges inside users a base rate of $33.60 per month that includes the first 800 cf (5,984 gallons) of water, a unit rate of $0.00772 per cf for usage between 801 and 50,000 cf, $0.00849 per cf for usage between 50,001 and 100,000 cf, and $0.00882 per cf for usage above 100,000 cf. For outside users, the base rate is approximately 1.38 times higher than the inside rate, and the unit rate is approximately 1.14 times higher than the inside rate. The City also imposes a monthly water meter surcharge on water meters greater than 1-1/4 inches.

The City also collects a CFC depending on meter size (see Table 1-2). Inside and outside users are charged the same CFCs. For services connected by the City, a connection fee is assessed (see Table 1-2).

The numbers of service connections and ERUs are shown in Tables 2-1 and 2-8. These numbers as they pertain to inside and outside users are summarized in Table 9-4.

TABLE 9-4

Number of Water Connections and ERUs

Users	No. of Connections	No. of ERUs
Inside the City	1,194	1,760
Outside the City	108	162
Total	**1,302**	**1,922**

Water Revenue and Expenditures (Excluding Capital Related Items)

Water revenue and expenditures (excluding capital related items) for 2011, 2012, and 2013 are summarized in Table 9-5. Additional details on water revenue and expenditures are presented in Appendix H.

TABLE 9-5

Water Revenues and Expenditures*

Description	2011	2012	2013
Revenue	$747,178	$770,692	$779,257
Expenditures	$719,181	$810,798	$773,017
Net Amount	**$27,997**	**($40,106)**	**$6,240**

** – Rounded*

From 2011 through 2013, revenue increased by approximately 4.3 percent. Expenditures ranged from approximately $719,181 to $810,798. In 2011 and 2013, revenue exceeded expenditures, but in 2012, expenditures exceeded revenue by approximately $40,106. This deficit reduced the balance in the City's Water Revenue Fund (No. 403) from $182,020 to approximately $141,914.

In 2013, approximately 77 percent of the revenue came from the base rate fees and 23 percent from the usage rate. The revenue from users inside and outside the City is summarized in Table 9-6, with respect to percent usage, percent revenue, and revenue obtained per ERU.

TABLE 9-6

2013 Water Revenue

Location	Percent Usage	Percent Revenue	ERUs	$/ERU/Year
Inside	91.3	88.6	1,760	$361
Outside	8.7	11.4	162	$390

The water revenue generated by inside and outside users is different, as the City charges outside users more than inside users. Typically, municipalities impose a surcharge (generally 50 percent more) to users outside City limits.

Water system revenue generated from water service charges (i.e., base rate, user rates, and meter surcharges) was $734,734 in 2013. With a total of 1,922 ERUs in 2013, the average rate charge in 2013 was $31.86 per ERU per month. This average charge is less than the base rate for a typical residential connection inside the City (i.e., $33.60 per month), which may mean that customers with higher usage are paying less on average than a typical residential connection.

Capital Funding and Expenditures

From 2011 to 2013, the City of Dayton completed several capital improvements including water meter and main replacement and well rehabilitation. Total capital related expense for 2011 to 2013 was approximately $228,000. During this period, the City received insurance proceeds for Well No. 1 totaling approximately $101,000. Net City contributions toward capital improvements from 2011 to 2013 are approximately $127,000.

Debt Service

The City is currently making payments on three bonds and two loans related to the water system. The debt service is summarized in Table 9-7.

TABLE 9-7

Debt Service for the City's Water System

Bond/Loan	Loan Balance(1)	Annual Payment(2)	Termination Year
Water and Sewer Refunding Bonds, Series 2010(3)	$861,300	$99,315	2023
USDA(4) Water Revenue Bond, Phase I	$230,950	$13,767	2034
USDA Water Revenue Bond, Phase II	$1,327,658	$81,225	2034
2001 Water System Improvements Project, PWTF(5)	$182,506	$27,345	2021
2004 Water System Improvements Project, PWTF	$87,766	$13,165	2022
Total	**$2,690,180**	**$234,817**	**-**

(1) *– Balance as of December 31, 2013*
(2) *– Annual payment made in 2013, rounded*
(3) *– Amounts shown are for the water system only*
(4) *– U.S. Department of Agriculture*
(5) *– Washington State Department of Commerce's Public Works Trust Fund*

Financial Sustainability

EPA uses two simple ratios to assess a water system's financial sustainability: the operating ratio (OR) and the debt service coverage ratio (DSCR). The OR shows whether or not a system has enough revenue to cover its expenses, and the DSCR measures a system's ability to cover its debt, over and above its operating expenses. Using the data in Tables 9-5 and 9-7, these ratios are calculated as follows:

OR = Total Operating Revenues / O&M Expenses (without Debt Service)
= $779,257 / ($773,017 - $234,817)
= $779,257 / $538,200
= 1.45

An OR of 1.2 or greater indicates that a system is in good financial health. An OR of 1.45 means the City is collecting sufficient revenue for current expenses.

DSCR = Annual Gross Revenue (Including CFCs and Investment Interest) – (O&M Expenses without Debt Service) / Annual Debt Service
= $783,760 – ($773,017 – $234,817) / $234,817
= $783,760 – $538,200 / $234,817
= 1.05

A DSCR of 1.05 is considered acceptable but is just above the minimum of 1.0. A DSCR of less than 1.0 means the City's revenue is inadequate for covering the system's debt service. Given the current DSCR, the City is not in a position to incur more debt unless water system revenue significantly increases, or the City significantly reduces water system expenses.

Reserves

The City maintains reserves on all of its water system funds. These reserve balances are summarized in Table 9-8.

TABLE 9-8

Fund Reserve Balances

Fund	2013 Balance
Water Revenue Fund – No. 403	$148,154.09
Water System Improvement Reserve – No. 404	$231,164.49
Water System Improvement Debt Service – No. 414	$31,879.95
Water/Sewer Systems Loan Repayment Fund – No. 420	$40,410.35
Total	**$451,608.88**

The operating reserve for the Water Revenue Fund (No. 403) should be sufficient to meet 1/8 of the sum of the annual O&M and general/administrative expenses. Based on total operation and administrative expenses of approximately $475,658 (2013), the operating reserve should be at least $59,460. At a fund balance of $148,154.09, the 2013 operating reserve is acceptable.

Overview

The City's current water system finances appear to be a good condition with adequate revenues to cover operating expenses and existing/near-term debt service. Additional revenue could be generated by imposing a higher surcharge on outside users and modifying the user rate structure.

Improvement Program Financing

Improvements are typically financed through a combination of grant and loan programs and/or local funding sources. Available grant and loan programs as well as local funding sources are discussed below.

Grant and Loan Programs

Outside funding assistance from grants or low interest loans will likely be necessary to make some of the proposed improvements affordable to Dayton residents. The amount and types of outside funding will dictate the amount of local funding the City will need to secure. In evaluating grant and loan programs, the major objective is to select a program, or a combination of programs, that are most applicable and available for the intended project.

A brief summary of the major Federal and State funding programs typically used to assist qualifying communities with financing major water system improvements is presented in Table H-1 in Appendix H. Since each government assistance program has particular prerequisites and requirements, not all communities or projects may qualify for every program. With any of these funding sources, the City is advised to confirm specific funding amounts with the appropriate funding agencies prior to making local financing arrangements.

Eligibility for the funding sources outlined in Table H-1 is dictated by factors such as the percent of low to moderate income residents, MHI, population, and job creation. Competition for a number of these funding sources (e.g., CDBG and Rural Development funds) is based on the severity of the issue to be resolved and whether the improvement will result in bringing the applicant into compliance with Federal or State wastewater and water quality regulations. Typically, more funding sources are available for improvements proposed to correct a Federal and/or State compliance issue than for general infrastructure upgrades (e.g., replacing existing water main with new, larger diameter pipe).

Three sources may be promising funding alternatives for the City's water improvements: DOH's Drinking Water SRF, the Department of Commerce's PWTF Construction Loan, and Rural Development's Rural Water and Waste Disposal Grants and Loans. A brief discussion of each funding source is given below.

Drinking Water SRF – DOH provides low interest loans for community and non-community water improvements. Current terms for State fiscal year 2014 are 1.0 to 1.5 percent interests for loan terms of 20 years, or life of the project, whichever is less. For communities with projected water rates greater than 2.0 percent of the City's MHI, varying degrees of loan principal forgiveness is provided based on the rate's percent of the MHI. With an MHI of $38,405, the City would only qualify for principal forgiveness with DOH funding if the monthly rates averaged $64.00 per month or more. Since the City's 2013 average monthly charge was calculated to be $31.86 per ERU per month, the City would not quality for principal forgiveness with DOH funding.

PWTF Construction Loan – The Department of Commerce typically solicits applications for the PWTF Construction Loan program on a biennial basis. No local match or loan fee is required. The term of the loan cannot exceed the life of the improvement. The 2016 PWTF Construction Loan funding included low interest loans of 1.28 percent for 0- to 5-year terms and 2.55 percent for greater than 5- to 20-year terms for non-distressed communities. The construction loan funding also provides discounted interest rates for distressed communities of 1.70 percent for systems with water rates greater than 1.51 to 2.5 percent of the entity's MHI and 1.28 percent for communities with water rates greater than 2.51 percent of the entity's MHI. To qualify for PWTF distressed community rates, the average monthly water rates in Dayton would need to be over $48.33 per month per ERU. Consequently, potential PWTF funding for Dayton would be based on the interest rate for a non-distressed community of 2.55 percent for a 30-year loan.

Rural Water and Waste Disposal Grants and Loans – Rural Development's grant/loan package consists of approximately 25 to 40 percent grant, 60 to 75 percent loan, and 2.25 to 3.75 percent interest (current rates). The loan has a maximum 40-year term, but, if desired, the loan term can be reduced. To provide equitable funding, Rural Development formulates its grant/loan packages by comparing projected average wastewater rates with the proposed improvements with average rates from similar or comparable communities. Factors affecting wastewater rates for different communities include service population, timing of the last significant system upgrade, debt circumstances, household income, and operations complexity.

Based on the water rates for comparable communities, Dayton would likely need to have a monthly water rate between $45 and $50 to qualify for grant funding. With the City's 2013 average monthly water rate of approximately $32 per ERU, the City would not qualify for grant funding under current user rates. With a 40-year, 3.75 percent interest rate loan, the City would need to incur approximately $3.2 million in Rural Development loans before qualifying for the Rural Development grant monies.

Obtaining grant and loan funds can be a difficult and arduous process, and success depends on several factors including the available funding, the number of applications submitted, and the type and need of the project. The most immediate improvements to be constructed are the Priority 1 Improvements shown in Table 8-1. These improvements are relatively moderate in size and would not be eligible for grant funds, but may qualify for Drinking Water SRF and PWTF loans. Since PWTF funds have not been consistently available the past few years, this plan bases funding the Priority 1 Improvements on the current Drinking Water SRF loan terms and conditions. If other outside funding is utilized, the debt service and resulting water rates for funding the Priority 1 Improvements may be higher or lower depending on the loan terms.

Once the City's existing PWTF loans are retired in 2021 and 2022, and the Water and Sewer Refunding Bonds, 2010 Series are paid off in 2023, the City will be in a position to initiate larger water system improvement projects.

Local Funding Sources

The amount and type of local funding obligations for water system improvements depends in part on the amount of grant funding anticipated and the requirements of potential loan funding. Local revenue sources for capital expenditures include assessments, various types of bonds, impact fees, loans, taxes, and user charges. A brief summary of local funding sources is presented in Table H-2 in Appendix H.

The City currently collects revenue from monthly user fees, connection fees, and CFCs from new users. The most significant portion of the City's water system revenue is derived from user rates.

The primary State statute regarding setting water rates is RCW 35.92.010. This statute generally gives broad flexibility to a city or town regarding setting water rates for its customers. The statute's two key stipulations state that rates must be uniform for the same class of customers or service, and that no rate shall be charged that is less than the cost of the water and service to the customers served.

In regard to classifying customers per RCW 35.92.010, the governing body is given great discretion to consider any matter which presents a reasonable difference as a ground for distinction. Examples include difference in cost of service to various customers, location of customers inside or outside the City, difference in cost of maintenance and repair, difference in character of service, and other factors.

Regarding surcharges for water outside city limits, RCW 35.92.010 and two key court decisions (12 Wn. App. 856, Geneva Water Corporation et al. v. The City of Bellingham, 1975 and 48 Wn. 2d 342, Faxe v. Grandview, 1956) support the use of a surcharge for water service outside city limits.

Suggested Rate/CFC Revisions

The City currently charges outside users a 38 percent surcharge on the base rate and an approximately 14 percent surcharge on the unit rate. The basis for these charges is unknown. Most communities charge a 25 to 50 percent surcharge (both base and unit rates) for water use outside the City. Further review of the City's outside unit rates is recommended.

Under the WUE discussion in Chapter 4, volume and price adjustments on the existing three-tier block rate system are suggested as a means of providing additional incentive to high consumption rate users to use water more efficiently. Two immediate concerns are the large volume allowance within the first tier of approximately 49,000 cf and the relatively small price difference between tiers. To address these issues, the City could modify their water user rates as follows:

1. Subdivide the first tier into two tiers and impose a 10 percent price difference between the tiers.

801 to 25,000 cf	$0.00772 per cf
25,001 to 50,000 cf	$0.00849 per cf

2. Re-price the remaining tier rates with a 10 percent price difference between the tiers.

50,001 to 100,000 cf	$0.00934 per cf
Greater than 100,000 cf	$0.0103 per cf

One obstacle to performing a thorough review of the existing water user rates is the limited data retrieval from the City's previous Disk Operating System-based user rate program. The City recently acquired a new accounting program. We recommend a water user rate study be performed once the new accounting program is in place and at least 1 year of reliable data has been collected with the new program.

The City's current water system CFCs were developed in 2008 (Anderson Perry & Associates, Inc.). For this plan, the CFCs were recalculated by incorporating the costs of recent water system improvements, revised debt service and allowable interest amounts, and the number of ERUs on the water system. The proposed CFC charges for the water system do not include grant funding contributions. The existing and proposed water system CFCs are shown in Table 9-9, and the supporting data for the calculations is included in Appendix H.

TABLE 9-9

Existing and Proposed CFCs for the Water System

Meter Size	**CFCs**	
	Existing	**Recommended**
3/4-inch and 1-inch	$1,250	$1,440
1-1/2-inch	$4,125	$4,750
2-inch	$6,625	$7,630
3-inch	$12,500	$14,400
4-inch	$20,875	$24,040
6-inch	$41,615	$47,950
8-inch	$66,625	$76,750
10-inch	$95,875	$110,440

Financing Strategy

A financing strategy must generate sufficient capital funds to pay for proposed improvements over the relatively short duration of design and construction (generally 3 years or less). The financing strategy must also identify the manner in which annual revenue will be generated to cover the expense of long-term debt repayment and the system's ongoing O&M. The objectives of a financial strategy include:

- Identify the capital improvement project costs and the estimated O&M expenses.
- Evaluate the potential funding sources and select the most viable program.

- Determine the availability of outside funding sources and identify the local cost share.
- Determine the cost to system users to finance the local share and the annual cost of O&M.

With any of the proposed funding sources, the City is advised to confirm specific funding amounts with the appropriate agencies prior to making local financing arrangements.

Several different strategies can be used to finance capital improvements. Selecting the best strategy depends on factors including the anticipated monthly user charge, the amount and length of time for debt service, the improvement schedule, and the amount of transfers to the existing capital reserve fund. We recommend the following steps to address Dayton's water system infrastructure needs.

- Initiate a water rate setting strategy where rates and fees are reviewed annually, increased to reflect inflation and new system costs, and sufficient to maintain adequate reserve funding.
- Modestly increase water system rates to increase capital improvement funding and have adequate resources available when replacement is necessary.
- Aggressively pursue all Federal, State, and other external funding (especially grants) for both preconstruction and construction of capital improvements.

Proposed Financing Plan

Ideally, the following Priority 1 Improvement projects will be completed in the next 6 years:

- North 5th Street and Patit Avenue (D-1)
- High School Water Main (D-2)
- Front Street Drain Line (D-3)
- North Touchet Road Area Water Line (D-4)

The North Touchet Road Area Water Line improvements are currently being investigated and will be financed using the City's Water System Improvement Reserve Fund (No. 404). For the remaining Priority 1 Improvements, the City should apply for a 2016 DOH Small Systems Preconstruction Grant (maximum $25,000). This grant money, supplemented with funds from the Water System Improvement Reserve Fund (No. 404), can be used to complete a historic/cultural review, environmental review, and bid documents. For construction funding, the City should apply for a 2015 Drinking Water SRF Construction Loan. If the City is not awarded this loan, it should apply for a 2016 PWTF Construction Loan, and if necessary, apply again for a Drinking Water SRF loan in 2016. Depending on the timing and type of project funding obtained, construction of the Priority 1 Improvements could occur in 2017 or 2018.

With any of the proposed funding alternatives, additional revenue will be needed to repay the accumulated debt. The impact on water rates is addressed below under Rate Assessment.

Financial Viability Test (FVT)

The purpose of the FVT is to ensure that the water system meets all regulatory and prudent business practices. The FVT demonstrates that the total cost of providing service to the water system has been taken into consideration. Four related tests were performed to assess the FVT of the City's financial plan for its water system: 1) 6-year operation period, 2) operating cash reserve, 3) emergency reserve, and 4) household income index.

Utility System Financial Capacity worksheets (Version 1.1) developed by the Environmental Finance Center at Boise State University were used to determine the financial viability of the City's water system and a financial strategy for constructing the proposed improvements. The worksheets allow for input of initial cost values and inflation rates to determine future expenses and rates required for future budgets. The information generated from these worksheets can be used to determine if a public water system will have the financial capabilities necessary for the sustained water service for its customers. The worksheets also assist public water systems in determining whether key criteria of financial viability are being met, or will be met, based on current and future operations, by investments in the system, and by the establishment of certain reserves.

One major consideration when constructing any proposed capital improvements is the users' ability to support the full cost, including debt repayment, of utility service. Several measures of household affordability or ability-to-pay have been proposed or are currently being utilized. One of the most common affordability indicators used in the financing community is the ratio of annual user charges to MHI. The threshold of affordability for this ratio varies from 1.5 to 2.5 percent of MHI. For this report, a value of 2.0 percent of the MHI was utilized to assess affordability of the proposed rates.

The City's financial plan is based on the following:

- The City's 2015 budget and 2014 actual revenue and expenditures.
- The initial number of billing units is assumed to be 1,922 ERUs. Growth of an additional 14 ERUs was assumed to occur within the plan's 6-year period (2014 to 2020).
- Based on the anticipated revenue for 2015, divided by 1,922 ERUs, the City's average monthly water rate is $32.50 per ERU.
- The City's MHI is $38,405.
- Three percent inflation per year for operating expenses and MHI.
- The operating reserve was budgeted to meet 1/8 of annual O&M expenses, plus general and administrative expenses within the 6-year budget schedule.
- The water fund's emergency reserve budget is $100,000.
- Leak detection and repair of the North Touchet Road Water Line (D-4) will be an expenditure of approximately $50,000 in 2015.
- A total expenditure of $55,200 is projected in 2016 and 2017 for preconstruction work related to Priority 1 Improvements D-1, D-2, and D-3. To be conservative, the plan assumes the City will not be awarded a DOH Small Systems Preconstruction Grant and will use money from City reserves to fund these improvements.
- Construction of proposed Priority 1 Improvements and loan payments will begin in 2018. The projected expenditure for these construction improvements is $424,000 (2017 dollars).

The City's projected finances are shown on the compiled Utility System Financial Capacity Worksheets included in Appendix H, and summary of the FVTs is shown on page 3 of the worksheets. With this suggested plan, the City could satisfy all the FVTs and maintain the debt services coverage ratio of greater than 1.0 percent.

Rate Assessment

Future City water rates will increase due to inflation, additional debt service payments for the 2010 Revenue Bond, and new anticipated debt service for the Priority 1 Improvements.

- With inflation at 3 percent per year, an additional $109,000 will be needed per year to fund the water system O&M in 2020.
- Starting in 2019, the 2010 Revenue Bond water system debt service payments will increase from approximately $88,000 per year to $148,700 per year, an annual increase of $60,700.
- Anticipated annual debt service for a Drinking Water SRF loan of $424,000 (2017 dollars) is approximately $24,940 per year.

Based on these three factors, the total annual water rates will need to increase by $194,600 per year, or $8.38 per ERU per month. With the City's projected average monthly water rate of $32.50 per ERU in 2015, the total anticipated monthly water rate per ERU in 2020 is anticipated to be approximately $42.00 per month.

The anticipated average monthly user rates per ERU between 2015 and 2020 are summarized in Table 9-10. These projected rates are based on increases ranging from $1.50 to $2.00 per month per ERU. The suggested schedule for average monthly user rates includes rate increases ranging from 4.6 to 5.9 percent between 2015 and 2020.

TABLE 9-10

Anticipated Average Monthly User Rates per ERU

Parameter/Year	2015	2016	2017	2018	2019	2020
Overall Charge, $/month	$32.50	$34.00	$36.00	$38.00	$40.00	$42.00
Percent Increase	-	4.6	5.9	5.6	5.3	5.0

The ability to pay indicator is expressed as a percentage of the MHI and referred to as "affordability criteria." EPA's stated view is that potable water utility fees are affordable if costs are less than 2.5 percent of a community's MHI (U.S. Conference of Mayors, AWWA, and Water Environment Federation, 2013). Using EPA's affordability criteria and the MHI for all households, average monthly water system rates of $89.33 in Dayton would be considered affordable by EPA. The projected average water rate of $32.50 per month is approximately 1.0 percent of the current MHI and is thus considered "affordable" by regulatory and funding agencies. Assuming the MHI within the City increases 3 percent per year, the projected 2020 MHI is $44,522. The anticipated average monthly rate per ERU of $42.00 in 2020 is projected to increase slightly to 1.1 percent of the projected MHI for City of Dayton. Since $42.00 per month per ERU is less than 2.5 percent of the community's MHI, this rate is still considered "affordable."

While the current and projected City water rates are considered "affordable," future water rate increases will adversely affect households with incomes significantly less than the MHI (i.e., renter-occupied, young, and elderly households). When considering future rate increases, the City should evaluate different means to minimize the rate increase to low income users, such as adjusting the cost and volume allowance of the base and usage rates, providing discounts for low income users, and implementing a voluntary utility assistance program. Further consideration of different options to minimize the effect of water rate increases on low income users would best be evaluated in a water system rate study.

Project Implementation

A schedule identifying the key tasks and approximate implementation dates of the recommended projects is provided in Table 9-11.

TABLE 9-11

Project Implementation Summary

Key Task or Activity	Implementation Date
Submit Water System Plan to DOH for Review and Comment	April 2015
DOH Review and Comment Period	May – July 2015
Respond to DOH Comments on Water System Plan	August 2015
DOH Approval of Water System Plan	September 2015
Leak Detection and Repair of North Touchet Road Water Line (D-4)	January – December 2015
Apply for Drinking Water SRF Construction Loan for Priority 1 Improvements	September 2015
Apply for DOH Small Systems Preconstruction Grant for Priority 1 Improvements	January 2016
Preconstruction Work for Priority 1 Improvements (D-1, D-2, and D-3)	April – September 2016
Apply for PWTF Construction Loan for Priority 1 Improvements	May 2016
Water User Rate Study	May – October 2016
Construction of Priority 1 Improvements	June – November 2017

Chapter 10 - Miscellaneous Documents

This chapter provides documentation on the *Water System Plan's* compliance with the requirements of the State Environmental Policy Act (SEPA) Chapter 43.21 RCW, summarizes the meetings held regarding this plan, documents county/adjacent utility correspondence, and references other supportive documents for the Plan.

SEPA

SEPA consideration is mandatory for water systems with 1,000 or more service connections. The lead agency for meeting the SEPA requirements will be the City of Dayton. A copy of the completed SEPA checklist is included in Appendix I.

Meetings

The first meeting on the City's *Water System Plan* was a telephone conference call held on March 31, 2014 to discuss elements of the revised plan and included representatives of the City, Anderson Perry & Associates, Inc., and DOH.

The City's *Water System Plan* was discussed at several other meetings. A brief summary of the date and subject of these meetings is given below.

- October 27, 2014 – The Public Works Committee discussed the proposed Water Use Efficiency Plan and reviewed potential WUE goals.
- November 24, 2014 – The City Council discussed WUE goals.
- April 13, 2015 – Representatives from Anderson Perry & Associates, Inc. presented an overview of the plan to the City Council at its regularly scheduled.

County/Adjacent Utility Correspondence

The Columbia County Planning Department was provided a draft copy of Chapters 1 through 3, and Appendix B for review and comment as well as completion of the Local Government Consistency Review Checklist. This completed checklist is provided in Appendix B.

There was no correspondence with an adjacent utility as the closest utility is Waitsburg, which is approximately 10 miles to the west of Dayton.

Other Supportive Documents

The City's completed Local Government Consistency Review Checklist is provided in Appendix B.

All supportive documents referred to or used in writing this plan are included either in the appendices, the hydraulic modeling documentation, or the City's Construction Standards Manual.

APPENDIX A

Background Water System Information

CHAPTER 4-2. - WATER SYSTEM—CONNECTIONS

FOOTNOTE(S):

--- **(2)** ---

State Law reference— See RCW 35.92 for statutes relating to municipal utilities.

4-2.02. - Reserved.

Editor's note—

Ord. No. 1850, § 1, adopted January 13, 2014, repealed § 4-2.02, which pertained to water and sewer systems combined and derived from Ord. No. 1622, 1998.

4-2.04. - Water mains as city property.

From and after the taking effect of this ordinance all water mains, water pipes, couplings, connections with any water pipe or main for the use of service pipe, all stock cocks and shutoffs now or that may hereafter be placed in position upon any of the streets or alleys or public grounds of the City of Dayton are hereby declared to be the exclusive property of and subject to the management and control of the City of Dayton.

(O. 505 § 1-1914)

4-2.08. - Supervision of water system—Commissioner.

The City Council of the City of Dayton shall have full supervision, charge and control of the water supply system and the mayor or council shall appoint all officers and employees as may be necessary for the efficient administration and regulation of the system. The superintendent of water and streets shall, subject to the direction and authority of the city council have direct charge of the municipal water supply system of the City of Dayton.

(O. 505 § 2-1914)

4-2.12. - Meter required for new connections.

Whenever any new service shall be installed in connecting any property with the water supply system of the City of Dayton, the owner or lessee of the property shall have a meter installed and thereafter service will be supplied to such property through meter only.

(O. 505 § 3-1914)

4-2.16. - Installation of meters.

Water meters may be installed on request of the owners or lessees of property situated within the limits of the City of Dayton upon application therefor as hereinafter provided.

(O. 505 § 5-1914)

4-2.20. - Water installation—Cost.

All meters will be supplied by the City of Dayton, and installation thereof shall be done by the superintendent of water and streets, and the expense of such installation shall equal the cost of the meter so installed, and the said cost thereof shall be paid by the owner or lessee of the property on which said meter is installed, and that all water meters heretofore or hereafter installed by said city are and shall become the property of said City of Dayton.

(O. 609 § 1-1921)

4-2.24. - Meters to be approved type.

The quality or make of meters installed for service within the City of Dayton shall be regulated or established by the council, and water from said water supply system will be furnished through no other meter or meters until the said council shall order otherwise.

(O. 505 § 6-1914)

4-2.28. - Meters—Testing—Accessibility.

All meters shall be of standard size and design approved by the superintendent of water and streets, and all meters shall, before installation be separately examined, tested and approved by him. All meters must be provided with all necessary valves and installed in a manner approved by the superintendent of water and streets. Meters shall at all times be accessible to the superintendent of water and streets and when it is necessary for the owner or lessee of the property to place the meter under lock and key, a key shall be furnished the superintendent of water and streets. Meters installed on any property will be tested by the superintendent of water and streets at the request of the owner or lessee of the property on his paying the charges therefor.

(O. 505 § 9-1914)

4-2.32. - Meters—Removal—Inspection.

Meters when installed in any property shall only be removed by the superintendent of water and streets. For the violation of this provision water may be turned off and a fine of $25.00 may be imposed which fine must be paid before the water is again turned on. The superintendent of water and streets shall have the right to enter at any reasonable time in any premises where the city water is used or make on examination of the premises for a test of the meter, and he shall also have the right to remove the meter from the premises for examination and test whenever necessary.

(O. 505 § 10-1914)

4-2.36. - Meters—Application for installation.

Any person, firm or corporation desiring to have property connected with the water supply system of the City of Dayton and desiring to have a meter installed in a service that is connected with the water supply system shall make application to the superintendent of water and streets on a printed form to be furnished by him.

(O. 505 § 11-1914)

4-2.40. - Application—Contents.

The application shall be signed by the owner or lessee of the property or the authorized agent of such owner or lessee and shall state fully all the purposes for which the water shall be used and the number of service pipes to be desired, whether there is to be more than one building or more than one separate building supplied by one service connection with the city main and the number and kind of buildings and the property so supplied and the number of apartments in the building, if it be an apartment building, the location where the city main is to be tapped and the site of the tap to be made and the location of the property by lot, block, addition and street number, and shall contain an agreement that the applicant will at all times conform to and be governed by the rules and regulations of the water department and the provisions of this chapter and will pay the costs of making the connection and of supplying the meter.

(O. 505 § 12-1914)

4-2.44. - Contracts—Commencement.

All contracts provided for in this chapter shall take effect from the day the premises are connected with the city water supply system and the water turned on.

(O. 505 § 13—1914)

4-2.48. - Separate service pipes—Exceptions.

Each separate building supplied with city water must have its own separate service connection with the city main, except that two or more buildings located on the same lot or on contiguous lots under a single ownership may be, upon written permission granted by the superintendent of water and streets, supplied through the same connection with the city main as long as the single ownership continues. Upon a change of such single ownership a new and separate connection shall be immediately made for the buildings on the premises theretofore having indirect connections, provided that in case there is no water main on any street on which said premises abut, the superintendent of water and streets may permit such connection to remain until a water main is laid in said abutting street.

(O. 505 § 14—1914)

4-2.56. - Distance from main.

In making the tap, the city shall not extend its water pipe more than a distance of 40 feet from said tap, to the connecting property, unless the water main is not in the center of the street, then it shall extend the same to the adjacent property for the additional distance from said center line of the street to such tap.

(O. 992 § 2—1946)

4-2.60. - Multiple service pipes on same premises.

Where the applicant desires to have two or more service pipes on the same premises, he shall so state in his application for permit, and separate service pipes shall be run from the connection to be made inside the curb line, and stop cocks shall be put upon each of the separate services.

(O. 505 § 16—1914)

4-2.64. - Service pipe—Stop and waste cocks—Depth.

Every service pipe shall be provided with a stop and waste cock for each consumer, easily accessible, placed inside the foundation wall, beyond damage from frost, and so situated that the water can be conveniently cut off and drained from the pipes, and all water in buildings shall be so arranged as to drain toward the stop and waste cock fixtures or drain cocks placed for that purpose. All service pipes inside property lines shall be laid to a depth of at least one and one-half feet below the surface of the ground. All water pipes laid inside the property line on any premises shall be left exposed in the trench until inspected by the superintendent of water and streets, and when they have passed inspection the pipes shall be properly covered by the property owner.

(O. 505 § 17—1914)

4-2.68. - Change of service connection.

When new buildings are to be erected on the site of old ones and it is desired to increase the size of, or to change the location of the old service connection, or where a service connection to any premises is abandoned or no longer used, the superintendent of water and streets may cut out or remove such service connection, after which should a service connection be required to said premises a new service shall be placed only upon the owner making application and paying for a new tap in the regular manner as hereinbefore provided.

(O. 505 § 18—1914)

4-2.72. - Service to new facilities—Inspection.

In all cases where a water service has been newly installed connecting any premises or building with the city mains, and in all cases of reconstruction, alteration or repair of any building where new or additional water service or fixtures have been installed, city water shall not be turned into such service until all charges for water used on the premises for any purpose shall have been paid, and the service finally inspected by the superintendent of water and streets and made to conform to the requirements of this chapter.

(O. 505 § 19—1914)

4-2.76. - Inspection of new facilities—Notice to commissioner.

The superintendent of water and streets shall be notified by the owner or agent of the premises whenever any water service or fixtures are ready for inspection and it shall be the duty of the superintendent of water and streets to proceed at once to have the same inspected.

(O. 505 § 20—1914)

4-2.78. - Cross connection control.

A. The purpose of this section is to protect the water supply of the City of Dayton from contamination or pollution from potential cross connections; promote the elimination or control of existing or potential cross connections; and assure that approved backflow devices are tested annually. The installation or maintaining of any actual or potential cross connection which would endanger the purveyor's public drinking water system is prohibited. Any such cross connection now existing is hereby declared unlawful and shall be removed immediately or face penalty. Water service to any premise shall be contingent upon the customer providing cross connection control in a manner approved by the purveyor. The control or elimination of cross connections shall be in accordance with the State of Washington Administrative Code (WAC 248-54-285), or any superseding WAC. The policies, procedures and criteria for determining appropriate levels of protection shall be in accordance with the Accepted Procedure and Practice in Cross Connection Control Manual - Pacific Northwest Section - American Waterworks Association, Fourth Edition, or any superseding editions, however, the authoritative body (as the city superintendent) of the purveyor may establish requirements for cross connection control more stringent than the state regulation if it is determined that conditions so dictate. It shall be the responsibility of the City of Dayton to protect the public drinking water system from contamination due to cross connection. Backflow devices required to be installed shall be a model approved by the State Department of Health. Authorized employees of the City of Dayton with proper identification shall have free access at reasonable hours of the day, to all parts of a premises or within buildings to which water is supplied.

B. *Definitions.* As used in this section:
   1. *"Backflow"* means the flow other than the intended direction of flow, of any foreign liquids, gases or substances into the distribution system of the public drinking water system.
   2. *"Contamination"* means the entry into, or the presence in, the public drinking water system of any substance or matter when present in drinking water above an acceptable level may adversely affect the health of the consumer and/or the aesthetic qualities of the water consumed.
   3. *"Cross connection"* means any physical arrangement connecting a public drinking water system, directly or indirectly, with anything other than another public drinking water system, capable of contaminating the public drinking water system as a result of backflow.
   4. *"Department"* means the Washington State Department of Social and Health Services.
   5. *"Public drinking water system"* means any water system or supply intended or used for human consumption or other domestic uses; including source, treatment, storage, transmission and distribution facilities where water is furnished to any community, collection or number of individuals; however, excluding a system serving one single family residence.
   6. *"Purveyor"* means the City of Dayton or its authorized agent.
   7. *"Service"* means a physical connection between the public drinking water system and customer's system.
   8. *"Customer"* means any person, firm or corporation that is furnished drinking water through a legal service connection to the drinking water system.
   9. *"Illegal user"* means any person, firm or corporation that is not authorized by the purveyor to use a customer's service.

C. Service to any premise receiving its water for the purveyor's public drinking water system shall be contingent upon compliance with all rules and regulations of the department and the purveyor.

D. Service shall be discontinued to any premises for failure to comply with the rules and regulations of the department and this purveyor; and, furthermore, shall be a violation of this chapter.

(O. 1510 (part)—1991)

(Ord. No. 1850, § 1, 1-13-2014)

4-2.80. - Turning on water—Compliance with law.

Whenever the owner or occupant of any premises connected with the city water supply shall desire to use the water, he shall make application therefor to the superintendent of water and streets and request that the water be turned on. When the superintendent of water and streets shall find that all the conditions and requirements of this chapter have been complied with, he shall order the water turned on.

(O. 505 § 21—1914)

4-2.84. - Water charges—Collection.

All rates for water supplied to any property connected with the city mains; all charges for meters supplied, or for tapping the city mains, and all charges for turning water on or off and all fines and penalties assessed or imposed under the provisions of this chapter or the rules of the superintendent of water and streets shall be charged to the applicant and against the property for which service was rendered or the fine or penalty imposed. All rates, charges, fines or penalties herein provided shall be paid to the city water collector at his office and by him turned over to the city treasurer to be placed to the credit of the water fund.

(O. 505 § 22—1914)

4-2.88. - Reserved.

Editor's note—

Ord. No. 1850, § 1, adopted January 13, 2014, repealed § 4-2.88, which pertained to delinquent charges—interest—enforcement and derived from Ord. No. 505.

4-2.90. - Water system capital facilities charge.

(a) *Purpose.* Capital facilities charges ("CFC") shall be imposed on new connections to the City of Dayton's water system. Said CFCs are an allocation of the equitable share of the cost of the existing domestic water system and may include the costs associated with the planned capital improvements of said system.

(b) *Definitions.*

  (1) *"Equivalent meter capacity"* shall mean the relative capacity of a water service connection to a residential unit, commercial use, or industrial use based on the size of the service meter and shall be in an amount as set by resolution of the city council.

  (2) *"Water system capacity factor"* shall be an amount as set by resolution of the city council.

(c) *Capital facility charge.* In addition to other fees, there is hereby imposed a CFC on new connections to the city's water system. The CFC shall be calculated by multiplying the equivalent meter capacity by the water system capacity factor.

(d) *Prior approval.* Prior to applying for a new water service connection, applicant must secure written approval from the public works department to connect to the water system.

(e) *Inspection fees.* Inspections of connections to the city's water system shall be performed as required in this chapter. An inspection fee shall be charged in the amount as established by resolution of the city council. An additional fee shall be charged for each re-inspection. If the city staff needs to dig up a water installation in order to inspect it, a dig-up fee shall be charged in the amount established by resolution of the city council in addition to the inspection fee.

(f) *Addition to other charges.* The capital facility charge for water imposed pursuant hereto shall be in addition to any permits and to the actual cost of connecting to the city's water system and to all other charges imposed by ordinance.

(g) *Collection of capital facility charge.* The capital facilities charge is payable at the time of application for water service connection. The connection shall not be made until all charges have been paid.

(h) *Review of capital facility charge.* The capital facility charge for water shall be reviewed with reasonable frequency by the city council.

(i)

Severability. If any section, sentence, clause, or phrase of this section should be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause, or phrase of this section.

(j) *Repeal.* Those sections of all prior ordinances establishing capital facility charges in conflict herewith are hereby repealed.

(Ord. No. 1772, 10-13-2008)

4-2.92. - Reserved.

Editor's note—

Ord. No. 1850, § 1, adopted January 13, 2014, repealed § 4-2.92, which pertained to council's rule-making power and derived from Ord. No. 505.

4-2.96. - Turning off water for repairs—City not liable for damage.

The superintendent of water and streets may at any time order the water cut off from any premises connected with the city mains, without notice, for repairs, extensions or other necessary purposes, and persons having boilers supplied with city water are cautioned against danger of explosion or collapse. The city will not be liable for any damage that may occur on account of the water being cut off for any of the above purposes, or on account of the breaking of any pipe or fixture by pressure of the water from the city mains.

(O. 505 § 25-1914)

4-2.100. - Unauthorized turning on water—Penalties.

When the water is to be turned off for any reason specified in this chapter or in the rules adopted hereunder by the city council, it shall, when possible, be turned off at the curb cock, by an employee of the city, and shall not be turned on again until the provisions of this chapter and of the said rules have been complied with. It shall be a violation of this chapter if an unauthorized person(s) turns the water on at the curb stop after the water has been turned off or disconnected by an employee of the city.

(O. 1603 § 2(part)—1997)

(Ord. No. 1850, § 1, 1-13-2014)

4-2.102. - Fee for turning on or off water at property owner request.

At the request of the property owner or his authorized agent, there shall be a $20.00 fee charged for turning water on at the property owner's premises.

(O. 1603 § 2(part)—1997)

(Ord. No. 1840, § 1, 10-28-2013; Ord. No. 1850, § 1, 1-13-2014)

4-2.103. - Reserved.

Editor's note—

Ord. No. 1850, § 1, adopted January 13, 2014, repealed § 4-2.103, which pertained to water stand-by fee and derived from Ord. No. 1621, 1998.

4-2.104. - Use of water during fire.

It shall be a violation of this chapter to use water from the city mains for sprinkling or for irrigating lawns, gardens, flower beds, plants, trees, shrubs, parking strips or streets, or for hosing windows, woodwork, porches, steps or sidewalks during the continuance of any fire destroying property in the city.

(O. 1603 § 2(part)—1997)

4-2.108. - Leading fixtures unlawful.

It shall be a violation of this chapter for any owner or lessee of property connected with the city mains to permit waste of water on account of leaking pipes, faucets, or fixtures on his property, if after receipt of written notice to repair, the owner or lessee fails to comply within the time set forth in the notice.

(O. 1603 § 2(part)—1997)

4-2.112. - Tampering with system prohibited.

It shall be a violation of this chapter for any unauthorized person(s) to in any way tamper with the water system including, but not limited to the following:

1. Breaking or defacing of any water meter;
2. Altering, injuring or preventing the action of any meter or other instrument used to measure or register the quantity of water supplied to a consumer thereof, or
3. Making any connection by means of a pipe or otherwise with any main or pipe used for the delivery of water to a consumer thereof, in such manner as to take water from said main or pipe without its passage through the meter or other instrument provided for registering the amount or quantity consumed, or use any water so obtained after meter is installed;
4. Making any connection or reconnection with such main or pipe, or turn on or off, or in any manner interfere with any valve, stopcock, or other appliance connected therewith;
5. Opening or shutting any street cock or to in any way tampering with or injuring any meter, valve or service pipe connecting any premises or building with the city water supply, or to tap or in any manner to tamper with any fire line, unless such be any of the officers or authorized employees of the City of Dayton.

(O. 1603 § 2(part)—1997)

(Ord. No. 1850, § 1, 1-13-2014)

4-2.116. - Reserved.

Editor's note—

Ord. No. 1850, § 1, adopted January 13, 2014, repealed § 4-2.116, which pertained to unlawful acts—penalty and derived from Ord. No. 505 and Ord. No. 1840, adopted October 28, 2013.

4-2.120. - Pollution of water supply unlawful.

It shall be a violation of this chapter for any person to bathe in, fish in, or throw any substance into any reservoir or standpipe, or to place any foreign substance upon any ground belonging to or under the control of the water supply system of the City of Dayton.

(O. 1603 § 2(part)—1997)

4-2.124. - Obstructing fire hydrant unlawful.

It shall be a violation of this chapter for any unauthorized person to obstruct the access to any fire hydrant by placing around, thereon, or within 20 feet thereof any stone, lumber, dirt, rubbish or other material or to open or operate any fire hydrant or to draw or attempt to draw water therefrom, or to wilfully or carelessly injure the same, or to fill up or to cover over any curb box, or in any manner to tamper with or injure the same.

(O. 1603 § 2(part)—1997)

4-2.126. - Obstructing meter unlawful.

It shall be a violation of this chapter for any person(s) to:

1. Prevent by the erection or construction of any device, or by any other means, free access to any meter or other instrument for registering or measuring the amount of water consumed; or
2. Interfere with, obstruct or prevent, by any means, the reading or inspection of such meter or instrument, by any person(s) other than authorized employees of the City of Dayton.

(O. 1603 § 2(part)—1997)

(Ord. No. 1850, § 1, 1-13-2014)

4-2.128. - Reserved.

Editor's note—

Ord. No. 1850, § 1, adopted January 13, 2014, repealed § 4-2.128, which pertained to enforcement violations and derived from Ord. No. 1603, 1997.

4-2.132. - Violations—Penalty.

Any person, association, firm, partnership or corporation that violates any of the provisions of this chapter shall be deemed guilty of a misdemeanor, and shall, upon conviction, be punished by a fine up to $1,000.00, and/or imprisonment in the county jail for a period of up to one year.

(O. 505 § 34—1914)

(Ord. No. 1840, § 1, 10-28-2013; Ord. No. 1850, § 1, 1-13-2014)

4-2.136. - Questions not covered by chapter—Commissioner's discretion.

The superintendent of water and streets shall have authority to decide any question which may arise and which is not fully covered by any of the provisions of this chapter and his decision in such cases shall be final.

(O. 505 § 35—1914)

CHAPTER 4-3. - WATER RATES

4-3.04. - Monthly payment—Refunds.

Payment for the use of water supplied from the city water supply system must be made monthly in advance between the first and tenth of each month, except that a new or renewed service may be paid for to the end of the current month. Meter patrons shall pay not less than the minimum rate in advance, and any over-plus according to monthly meter reading at the beginning of the next month. A refund may be made on account of discontinued service upon the authorization of the superintendent of water and street. All payments for the use of city water become delinquent at the end of the tenth day of each month as specified in this section, and shall be cut off forthwith from the premises with which such water service has been connected and not turned on again until such sums as are then delinquent or due have been paid, together with all reconnection fees and penalties.

(O. 1693—2003: O. 940 § 1—1937)

(Ord. No. 1693, 11-11-2003)

4-3.06 - Rebilling charges on delinquent accounts.

To enforce the lien of said city for any or all utility charges, the superintendent is authorized and directed; immediately following a delinquency, to send notice to the delinquent account that water service shall be disconnected unless the customer pays in full all of the fees and charges due at the time payment is made, plus a service charge.

A service charge shall be $15.00 for accounts with balances of $15.00 or more.

If the customer fails to pay all the fees and charges, together with the service charge, on or before the fifteenth day following service of the delinquency notice, the superintendent shall immediately disconnect water service to such premises, provided however no disconnection shall be made on Saturdays, Sundays, legal holidays or any other day in which the city cannot reestablish service on the same or the following day and no disconnection shall be made if the customer, prior to the fifteenth day following service of the notice shows to the superintendent or the city clerk that disconnecting the water would endanger life or endanger substantial property rights on the premises.

After water service has been disconnected, it shall be reconnected only after the customer has paid in full all of the charges, fees and service charges which are due and owing at the date payment is made, together with an additional fee of $20.00 for disconnecting and reconnecting the water service. The disconnection and notice provided for herein shall specify the total amount which the customer must pay, including the turn on fee.

(O. 1718 (part)—2004: O. 1693—2003: O. 1370 § 1(part)—1982)

(Ord. No. 1693, 11-11-2003; Ord. No. 1840, § 1, 10-28-2013)

4-3.07. - Annual price indexing of monthly water rates both inside and outside the City Limits of Dayton, Washington.

In addition to such other changes as may be approved by the city council, commencing January 1 of each successive year after the effective date of the ordinance codified in this section, the rates and charges specified in section 4-3.08 of this chapter shall automatically be increased based on the consumer price index published by the Department of Labor, Bureau of Labor Standards, all urban consumers, U.S. City average, all items, for year ending June 30th of the previous year. For purposes of this section, the CPI published for June 30th shall be the base for calculating adjustments for the rates commencing on January 1, 2006 and on the first day of January of each year thereafter. The rate increase each year shall be in an amount equal to the increase in the CPI. For purposes of the preceding sentence, the increase in the CPI means the division of the CPI of the most recent June 30th CPI and the CPI for June 30th of the preceding year.

In addition, each successive year, the increase will be reviewed and presented to the council the first meeting in December, commencing December 2006 to determine if an increase in utility rates is needed to offset raises in expenditures for the next year.

If the above-mentioned review does not result in council approval to raise rates, the current rate shall stay in effect until the next January review date.

(O. 1731 (part)—2005)

4-3.08. - Monthly base water rates.

A. Minimum monthly base water rates for the first 800 cubic feet or less of water usage per month based on size of water meter is as follows:

Basic Rates	Inside City Limits	Outside City Limits	Water Meter Surcharge
1¼" or less	$33.60	$46.40	$-
1½"—2"	$33.60	$46.40	$25.00
3"	$33.60	$46.40	$50.00
4"	$33.60	$46.40	$75.00
6"	$33.60	$46.40	$150.00

B. Water rates based on water usage. In addition to the minimum monthly base water rates set out above, the rates of customers of the City of Dayton water system shall be based on the water consumption of such customer, as follows:

Per Cubic Foot of Water Consumption	Inside City Limits	Outside City Limits
	Per Cubic Foot	
801—50,000 cubic feet consumption	$0.00772	$0.00882
50,001—100,000 cubic feet consumption	$0.00849	$0.00959
Over 100,000 cubic feet consumption	$0.00882	$0.00992

(O. 1731 (part)—2005: O. 1718 (part)—2004: O. 1703—2004; O. 1693—2003: O. 1668 § 1—2002; O. 1628 § 1—1998; O. 1613 § 1—1997; O. 1599 § 1(part)—1996; O. 1547 § 1—1992: O. 1458 § 1—1988; O. 1311 §§ 1, 2—1977: O. 1299 § 1—1976: O. 1291 § 1—1975: O. 1267 § 1—1973: O. 1261 § 1—1972: O. 1293 § 1—1966: O. 1183 § 1—1964: O. 1086 § 1(part)—1956)

(Ord. No. 1668, § 1, 2-26-2002; Ord. No. 1693, 11-11-2003; Ord. No. 1703, 4-13-2004; Ord. No. 1765, 12-3-2007; Ord. No. 1778, § 1, 12-15-2008; Ord. No. 1800, § 1, 11-22-2010; Ord. No. 1826, § 1, 11-26-2012; Ord. No. 1846, §§ II, III, 11-25-2013, eff. 1-1-2014)

4-3.09. - Turn on fee.

Should any property owner desire to terminate water service, the property owner shall give written notice stating the date, of such termination and pay all unpaid charges at the office of the clerk/treasurer.

The property owner shall be responsible for all charges accruing prior to such date, or in case of failure to give notice, until the date of actual disconnect by the city. Upon the payment of all unpaid water and sewage charges, and the additional payment of $20.00, the water department will turn on the water service again. No change of ownership shall affect the application of this section.

In those cases where the city turns off water service as the result of repairs to the city's water system, or other emergency requiring the discontinuance of service, no charge shall be imposed.

(O. 1693—2003: O. 1497—1990)

(Ord. No. 1693, 11-11-2003)

4-3.10. - Criteria for adjustments to water charges in the event of leaks.

A. In the event that there is a leak in the water service line on a customer's property, a water service customer may apply for an adjustment as provided in this section.

B. A rate adjustment granted pursuant to this section shall not exceed 50 percent of the total charge for the billing period for which the adjustment is sought minus the customer's average water usage charge.

C. For the purpose of this section, "average water usage" shall be computed by determining total water consumed during the preceding 36 months and dividing that total volume by 36 months and dividing that total volume by 36 and multiplying by the number of month for which an adjustment is sought.

D. The following shall govern requests for adjustments:

   1. No adjustment shall be made until it is verified that a leak did exist and that the leak has been properly repaired in accordance with the Uniform Plumbing Code requirements. Such verification may require on-site inspection by city employees.
   2. No adjustment shall be granted unless the charge for the period exceeds two times the customer's average water usage.
   3. A customer shall be entitled to only one adjustment per year.
   4. In order to qualify for an adjustment on water charges, the leak must be repaired within 15 days after it is discovered by the customer, whichever occurs sooner. Delivery to a customer a statement by the city showing water consumption which is 60 percent, or more, greater than the customer's average water use shall be deemed noticed to the customer that a leak exists.

E.

The city may discontinue service to any premises if the owner or occupant refuses to make repairs necessary to avoid waste of water. If the occupant is not at home and it is observable that water is being lost through leakage, the city's utility superintendent, at his option, may terminate water service and leave written notice describing his actions and the reasons therefor.

(O. 1725—2005)

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 04/30/2014
Printed: 2/9/2015
WFI Printed For: On-Demand
Submission Reason: Pop/Connect

RETURN TO: Eastern Regional Office, 16201 E Indiana, Suite 1500, Spokane Valley, WA, 99216

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
18250 3	DAYTON WATER DEPARTMENT	COLUMBIA	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS

JAMES S. COSTELLO [WDM 3 SUPERVISOR]
CITY OF DAYTON WATER DEPT
111 S FIRST ST
DAYTON, WA 99328

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

7. OWNER NAME & MAILING ADDRESS

DAYTON, CITY OF
JAMES S. COSTELLO
111 S FIRST ST
DAYTON, WA 99328

8. Owner Number 001434
TITLE: WDM 3

STREET ADDRESS IF DIFFERENT FROM

ATTN
ADDRESS
CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION

Primary Contact Daytime Phone: (509) 382-4571
Primary Contact Mobile/Cell Phone: (509) 386-0875
Primary Contact Evening Phone: (xxx) xxx-xxxx
Fax:(509) 382-4651 | E-mail: XXXXXX

10. OWNER CONTACT INFORMATION

Owner Daytime Phone: (509) 382-4571
Owner Mobile/Cell Phone: (509) 386-0875
Owner Evening Phone: (xxx) xxx-xxxx
Owner Fax Phone: | E-mail: XXXXXX

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

☒ Not applicable (Skip to #12)
☐ Owned and Managed SMA NAME: ____ **SMA Number:**
☐ Managed Only
☐ Owned Only

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

☐ Agricultural
☒ Commercial / Business
☒ Day Care
☒ Food Service/Food Permit
☒ 1,000 or more person event for 2 or more days per year
☒ Hospital/Clinic
☒ Industrial
☒ Licensed Residential Facility
☒ Lodging
☐ Recreational / RV Park
☒ Residential
☒ School
☐ Temporary Farm Worker
☒ Other (church, fire station, etc.): ____

13. WATER SYSTEM OWNERSHIP (mark only one)

☐ Association
☒ City / Town
☐ County
☐ Federal
☐ Investor
☐ Private
☐ Special District
☐ State

14. STORAGE CAPACITY (gallons)

2,220,000

15	16 SOURCE NAME	17 INTERTIE	18 SOURCE CATEGORY										19 USE			20	21 TREATMENT						22 DEPTH	23	24 SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL	SPRING	SPRING FIELD	SPRING IN	SEA WATER	SURFACE WATER	RANNEY / INF.	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	Well #2 - AEN297		X										X			Y		X					1445	1114	NW SE	30	10N	39E
S02	Well #3 - AEN296		X										X			Y		X					1180	1072	SW NE	32	10N	39E
S03	Well #1		X										X			Y		X					1303	624	SE NE	30	10N	39E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
18250 3	DAYTON WATER DEPARTMENT	COLUMBIA	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	1291	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	1107		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	17		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	23		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	167		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	190	190	
28. TOTAL SERVICE CONNECTIONS		1481	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per 2740

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?				11	11	11						
B. How many days per month are they present?				30	30	30						

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?												
B. How many days per month is water accessible to the public?												

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?												
B. How many days per month are they present?												

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	3	3	3	3	3	3	3	3	3	3	3	3

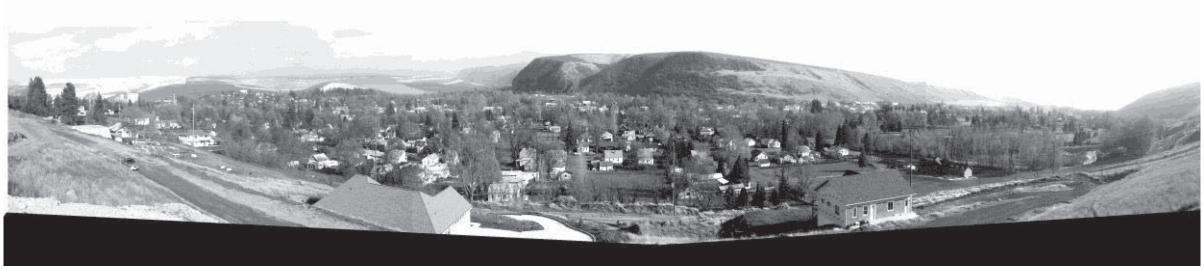
35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other ____________

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: ______________________________
DATE: ______________________

PRINT NAME: ______________________________
TITLE: ______________________



LAND USE ELEMENT

Inventory and Assessment

This element describes the various land uses in the city. This addresses the proposed general distribution and location of uses for the existing and future population, building intensities and densities of the City of Dayton. These land uses should recognize limitations of the land and protect water quality, quantity and drainage.

Land Use Designations

The Comprehensive Plan Land Use Map (illustrated in Figure LU-1) designates all land uses within the Urban Growth Area into broad categories. The designations on the maps are a representation of the goals and objectives that reflect land use trends, capabilities, and projections for the City of Dayton. Specific descriptions of each designation is given below:

Low Density Residential "LDR"

This designation is intended to retain a low density for single-family character. This classification shall also allow for the usual agricultural enterprises such as commercial gardening, fruit and berries, poultry, animal husbandry and horticultural nurseries. The recommended base density is three - four dwelling units per gross acre.

Urban Density Residential "UDR"

This designation provides for a mixture of housing unit types including single-family and multi-family dwellings. The recommended base density is four to eight dwelling units per gross acre. This classification is also intended to include provisions for historic preservation districts.

Central Business “CB”

As the name implies, the Central Business designation shall promote the center for commercial/business activity. Development performance standards should be implemented and oriented toward quality shopping experiences and attracting pedestrian use. The types of uses, activities and structure usually associated with this type of characterization include but are not limited to retail stores; financial, insurance, real estate, and professional offices; entertainment facilities: theaters, and restaurants; and lodging facilities: hotels and upper-story apartment housing. Discouraged uses are those that are land consumptive, such as warehouses, automobile and equipment dealers, building supply outlets and other similar uses which diminish the area's compactness and convenience as an integrated shopping goods and service area. Also discouraged are uses that are automobile orientated, such as drive-in restaurants and gas stations.

General Commercial “GC”

The General Commercial designation is intended for access and convenience. The General Commercial designation is intended to accommodate automobile oriented and land consumptive commercial needs. A wide range of commercial uses and activities are encouraged. This designation is the area outside the Central business area. Development performance standards should be implemented and oriented toward both pedestrian and automobile use.

Manufacturing "M”

This designation recognizes the need to maintain and improve air and water quality and assure safe and compatible levels of noise and lighting in order to provide for both light and heavy industrial activities.

Open Space OS"

This designation acknowledges and promotes the uniqueness of the landscape such as adjacent to the Touchet River and encourages use for passive and active recreation.

Public "P"

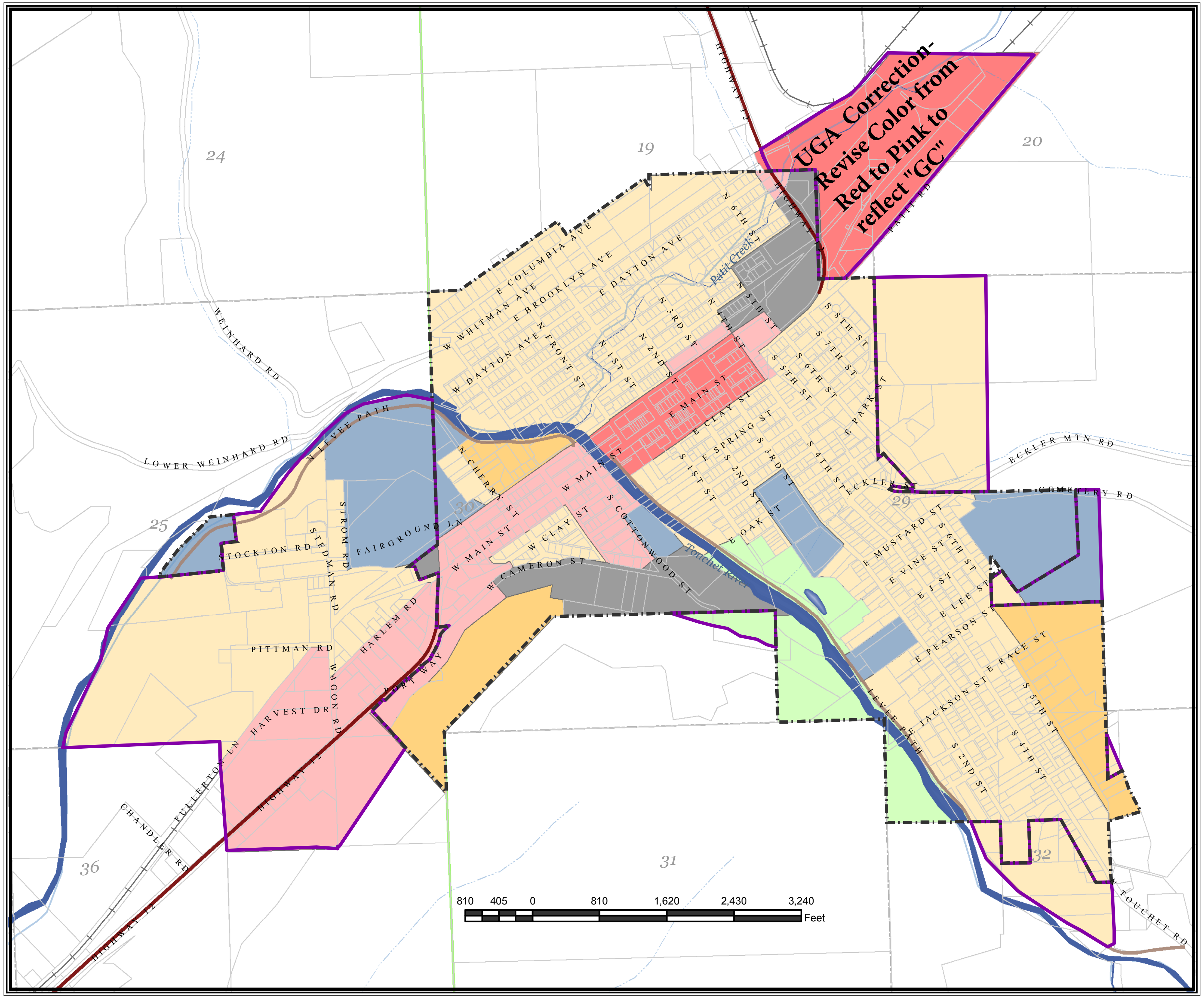
The purpose of this designation is to note the major location of facilities that are in the public or semi-public ownership, or are operated for the purpose of benefiting the public. This includes public parks, schools, government buildings, cemetery, hospital, golf courses, and utility stations. Church properties are not part of this category.

Commercial, industrial, or residential development with this designation shall not be permitted. Other types of development shall be restricted to essential facilities, emergency or recreation purposes.

In the process of developing a comprehensive plan it is necessary to take stock of existing land use patterns in order to assess the positive and negative impacts, which may occur as a result of change. Another important reason for documenting existing land use in the comprehensive plan is that land is often viewed as an investment, and a thorough understanding of existing land uses is necessary to protect and enhance that investment.

City of Dayton

Columbia County, WA



Legend

- City Limit
- Urban Growth Area
- Parcels
- Water
- Intermitent Stream
- Perrenial Stream
- <all other values>
- Public
- Urban Density Residential
- Low Density Residential
- Central Business
- General Commercial
- Manufacturing
- Open Space
- Railroad
- Townships
- Section Lines

Ord. 1873 - Attachment C

Comprehensive Plan Land Use and UGA

Printed on: January 26, 2015

UTILITY CONNECTION ANNEXATION COVENANT

1. OWNER/PROPERTY

A. The parties whose names appear below; hereafter "Owner", covenant and warrant that they are the owners of the property to which this document applies, are fully authorized to execute this document and forever bind themselves, their successors and assigns and the subject property to the terms set forth herein. "City" refers to the City of Dayton, Washington.

B. The terms herein are a covenant running with the land as a burden on the subject premises commonly known as__________ ______________________________ and legally described as: ____

Parcel Number______________________________________.

C. In general, it is intended that this covenant shall pertain to the subject premises and shall deal only with the issue of future annexation of subject premises to the City of Dayton.

2. PROVISIONAL SERVICE

A. Subject to City policies, ordinances, and other applicable laws, Owner desires to procure utility service for the subject premises by connection to ____________________ all at owner's sole expense and liability. Owner is responsible to obtain and record any necessary easements. Owner agrees that said service or connection is obtained provisionally, conditioned upon fulfillment of the terms of this covenant.

3. FUTURE ANNEXATION

A. The Owner covenants, warrants and agrees that he or the current owner will join in any petition for annexation to the City of Dayton which includes the above-described property and will not protest the annexation in any way.

B. This covenant applies to a ____________________connection proposal and is perpetual and not subject to termination without the written consent of the City Superintendent.

C. The foregoing items are accepted as full consideration for this covenant, regardless of whether any provisional service option is otherwise required by law or applicable regulation. Owner understands the provisional service would not be authorized without Owner's binding commitment, on his own behalf and the behalf of his successors and assigns, as provided by this covenant.

4. **ADDITIONAL**

A. If, for any reason, any provision or part of this instrument should be declared illegal or unenforceable, then the City may declare the provisional service above installed to be canceled, and Owner shall immediately remove all improvements and/or connections and otherwise restore the premises or the City may do so as above provided.

B. No obligation incurred may be waived except in writing by the City Superintendent. Failure to enforce any provision in any instance or occasion shall not waive the right to enforce it in any subsequent instance or occasion. Owner acknowledges that he has had an opportunity to consult with legal counsel. No provision shall be construed in favor of or against any person or entity.

Dated this ____________ day of ____________________, 20____.

____
Owner

____
Owner

STATE OF WASHINGTON)
) ss.
County of Columbia)

I certify that I know or have satisfactory evidence that ______________________________ signed this document and acknowledged it to be his/her free and voluntary act for the uses and purposes therein mentioned.

DATED: ____________________

____
(Signature of Notary Public)

My appointment expires______________

RESOLUTION NUMBER 1133

A RESOLUTION OF THE COUNCIL OF THE CITY OF DAYTON, COLUMBIA COUNTY, WASHINGTON DECLARING A MORATORIUM ON NEW CONNECTIONS TO THE CITY'S WATER SUPPLY OCCURRING OUTSIDE OF THE CITY URBAN GROWTH AREA.

WHEREAS, the City of Dayton currently supplies water to a limited number of households outside of the City limits; and

WHEREAS, the City of Dayton's current water supply infrastructure cannot support the addition of new connections occurring outside the City's urban growth area

WHEREAS, the City of Dayton has no duty to supply water to locations outside of the City's urban growth area.

NOW, THEREFORE, let it be resolved by THE CITY COUNCIL OF THE CITY OF DAYTON, WASHINGTON AS FOLLOWS:

New connections to the City of Dayton water system, outside the City's urban growth area are prohibited.

Adopted by the Dayton City Council this 11th day of February, 2008

Mayor

Attest:

City Clerk/Treasurer

Approved as to Form:

Office of the City Attorney

Water __________
Sewer __________
Turn on Fee __________
Total Due __________

Paid CASH /CHECK

City of Dayton

111 South 1st St
Dayton, WA 99328
(509) 382-2361 ~ FAX (509) 382-2539

APPLICATION FOR UTILITY SERVICES

EFFECTIVE DATE OF SERVICE________________ TODAY'S DATE_______________

CUSTOMER NAME(S) ____

SERVICE ADDRESS____

INSIDE CITY LIMITS_________________ OUTSIDE CITY LIMITS _____________

MAILING ADDRESS ____

DRIVER'S LICENSE NUMBER ____

CONTACT PHONE NUMBER __________________________________

DO YOU OWN ANY PETS? _______ HOW MANY? _______

WHAT KIND?____

IF RENTING THIS PROPERTY, PLEASE PROVIDE THE FOLLOWING LANDLORD INFORMATION:

LANDLORD NAME ____

LANDLORD ADDRESS ____

PHONE NUMBER __________________________________

By entering into this service agreement, I herby grant the City of Dayton permission to enter and remain upon the property of the above service address for the purpose of installing, monitoring, repairing and/or terminating utility services described in this agreement. Such permission to enter and remain upon said property shall be effective for the duration of the service agreement.

The City of Dayton Customer Service Representative explained the City's billing and collection policies and I understand that failure to comply with this agreement could result in interruption of utility services.

CUSTOMER INITIALS __________

I, understand, request the City of Dayton to provide utility services at the above address and promise to pay in accordance with the City of Dayton's ordinance at rates established by the Dayton City Council.

CUSTOMER SIGNATURE___________________________________**DATE**_______________

CUSTOMER SERVICE REPRESENTATIVE ____

COMMENTS____

THE FOLLOWING INFORMATION IS REQUIRED BY THE FEDERAL GOVERNMENT IN ORDER TO MONITOR COMPLIANCE WITH FEDERAL LAWS PROHIBITING DISCRIMINATION AGAINST APPLICANTS SEEKING TO PARTICIPATE IN THIS PROGRAM. YOU ARE NOT REQUIRED TO FURNISH THIS INFORMATION, BUT ARE ENCOURAGED TO DO SO. THIS INFORMATION WILL NOT BE USED IN EVALUATING YOUR APPLICATION OR TO DISCRIMINATE AGAINST YOU IN ANYWAY. HOWEVER, IF YOU CHOSE NOT TO FURNISH IT, WE ARE REQUIRED TO NOTE THE RACE/NATIONALITY ORIGIN OF INDIVIDUAL APPLICANTS ON THE BASIS OF VISUAL OBSERVATION OR SURNAME.

ETHNICITY

HISPANIC OR LATINO ________ **NOT HISPANIC OR LATINO** ________

RACE

______________**AMERICAN INDIAN/ ALASKAN NATIVE**
______________**ASIAN**
______________**BLACK OR AFRICAN AMERICAN**
______________**NATIVE HAWAIIAN OR PACIFIC ISLANDER**
______________**WHITE**

SEX

______ **MALE**

______ **FEMALE**

FOR OFFICIAL USE ONLY:

WATER ______________ **SEWER** ______________ **GARBAGE** ________

INSIDE CITY LIMITS ____________ **OUTSIDE CITY LIMITS** ________________

CURRENT WATER STATUS ____________ **OFF** ______________ **ON**

IF WATER STATUS IS OFF, $20.00 TURN ON FEE PAID: YES ______ **NO** ________

OLD ACCOUNT NUMBER_______________ **NEW ACCOUNT NUMBER** ____________

METER READING/ DATE OF READING

____

09-08-14

Complaint on 09-05-14 about sewer smell in city water at the Abramsons, 209 West Clay behind city hall. Went to Elk drug where Mr. Abramson works and asked if we could meet at his home Dave Elkins and myself went over and went inside, Mrs. Abramson took us into the kitchen and said that first thing in the morning she and her son could smell sewage in the kitchen and bathroom when you turned on the water. I asked for a clean glass, they gave me a canning jar. I turned on the cold water and filled half of a quart jar, turned off the water and smelled the water, no smell, I gave the jar to Mrs. Abramson and she smelled it and said can't you smell that? I took the jar and smelled again, no, I don't smell anything. Dave took a Cl2 residual and got at 0.19 mg/l chlorine residual. I told Mrs. Abramson if there was sewage in the water we would not get a residual, and that we don't pump sewage in the city water system. I took the jar into the bathroom and filled the jar half full and smelled it and again nothing. I took the jar into the kitchen and let Mrs. Abramson smell it. She then told me she does not drink the city water, I said I drink it a lot, there is nothing wrong with the water. Mrs. Abramson said she drinks some other water cause of kidney stones. I suggested they get a plumber to check there drains. Dave and I left.

Jim Costello

To: Dave Jepson
529-8102

IMPORTANT MESSAGE

FOR Jim

DATE Sept. 5 TIME 12:15 [✓ A.M.] P.M.

M Abramson, Kathlyn

OF 559-827-1716

PHONE/ CELL

TELEPHONED		PLEASE CALL	✓
CAME TO SEE YOU		WILL CALL AGAIN	
WANTS TO SEE YOU		RUSH	
RETURNED YOUR CALL		SPECIAL ATTENTION	

MESSAGE Has a complaint that her water has a bad odor. I told her we had no other complaints so it may be an issue w/ their plumbing but I would let you know; because you the Man!

SIGNED TKS

APPENDIX B

Correspondence and Supportive Documents

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Local Government Consistency Review Checklist

Water System Name: City of Dayton PWS ID: 182503

Planning/Engineering Document Title: City of Dayton Water System Plan Plan Date: April 2015

Local Government with Jurisdiction: City of Dayton

WAC 246-290-108 Consistency with local plans and regulations:
Consistency with local plans and regulations applies to planning and engineering documents under WAC 246-290-106, 246-290-107, and 246-290-110(4)(b (ii).

1) Municipal water suppliers must include a consistency review and supporting documentation in its planning or engineering document describing how it has addressed consistency with **local plans and regulations**. This review must include specific elements of local plans and regulations, as they reasonably relate to water service as determined by Department of Health (DOH). Complete the table below and see instructions on back.

Local Government Consistency Statement	Page(s) in Planning Document	Yes – No – Not Applicable
a) The water system service area is consistent with the adopted land use and zoning within the applicable service area.	1-6, 1-7, Appendix A, Figures 1-4 - 1-8	
b) The six-year growth projection used to forecast water demand is consistent with the adopted city/county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-11	
c) Applies to cities and towns that provide water service: All water service area policies of the city or town are consistent with the utility service extension ordinances of the city or town.	1-8 through 1-11, Appendix A	
d) Service area policies for new service connections are consistent with the adopted local plans and adopted development regulations of all jurisdictions with authority over the service area [City(ies), County(ies)].	1-8 through 1-13, Appendix A	
e) Other relevant elements related to water supply are addressed in the water system plan, if applicable; Coordinated Water System plans, Regional Wastewater plans, Reclaimed Water plans, Groundwater Area Management plans, and Capital Facilities Element of Comprehensive plans.	Reclaimed Water, 4-7, Appendix D	

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature Date

Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

This checklist may be used to meet the requirements of WAC 246-290-108. When using an alternative format, it must describe all of the elements; 1a), b), c), d), and e), when they apply.

For **water system plans (WSP)**, a consistency review is required for the retail service area and any additional areas where a <u>municipal water supplier</u> wants to expand its water right's place of use.

For **small water system management programs**, a consistency review is only required for areas where a <u>municipal water supplier</u> wants to expand its water right's place of use. If no water right place of use expansion is requested, a consistency review is not required.

For **engineering documents**, a consistency review is required for areas where a <u>municipal water supplier</u> wants to expand its water right's place of use (water system plan amendment is required). For non-community water systems, a consistency review is required when requesting a place of use expansion. All engineering documents must be submitted with a service area map per WAC 246-290-110(4)(b)(ii).

A) Documenting Consistency: Municipal water suppliers must document all of the elements in a consistency review per WAC 246-290-108.

1 a) Provide a copy of the adopted **land use/zoning** map corresponding to the service area. The uses provided in the WSP should be consistent with the adopted land use/zoning map. Include any other portions of comprehensive plans or development regulations that are related to water supply planning.

1 b) Include a copy of the **six-year growth projections** that corresponds to the service area. If the local population growth rate projections are not used, provide a detailed explanation on why the chosen projections more accurately describe the expected growth rate. Explain how it is consistent with the adopted land use.

1c) Include water service area policies and show that they are consistent with the **utility service extension ordinances** within the city or town boundaries. This applies to cities and towns only.

1 d) Include all **service area policies** for how new water service will be provided to new customers.

1 e) **Other relevant elements** related to water supply planning as determined by the department (DOH). See Local Government Consistency – Other Relevant Elements, Policy B.07, September 2009.

B) Documenting an Inconsistency: Please document the inconsistency, include the citation from the comprehensive plan or development regulation, and provide direction on how this inconsistency can be resolved.

C) Documenting Lack of Consistency Review by Local Government: Where the local government with jurisdiction did <u>not</u> provide a consistency review, document efforts made and the amount of time provided to the local government for their review. Please include: name of contact, date, and efforts made (letters, phone calls, and e-mails). In order to self-certify, please contact the DOH Planner.

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Local Government Consistency Review Checklist

Water System Name: City of Dayton PWS ID: 182503

Planning/Engineering Document Title: City of Dayton Water System Plan Plan Date: April 2015

Local Government with Jurisdiction: Columbia County

WAC 246-290-108 Consistency with local plans and regulations:
Consistency with local plans and regulations applies to planning and engineering documents under WAC 246-290-106, 246-290-107, and 246-290-110(4)(b (ii).

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I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature Date

Printed Name, Title, & Jurisdiction

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APPENDIX C

Water Usage Data

SUMMARY OF WATER CONSUMPTION, SERVICE CONNECTIONS, UNITS SERVED, AND ERU CALCULATIONS
CITY OF DAYTON WATER SYSTEM PLAN

User	2002-2003	2003-2004	2004-2005	2005-2006	2010-2011	2011-2012	2012-2013	Percent
No. of Connections								
Inside Residential	1,022	1,017	1,020	1,026	1,040	1,028	1,033	
Inside Business	173	176	182	181	164	164	161	
Outside Residential	87	89	91	91	88	87	89	
Outside Business	22	21	18	19	18	18	18	
County Standpipe	-	-	-	-	-	1	1	
Total	**1,304**	**1,303**	**1,311**	**1,317**	**1,310**	**1,298**	**1,301**	
No. of Units								
Inside Residential	1,091	1,117	1,112	1,116	1,108	1,095	1,100	
Inside Business	254	231	237	234	223	220	220	
Outside Residential	93	96	105	102	106	103	104	
Outside Business	63	55	41	46	31	31	31	
County Standpipe	-	-	-	-	-	1	1	
Total	**1,501**	**1,499**	**1,495**	**1,498**	**1,467**	**1,451**	**1,457**	
Water Consumed (cubic feet)								
Inside Residential	14,697,631	16,805,537	13,670,359	15,055,931	14,890,063	15,001,109	16,684,011	
Inside Business	12,263,453	11,585,161	9,998,426	11,803,791	8,044,027	10,266,238	10,059,013	
Subtotal	26,961,084	28,390,698	23,668,785	26,859,722	22,934,090	25,267,347	26,743,024	
Outside Residential	1,358,843	1,435,684	1,204,012	1,343,494	1,418,018	1,426,495	1,669,568	
Outside Business	2,472,066	2,732,897	2,173,193	3,063,910	933,508	808,524	864,352	
County Standpipe	-	-	-	-	-	12,300	25,900	
Subtotal	3,830,909	4,168,581	3,377,205	4,407,404	2,351,526	2,247,319	2,559,820	
Total	**30,791,993**	**32,559,279**	**27,045,990**	**31,267,126**	**25,285,616**	**27,514,666**	**29,302,844**	
Water Consumed (gallons)								
Inside Residential	109,938,280	125,705,417	102,254,285	112,618,364	111,377,671	112,208,295	124,796,402	56.94%
Inside Business	91,730,628	86,657,004	74,788,226	88,292,357	60,169,322	76,791,460	75,241,417	34.33%
Subtotal	201,668,908	212,362,421	177,042,512	200,910,721	171,546,993	188,999,756	200,037,820	91.26%
Outside Residential	10,164,146	10,738,916	9,006,010	10,049,335	10,606,775	10,670,183	12,488,369	5.70%
Outside Business	18,491,054	20,442,070	16,255,484	22,918,047	6,982,640	6,047,760	6,465,353	2.95%
County Standpipe	-	-	-	-	-	92,004	193,732	0.09%
Subtotal	28,655,199	31,180,986	25,261,493	32,967,382	17,589,414	16,809,946	19,147,454	8.74%
Total	**230,324,108**	**243,543,407**	**202,304,005**	**233,878,102**	**189,136,408**	**205,809,702**	**219,185,273**	**100.00%**

SUMMARY OF WATER CONSUMPTION, SERVICE CONNECTIONS, UNITS SERVED, AND ERU CALCULATIONS
CITY OF DAYTON WATER SYSTEM PLAN

User	2002-2003	2003-2004	2004-2005	2005-2006	2010-2011	2011-2012	2012-2013	Percent
Residential Water Use (cubic feet per year)								
Inside	14,697,631	16,805,537	13,670,359	15,055,931	14,890,063	15,001,109	16,684,011	
Outside	1,358,843	1,435,684	1,204,012	1,343,494	1,418,018	1,426,495	1,669,568	
Total	**16,056,474**	**18,241,221**	**14,874,371**	**16,399,425**	**16,308,081**	**16,427,604**	**18,353,579**	
Residential Units								
Inside	1,091	1,117	1,112	1,116	1,108	1,095	1,100	
Outside	93	96	105	102	106	103	104	
Total	**1,184**	**1,213**	**1,217**	**1,218**	**1,214**	**1,198**	**1,205**	
Water Use Per Residential Unit (gpd per ERU)								
Inside	276.1	308.3	251.9	276.5	275.4	280.7	310.7	
Outside	299.4	306.5	235.0	269.9	275.2	283.6	328.2	
Average	**277.9**	**308.2**	**250.5**	**275.9**	**275.4**	**280.9**	**312.2**	
Non-Residential Water Use (cubic feet per year)								
Inside	12,263,453	11,585,161	9,998,426	11,803,791	8,044,027	10,266,238	10,059,013	
Outside	2,472,066	2,732,897	2,173,193	3,063,910	933,508	808,524	864,352	
County Standpipe	-	-	-	-	-	12,300	25,900	
Total	**14,735,519**	**14,318,058**	**12,171,619**	**14,867,701**	**8,977,535**	**11,087,062**	**10,949,265**	
Equivalent Residential Units for Non-Residential Water Use (gpd per ERU)								
Inside	910.3	770.0	813.3	874.9	598.6	749.6	660.2	
Outside	169.2	182.7	189.5	232.6	69.5	58.4	56.7	
County Standpipe	0.0	0.0	0.0	0.0	0.0	0.9	1.7	
Total	**1080**	**953**	**1003**	**1108**	**668.1**	**808.9**	**718.6**	

Top 15 Water Users
City of Dayton Water System Plan

Top 15 Water Users in Dayton, Year 2011 - 2012

No.	User	ft3	gal	% of Total Consumed	% Irrigation	% Industrial	Est. Reclaimed Water Ac-ft/yr
1	Dayton WWTP	2,938,270	21,978,260	10.7%		95%	64.1
2	City Cemetery	1,648,610	12,331,603	6.0%	100%		37.8
3	Dayton Youth Sports Complex	485,360	3,630,493	1.8%	95%		10.6
4	Dayton General Hospital	415,560	3,108,389	1.5%	15%		1.4
5	School District - High School	353,100	2,641,188	1.3%			0.0
6	Dayton Fish Pond Park	296,550	2,218,194	1.1%	95%		6.5
7	Columbia Courts	281,050	2,102,254	1.0%			
8	Cameron Court	262,580	1,964,098	1.0%			
9	Trail West	257,489	1,926,018	0.9%			0.0
10	McGregor Company	238,840	1,786,523	0.9%		90%	4.9
11	Seneca Food Corporation	201,340	1,506,023	0.7%			0.0
12	LDS Church	199,497	1,492,238	0.7%	90%		4.1
13	School District - Irrigation	192,530	1,440,124	0.7%			0.0
14	Dayton Manor	174,850	1,307,878	0.6%			0.0
15	Pullium Trailers	149,810	1,120,579	0.5%			0.0
	Top 15 Users	8,095,436	60,553,861	29.4%			129.47
	Total Water Consumed	27,514,666	205,809,702				

Top 15 Water Users in Dayton, Year 2012 - 2013

No.	User	ft3	gal	% of Total Consumed	% Irrigation	% Industrial	Est. Reclaimed Water Ac-ft/yr
1	City Cemetery	2,261,300	16,914,524	7.7%	100%		51.9
2	Dayton WWTP	1,516,340	11,342,223	5.2%		90%	31.3
3	Dayton General Hospital	588,818	4,404,359	2.0%	15%		2.0
4	Columbia Courts	390,900	2,923,932	1.3%			0.0
5	School District - High School	347,100	2,596,308	1.2%			
6	Dayton Youth Sports Complex	343,250	2,567,510	1.2%	95%		7.5
7	Dayton Fish Pond Park	328,560	2,457,629	1.1%	95%		7.2
8	Cameron Court	301,620	2,256,118	1.0%			0.0
9	Seneca Food Corporation	288,910	2,161,047	1.0%			0.0
10	County Fairgrounds - Youth Building	247,131	1,848,540	0.8%			0.0
11	County Fairgrounds - Horse Barn	232,654	1,740,252	0.8%			0.0
12	McGregor Company	228,670	1,710,452	0.8%		90%	4.7
13	School - Irrigation	208,060	1,556,289	0.7%	100%		4.8
14	Trails West	198,347	1,483,636	0.7%			0.0
15	Ag Link	193,700	1,448,876	0.7%		90%	4.0
	Top 15 Users	7,675,360	57,411,693	26.2%			113.42
	Total Water Consumed	29,302,844	219,185,273				

Historical Comparison of Top 15 Water Users
City of Dayton Water System Plan

User	**Water Usage (gallons)**		
	2005-2006	**2011-2012**	**2012-2013**
City Cemetery	15,845,632	12,331,603	16,914,524
Dayton WWTP	*	21,978,260	11,342,223
Seneca Food Corporation	8,723,700	1,506,023	2,161,047
School District - High School	5,135,020	2,641,188	2,596,308
Dayton Fish Pond Park	3,772,912	2,218,194	2,457,629
Dayton Youth Sports Complex	2,553,597	3,630,493	2,567,510
Cameron Court	2,448,802	1,964,098	2,256,118
LDS Church	1,833,258	1,492,238	*
Dayton General Hospital	1,772,162	3,108,389	4,404,359
Knoblock	1,691,901	*	*
McGregor Company	1,653,604	1,786,523	1,710,452
Dayton City Park	1,617,924	*	*
School District - Irrigation	1,599,299	1,440,124	1,556,289
Columbia Courts	1,439,975	2,102,254	2,923,932
Dayton Manor	1,343,707	1,307,878	*
School District No. 2 Building	1,059,766	*	*

* - not a top 15 user for this time period

APPENDIX D

System Analysis Information

Well No. 1

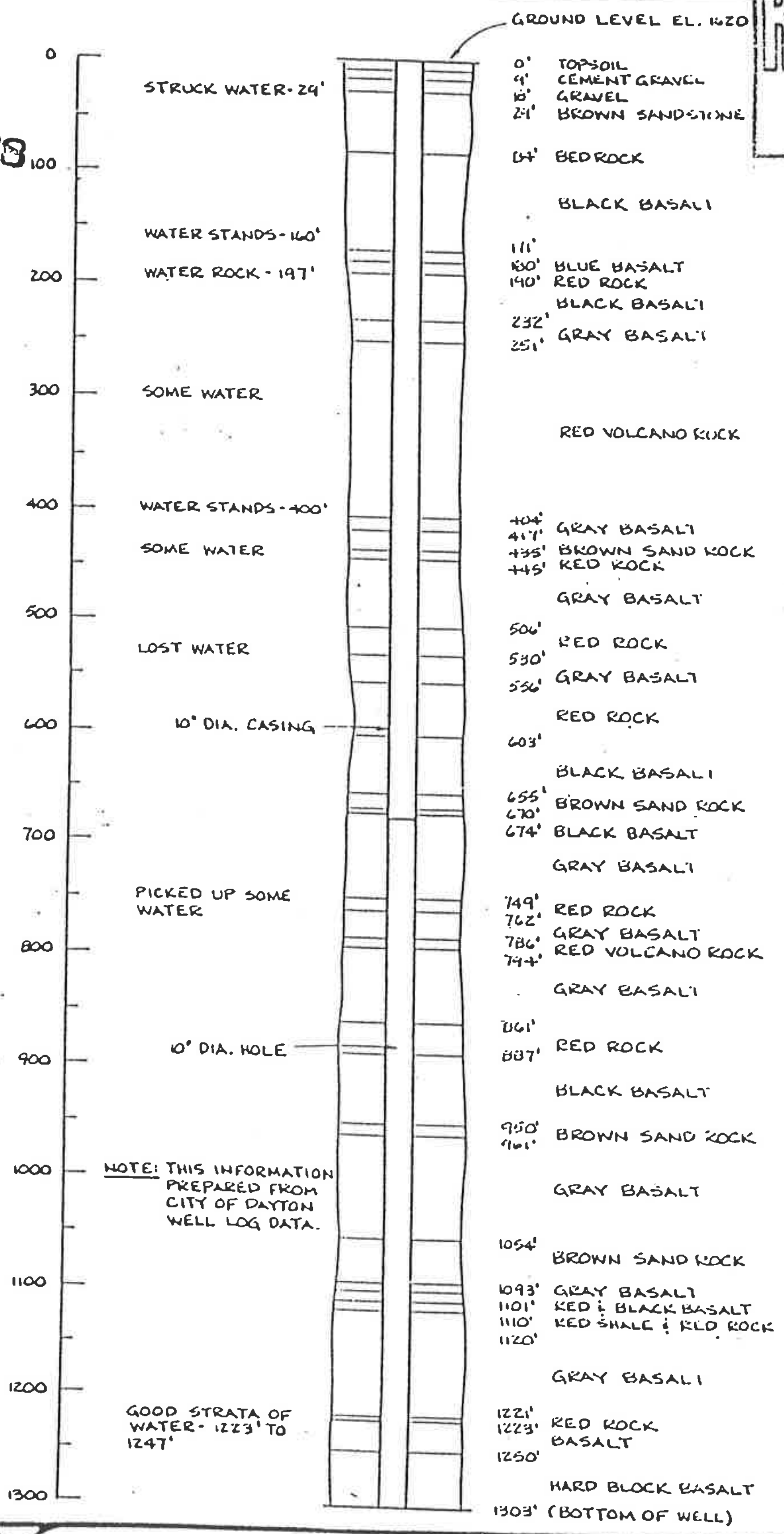
[illegible] from 240 to 260

Log Of City Well. A.A.Durand Contractor. Jack Lance Driller.

Wednesday, April 15, 1936. Well #1

0 to 9' Soil.
9 " 18' Cement Gravel.
18 " 29' gravel caving bad (struck water)
29 " 84' Bed rock (brown color sand stone)
84 " 171' Black Basalt.
171 " 180' Blue Basalt.
180 " 190' Red rock.(water rock) Water stands at 160 feet below surface.
190 " 232' Black Basalt.
232 " 251' Gray Basalt.
251 " 404' Red volcano rock.(some water)
404 " 417' Gray Basalt rock.
417 " 435' Brown sand rock.
435 " 445' Red rock (some water)
445 " 506' Gray Basalt.
506 " 530' Red rock.(lost water) stands at 400 feet.
530 " 556' Gray Basalt rock.
556 " 603' Red rock.
603 " 655' Black Basalt rock.
655 " 670' Brown sand rock. (casing down to this depth)
670 " 674' Black Basalt rock.
674 " 749' Gray Basalt rock.
749 " 762' Red rock picked up some water.
762 " 786' Gray Basalt rock.
786 " 794' Volcano red rock.
794 " 861' Gray Basalt rock.
861 " 887' Red rock.
887 " 950' Black Basalt rock.
950 " 961' Brown sand rock.
961 " 1054' Gray Basalt.rock.
1054 " 1090' Brown sand rock.
1090 " 1093' Red shale.
1093 " 1101' Gray Basalt rock.
1101 " 1110' Red and black basalt rock.
1110 " 1120' Red shale and red rock.
1120 " 1221' Gray Basalt rock.
1221 " 1223' Red rock.
1223 " 1250' Good strata of water at 1223 to 1247.
Basalt.

G 328378



anderson perry & associates, inc.

CITY OF
DAYTON, WASHINGTON
WATER SYSTEM

WELL NO. 1 LOG

FIGURE
1
Page 1 of 3

Well No. 2

File Original and First Copy with
Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....
Permit No. G-3-26587P

(1) OWNER: Name City of Dayton Address 111 South First, Dayton, WA 99328

(2) LOCATION OF WELL: County Columbia NE ¼ NE ¼ SW¼ NW¼ Sec. 32 T. 10 N., R. 39E W.M.
Bearing and distance from section or subdivision corner 1550'S-1150'E of NW WRIA32

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one).... 2
First Well
Drilled by us
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☐ Rotary ☒ Bored ☐ Driven ☐ Jetted ☐
~~28" 0-19, 19 3/8" 19-63, 12" 63-710~~

(5) DIMENSIONS: Diameter of well 12" 710-1445 inches.
Drilled 1445 ft. Depth of completed well 1445 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 20" Diam. from +1 ft. to 31 ft.
Threaded ☐ 16" Diam. from +1 ft. to 707 ft.
Welded ☒ ...." Diam. from .... ft. to .... ft.

Perforations: Yes ☐ No ☒
Type of perforator used ....
SIZE of perforations .... in. by .... in.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.

Screens: Yes ☐ No ☒
Manufacturer's Name ....
Type .... Model No. ....
Diam. .... Slot size .... from .... ft. to .... ft.
Diam. .... Slot size .... from .... ft. to .... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: ....
Gravel placed from .... ft. to .... ft.

Surface seal: Yes ☒ No ☐ To what depth? 707 ft.
Material used in seal neat cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? .... Depth of strata ....
Method of sealing strata off ....

(7) PUMP: Manufacturer's Name ....
Type: .... H.P. ....

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 1650 ft.
Static level 613 ft. below top of well Date ....
Artesian pressure .... lbs. per square inch Date ....
Artesian water is controlled by .... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? ....
Yield: gal./min. with ft. drawdown after hrs.
"By Ladd" TCR.
"Moses Lake Wash

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....
Bailer test .... gal./min. with .... ft. drawdown after .... hrs.
Artesian flow .... g.p.m. Date ....
Temperature of water .... Was a chemical analysis made? Yes ☒ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
boulders, gravel	0	11
ledge or slab, a very large boulder	11	19
boulders & gravel red-brown & gray color	19	26
gravel w/pea size & larger rounded water bearing, red-black-brown	26	30
black fractured basalt	30	40
med hard gray basalt, drilling 10'/hr	40	54
brownish black basalt some H_2O drilling about 15'/hr	54	59
very hard blackish-gray basalt 4-5'/hr 70 rpm rotation	59	68
red cinders soft 70 rpm rot.	68	71
brown & black basalt some porous 15'/hr, rate med-soft 70 rpm	71	80
med hard blackish gray basalt 12'/hr 70 rpm	80	94
soft gray basalt 40'/hr	94	99
hard crevised basalt 10'/hr blackish-gray color 70 rpm	99	102
soft brown & black basalt 40'/hr, 70 rpm	102	110
hard broken basalt crevised bad	110	130
hard broken basalt	130	145
med soft brown basalt	145	156
med gray brown basalt	156	158
hard gray basalt	158	197
hard gray crevised basalt runs ruff	197	210
soft brown basalt	210	217
med hard black & brown basalt	217	243
hard gray basalt	243	254
brownish tan colored very soft	254	278
med hard gray basalt	278	295
soft brown shattered basalt	293	318
hard crevised gray basalt	318	324

Work started 4-16, 19 81 Completed 7-21, 19 81

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME LEACH WELL DRILLING, INC.
(Person, firm, or corporation) (Type or print)
Address 821 W. Broadway, Moses Lake, WA 98837
[Signed] ....
(Well Driller)
License No. 0591 Date 7-29, 19 81

9/28/81

(USE ADDITIONAL SHEETS IF NECESSARY)
Dayton

ECY 050-1-20

Page 2

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....

Permit No. ....

(1) OWNER: Name City of Dayton Address....................

(2) LOCATION OF WELL: County.................... ....¼ ....¼ Sec....... T.......N., R.......W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)....
New well ☐ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Bored ☐ Cable ☐ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well .... inches.
Drilled.......... ft. Depth of completed well.......... ft.

(6) CONSTRUCTION DETAILS:

Casing installed: ......" Diam. from ...... ft. to ...... ft.
Threaded ☐ ......" Diam. from ...... ft. to ...... ft.
Welded ☐ ......" Diam. from ...... ft. to ...... ft.

Perforations: Yes ☐ No ☐
Type of perforator used..........
SIZE of perforations .... in. by .... in.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.

Screens: Yes ☐ No ☐
Manufacturer's Name..........
Type.......... Model No..........
Diam. ...... Slot size ...... from ...... ft. to ...... ft.
Diam. ...... Slot size ...... from ...... ft. to ...... ft.

Gravel packed: Yes ☐ No ☐ Size of gravel: ....
Gravel placed from .... ft. to .... ft.

Surface seal: Yes ☐ No ☐ To what depth? .... ft.
Material used in seal..........
Did any strata contain unusable water? Yes ☐ No ☐
Type of water?.......... Depth of strata..........
Method of sealing strata off..........

(7) PUMP: Manufacturer's Name..........
Type: .... H.P. ....

(8) WATER LEVELS: Land-surface elevation above mean sea level.......... ft
Static level .... ft. below top of well Date..........
Artesian pressure .... lbs. per square inch Date..........
Artesian water is controlled by.......... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?..........
Yield: .... gal./min. with .... ft. drawdown after .... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....
Bailer test.......... gal./min. with.......... ft. drawdown after.......... hrs.
Artesian flow.......... g.p.m. Date..........
Temperature of water.......... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
brown & black fractured basalt		
soft	324	343
mixed med soft to med hard brown-		
black mixed basalt w/some yellow		
clay, also some porous rock		
w/very small holes	343	410
brown red rock estimate we picked		
up 75-100 gal H_2O at top of strata		
there is also brown & some trace of		
blue, also rock has sm vesculor		
holes in it	410	432
hard broken basalt	432	471
red soft cinders trace of H_2O	471	498
hard crevised basalt, runs ruff	498	520
Very hard black basalt	520	537
Hard black basalt	537	554
Med hard black basalt	554	600
hard black basalt	600	668
red cinders basalt porous, no H_2O	668	701
hard gray basalt	701	716
soft red and brown basalt	716	720
hard gray & brown basalt w/fractures	720	725
med soft to med hard fractured		
brown basalt, some H_2O, some		
porous brown basalt	725	770
med hard to med soft gray basalt	770	796
red cinders basalt & some white		
sand stone, some H_2O	796	822
med soft gray & brown basalt		
fracture, runs ruff	822	838
soft brown porous basalt, no H_2O	838	850
med hard gray & brown basalt	850	860
hard black basalt	860	885
soft brown basalt w/some	885	912
XXXXXXXXXXXXXXXXXXXXXXXXXXXX		
XXXX white sand stone		

Work started.........., 19...... Completed.........., 19......

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME LEACH WELL DRILLING, INC. (Person, firm, or corporation) (Type or print)

Address..........

[Signed].......... (Well Driller)

License No.......... Date.........., 19......

9/22/81

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name City of Dayton Address ....

(2) LOCATION OF WELL: County .... ¼ ..... ¼ Sec. ..... T. ..... N., R. ..... W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☐ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well .... inches.
Drilled .... ft. Depth of completed well .... ft.

(6) CONSTRUCTION DETAILS:

Casing installed: ......" Diam. from ...... ft. to ...... ft.
Threaded ☐ ......" Diam. from ...... ft. to ...... ft.
Welded ☐ ......" Diam. from ...... ft. to ...... ft.

Perforations: Yes ☐ No ☐
Type of perforator used ....
SIZE of perforations ...... in. by ...... in.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.

Screens: Yes ☐ No ☐
Manufacturer's Name ....
Type .... Model No. ......
Diam. ...... Slot size ...... from ...... ft. to ...... ft.
Diam. ...... Slot size ...... from ...... ft. to ...... ft.

Gravel packed: Yes ☐ No ☐ Size of gravel: ....
Gravel placed from ...... ft. to ...... ft.

Surface seal: Yes ☐ No ☐ To what depth? ...... ft.
Material used in seal ....
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ...... Depth of strata ......
Method of sealing strata off ....

(7) PUMP: Manufacturer's Name ....
Type: .... H.P. ......

(8) WATER LEVELS: Land-surface elevation above mean sea level ...... ft.
Static level ...... ft. below top of well Date ......
Artesian pressure ...... lbs. per square inch Date ......
Artesian water is controlled by ...... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? ......
Yield: ...... gal./min. with ...... ft. drawdown after ...... hrs.
" ...... " ...... " ...... "
" ...... " ...... " ...... "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ......
Bailer test ...... gal./min. with ...... ft. drawdown after ...... hrs.
Artesian flow ...... g.p.m. Date ......
Temperature of water ...... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Med hard brown & black basalt	912	930
Hard gray & brown basalt	930	940
Hard gray basalt	940	1007
Med hard brown basalt	1007	1010
Med soft red cinders basalt, some H_2O, some brown basalt mixed	1010	1044
Brown cracked basalt, runs very ruff	1044	1055
Hard gray basalt	1055	1070
Hard gray & brown basalt mix	1070	1130
Hard gray basalt	1130	1147
Red porous cinders basalt soft	1147	1170
Med hard gray & brown basalt	1170	1185
Med soft brown fractured basalt & some red cinders basalt mixed	1185	1195
Red cinders basalt & brown basalt	1195	1352
Med soft gray & brown & red basalt mix	1352	1360
Med hard basalt black	1360	1375
Hard black basalt	1375	1386
Soft brown & black & light brown	1386	1390
Med hard gray & brown fractured basalt	1390	1405
Very Hard basalt black & gray & brown basalts	1405	1420
Hard gray basalt	1420	1445
Bottom 20' have cuttings		

Permit GPM 2000 A/yr 2500 Max

Work started ...., 19...... Completed ...., 19......

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME LEACH WELL DRILLING, INC. (Person, firm, or corporation) (Type or print)

Address ....

[Signed] .... (Well Driller)

License No. .... Date ...., 19......

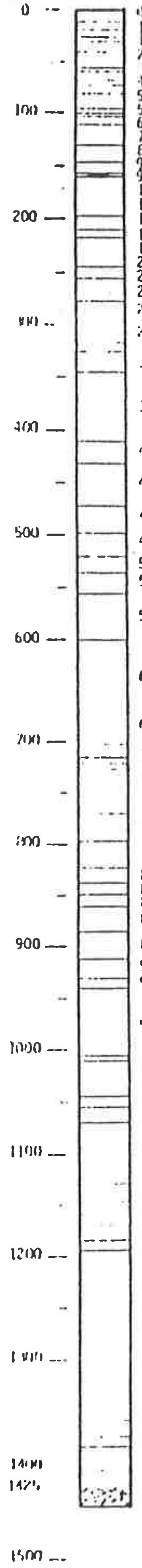
9/28/81

(USE ADDITIONAL SHEETS IF NECESSARY)

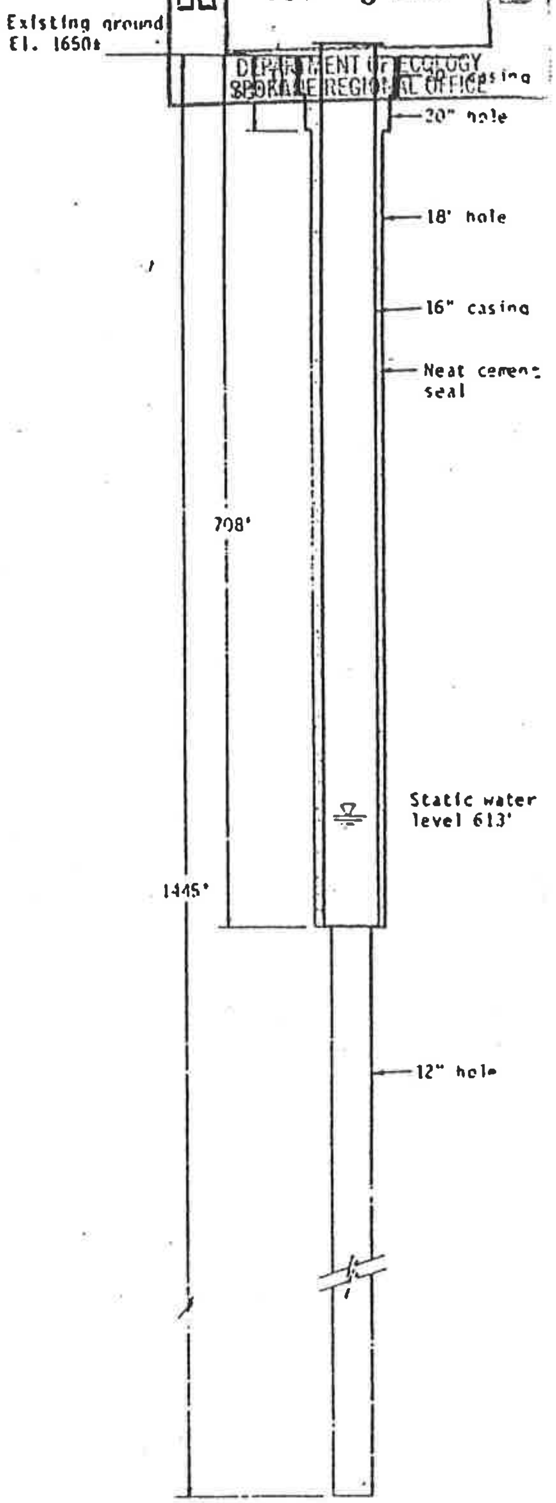
ECY 050-1-20

G 328378

City of
DAYTON, WASHINGTON
CITY WELL NO. 2 RECORD DRAWING



0-11	Boulders, gravel
11-19	Ledge or slab
19-26	Red & gray gravel w/boulders
26-30	Water bearing gravel
30-40	Black basalt, fractured
40-54	Med. hard gray basalt
54-59	Brownish black basalt
59-68	Very hard blackish gray basalt
68-71	Soft red cinders
71-80	Brown, black basalt, porous
80-94	Med. hard blackish gray basalt
94-99	Soft gray basalt
99-102	Hard crevised basalt
102-110	Soft brown basalt
110-130	Hard basalt, fractured
130-145	Hard broken basalt
145-156	Med. soft brown basalt
156-217	Gray brown basalt
217-243	Med. hard black & brown basalt
243-254	Hard gray basalt
254-278	Brownish tan colored, soft
278-295	Med. hard gray basalt
295-318	Soft brown shattered basalt
318-324	Hard crevised gray basalt
324-343	Soft black basalt, fractured
343-410	Basalt mixed w/yellow clay
410-432	Reddish brown rock
432-471	Hard broken basalt
471-498	Soft red cinders
498-520	Hard crevised basalt
520-537	Very hard black basalt
537-554	Med. hard black basalt
554-600	Med. hard black basalt
	Static level
600-668	Hard black basalt
668-701	Red cinders basalt
701-716	Hard gray basalt
716-720	Soft red basalt
720-725	Hard gray & brown basalt
725-770	Fractured brown basalt
770-796	Med. gray basalt
796-822	Red cinders basalt, some sandstone
822-838	Soft gray & brown basalt
838-850	Soft brown porous basalt
850-860	Med. hard brown & gray basalt
860-885	Hard black basalt
885-912	Soft brown basalt
912-930	Med. hard brown & black basalt
930-940	Hard gray & brown basalt
940-1007	Hard gray basalt
1007-1010	Med. hard brown basalt
1010-1044	Soft red cinders basalt
1044-1055	Brown cracked basalt
1055-1070	Hard gray basalt
1070-1130	Hard gray & brown basalt
1130-1147	Hard gray basalt
1147-1170	Red cinders basalt, porous
1170-1185	Med. hard brown & gray basalt
1185-1195	Soft brown basalt, fractured
1195-1262	Red cinders basalt
1262-1360	Med. soft basalt
1360-1375	Med. hard black basalt
1375-1386	Hard black basalt
1386-1390	Soft basalt
1390-1405	Gray & brown basalt, fractured
1405-1420	Very hard basalt
1420-1445	Hard gray basalt (Bottom 20' of hole filled with cuttings)



Well located on South 2nd Street.
Drilled 4/16/81 to 7/21/81 by Leach Well Drilling.
Pump test 1750 gpm with 4' drawdown after 11 hours.

WELL NO. 2 LOG

FIGURE 1

anderson perry & associates, inc.

Well No. 3

RECEIVED
NOV 5 1981
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPOR
STATE OF WASHINGTON

Application No.
Permit No. G3 26587P

(1) OWNER: Name City of Dayton Address 111 S. 1st, Dayton, WA 99328

(2) LOCATION OF WELL: County Columbia — NE ¼ NE ¼ SW¼ [illegible] Sec. 32 T. 10 N., R. 39E. W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) 3
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☐ Rotary ☒ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 20" 0-32', 19¼" 32-60, 18" 60-700, 12¼ 700-1180 ins.
Drilled 1180 ft. Depth of completed well 1180 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 20 " Diam. from 0 ft. to 32 ft.
Threaded ☐ 16 " Diam. from +1 ft. to 700 ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 700 ft.
Material used in seal neat cement
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 1660 ft.
Static level 541 ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Lad Irrig.
Yield: gal./min. with ft. drawdown after hrs.
Lad Irrigation has information

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Brown dirt	0	3
Basalt boulders	3	30
Pea gravel	30	32
Med. hard brown basalt, fractured & some gravel	32	50
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Med hard brown basalt	50	96
Soft brown	96	100
Med hard brown & black basalt mix	100	116
Med soft brown porous basalt, no water	116	130
med hard brown basalt	130	220
Soft brown porous basalt & green & yellow clay stone mix. This area is very broken	220	248
Hard black & brown basalt	248	255
Soft brown basalt & yellow & green clay stone mix	255	288
@ 260' picked up some water seepage		
Hard brown basalt	288	338
Soft black basalt	338	345
Red cinders basalt, more seepage	345	358
Black basalt med hard	358	380
Black basalt hard	380	400
Med hard black basalt	400	420
Hard black basalt	420	425
Soft brown basalt, sm trace H_2O	425	438
Med hard black basalt	438	440
Hard black basalt	440	450
Med soft brown basalt	450	460
Med hard brown basalt w/some black basalt mix & brown porous material being black & brown & broken		
Runs rough/Satic level	530	550

Continued on Page 2

Work started Aug 3, 1981 Drilling Completed Oct 8, 1981
Testing Oct 2[illegible], 1981

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME LEACH WELL DRILLING, INC. (Person, firm, or corporation) (Type or print)
Address 821 W. Broadway, Moses Lake, WA 98837
[Signed] E. Keith Hellyer (Well Driller)
License No. 0591 Date Oct 30, 1981

(USE ADDITIONAL SHEETS IF NECESSARY)

11/6/81

Dayton T/w

ECY 050-1-20

Page 2

File Original and First Copy with
Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPOR

STATE OF WASHINGTON

Application No. ....

Permit No. ....

(1) OWNER: Name City of Dayton Address

(2) LOCATION OF WELL: County .... ¼ .... ¼ Sec. .... T. .... N., R. .... W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....

New well ☐ Deepened ☐ Reconditioned ☐

Method: Dug ☐ Bored ☐ Cable ☐ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well .... inches.

Drilled .... ft. Depth of completed well .... ft.

(6) CONSTRUCTION DETAILS:

Casing installed: ...." Diam. from .... ft. to .... ft.

Threaded ☐ ...." Diam. from .... ft. to .... ft.

Welded ☐ ...." Diam. from .... ft. to .... ft.

Perforations: Yes ☐ No ☐

Type of perforator used ....

SIZE of perforations .... in. by .... in.

.... perforations from .... ft. to .... ft.

.... perforations from .... ft. to .... ft.

.... perforations from .... ft. to .... ft.

Screens: Yes ☐ No ☐

Manufacturer's Name ....

Type .... Model No. ....

Diam. .... Slot size .... from .... ft. to .... ft.

Diam. .... Slot size .... from .... ft. to .... ft.

Gravel packed: Yes ☐ No ☐ Size of gravel: ....

Gravel placed from .... ft. to .... ft.

Surface seal: Yes ☐ No ☐ To what depth? .... ft.

Material used in seal ....

Did any strata contain unusable water? Yes ☐ No ☐

Type of water? .... Depth of strata ....

Method of sealing strata off ....

(7) PUMP: Manufacturer's Name ....

Type: .... H.P. ....

(8) WATER LEVELS: Land-surface elevation above mean sea level .... ft.

Static level .... ft. below top of well Date ....

Artesian pressure .... lbs. per square inch Date ....

Artesian water is controlled by .... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☐ No ☐ If yes, by whom? ....

Yield: .... gal./min. with .... ft. drawdown after .... hrs.

" .... " .... " .... "

" .... " .... " .... "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....

Bailer test .... gal./min. with .... ft. drawdown after .... hrs.

Artesian flow .... g.p.m. Date ....

Temperature of water .... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Hard black basalt	550	556
Brown & black broken basalt also porous brown basalt, soft, some water	556	581
Hard black & brown basalt mix, fractured, runs rough	581	590
Hard black basalt	590	760
Hard black basalt, fractured, runs rough	760	787
Med hard black & brown broken basalt	787	797
Brown broken basalt w/some red cinders basalt, med soft	797	802
Red cinder basalt, there is some water	802	809
Fractured gray basalt, runs rough hard	809	828
Hard brown basalt	828	840
Red cinders basalt some water, red cinder basalt is porous	840	851
Brown fractured basalt, med hard	851	830
Brown & gray fractured basalt runs rough	880	900
Hard gray basalt, runs rough, fractured	900	955
Red cinder basalt, med soft, brown broken basalt, porous	955	970
Brown basalt med hard	970	997
Light & dark brown porous basalt water, 140 psi, 170 psi, some white sandstone	997	1006
Hard gray basalt runs smooth	1006	1034
Soft brown porous basalt, some water 185-210 psi	1037	1046
Hard black fractured basalt	1046	1063
Continued on Page 3		

Work started ...., 19...... Completed ...., 19......

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME LEACH WELL DRILLING, INC. (Person, firm, or corporation) (Type or print)

Address ....

[Signed] .... (Well Driller)

License No. .... Date ...., 19......

RECEIVED
5 1981
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

11/6/81

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-70

File Original and First Copy with
Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. ....

Permit No. ....

(1) OWNER: Name City of Dayton Address..........

(2) LOCATION OF WELL: County.......... — ....¼ ....¼ Sec....... T.......N., R.......W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)..........

New well ☐ Method: Dug ☐ Bored ☐

Deepened ☐ Cable ☐ Driven ☐

Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well .... inches.

Drilled..........ft. Depth of completed well..........ft.

(6) CONSTRUCTION DETAILS:

Casing installed: ......" Diam. from ...... ft. to ...... ft.

Threaded ☐ ......" Diam. from ...... ft. to ...... ft.

Welded ☐ ......" Diam. from ...... ft. to ...... ft.

Perforations: Yes ☐ No ☐

Type of perforator used..........

SIZE of perforations .... in. by .... in.

.... perforations from ...... ft. to ...... ft.

.... perforations from ...... ft. to ...... ft.

.... perforations from ...... ft. to ...... ft.

Screens: Yes ☐ No ☐

Manufacturer's Name..........

Type.......... Model No..........

Diam. ...... Slot size ...... from ...... ft. to ...... ft.

Diam. ...... Slot size ...... from ...... ft. to ...... ft.

Gravel packed: Yes ☐ No ☐ Size of gravel: ....

Gravel placed from .... ft. to .... ft.

Surface seal: Yes ☐ No ☐ To what depth? .... ft.

Material used in seal..........

Did any strata contain unusable water? Yes ☐ No ☐

Type of water?.......... Depth of strata..........

Method of sealing strata off..........

(7) PUMP: Manufacturer's Name..........

Type: .... H.P. ......

(8) WATER LEVELS: Land-surface elevation above mean sea level.......... ft.

Static level .... ft. below top of well Date..........

Artesian pressure .... lbs. per square inch Date..........

Artesian water is controlled by.......... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☐ No ☐ If yes, by whom?..........

Yield: gal./min. with ft. drawdown after hrs.

" " " "

" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....

Bailer test.......... gal./min. with.......... ft. drawdown after.......... hrs.

Artesian flow.......... g.p.m. Date..........

Temperature of water.......... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Soft brown fractured basalt	1063	1075
Hard black fractured basalt	1075	1082
Black porous basalt, drilling pressure increased to 260psi	1082	1085
Hard black fractured basalt	1085	1092
Med hard brown fractured basalt	1092	1140
Red & Brown basalt porous soft	1140	1155
Brown & Gray basalt fractured runs rough	1155	1180

Work started.........., 19...... Completed.........., 19......

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME LEACH WELL DRILLING, INC. (Person, firm, or corporation) (Type or print)

Address..........

[Signed].......... (Well Driller)

License No.......... Date.........., 19......

RECEIVED
NOV - 5 1981
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

11/6/81

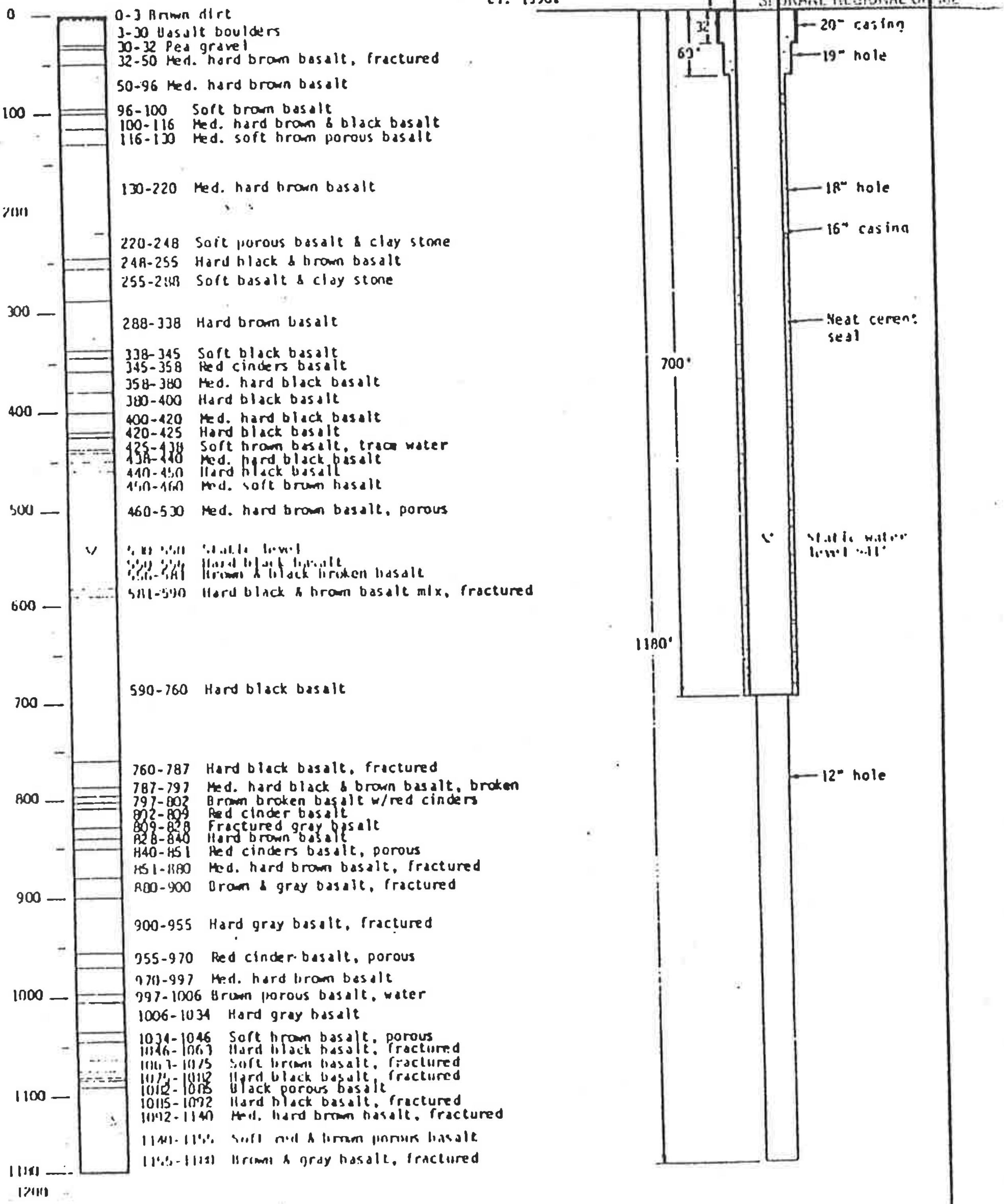
(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-70

328

City of
DAYTON, WASHINGTON
CITY WELL NO. 3 RECORD DRAWING

Existing ground
El. 1590±



0-3	Brown dirt
3-30	Basalt boulders
30-32	Pea gravel
32-50	Med. hard brown basalt, fractured
50-96	Med. hard brown basalt
96-100	Soft brown basalt
100-116	Med. hard brown & black basalt
116-130	Med. soft brown porous basalt
130-220	Med. hard brown basalt
220-248	Soft porous basalt & clay stone
248-255	Hard black & brown basalt
255-288	Soft basalt & clay stone
288-338	Hard brown basalt
338-345	Soft black basalt
345-358	Red cinders basalt
358-380	Med. hard black basalt
380-400	Hard black basalt
400-420	Med. hard black basalt
420-425	Hard black basalt
425-438	Soft brown basalt, trace water
438-440	Med. hard black basalt
440-450	Hard black basalt
450-460	Med. soft brown basalt
460-530	Med. hard brown basalt, porous
[illegible]	Static level
[illegible]	Hard black basalt
[illegible]-581	Brown & black broken basalt
581-590	Hard black & brown basalt mix, fractured
590-760	Hard black basalt
760-787	Hard black basalt, fractured
787-797	Med. hard black & brown basalt, broken
797-802	Brown broken basalt w/red cinders
802-809	Red cinder basalt
809-828	Fractured gray basalt
828-840	Hard brown basalt
840-851	Red cinders basalt, porous
851-880	Med. hard brown basalt, fractured
880-900	Brown & gray basalt, fractured
900-955	Hard gray basalt, fractured
955-970	Red cinder basalt, porous
970-997	Med. hard brown basalt
997-1006	Brown porous basalt, water
1006-1034	Hard gray basalt
1034-1046	Soft brown basalt, porous
1046-1063	Hard black basalt, fractured
1063-1075	Soft brown basalt, fractured
1075-1082	Hard black basalt, fractured
1082-1085	Black porous basalt
1085-1092	Hard black basalt, fractured
1092-1140	Med. hard brown basalt, fractured
1140-1155	Soft red & brown porous basalt
1155-1180	Brown & gray basalt, fractured

Well located near corner of Commercial & Pine Streets.
Drilled 8/3/81 to 10/8/81 by Leach Well Drilling.
Pump test 1750 gpm with 80' drawdown after 11.5 hours.

FIGURE 1

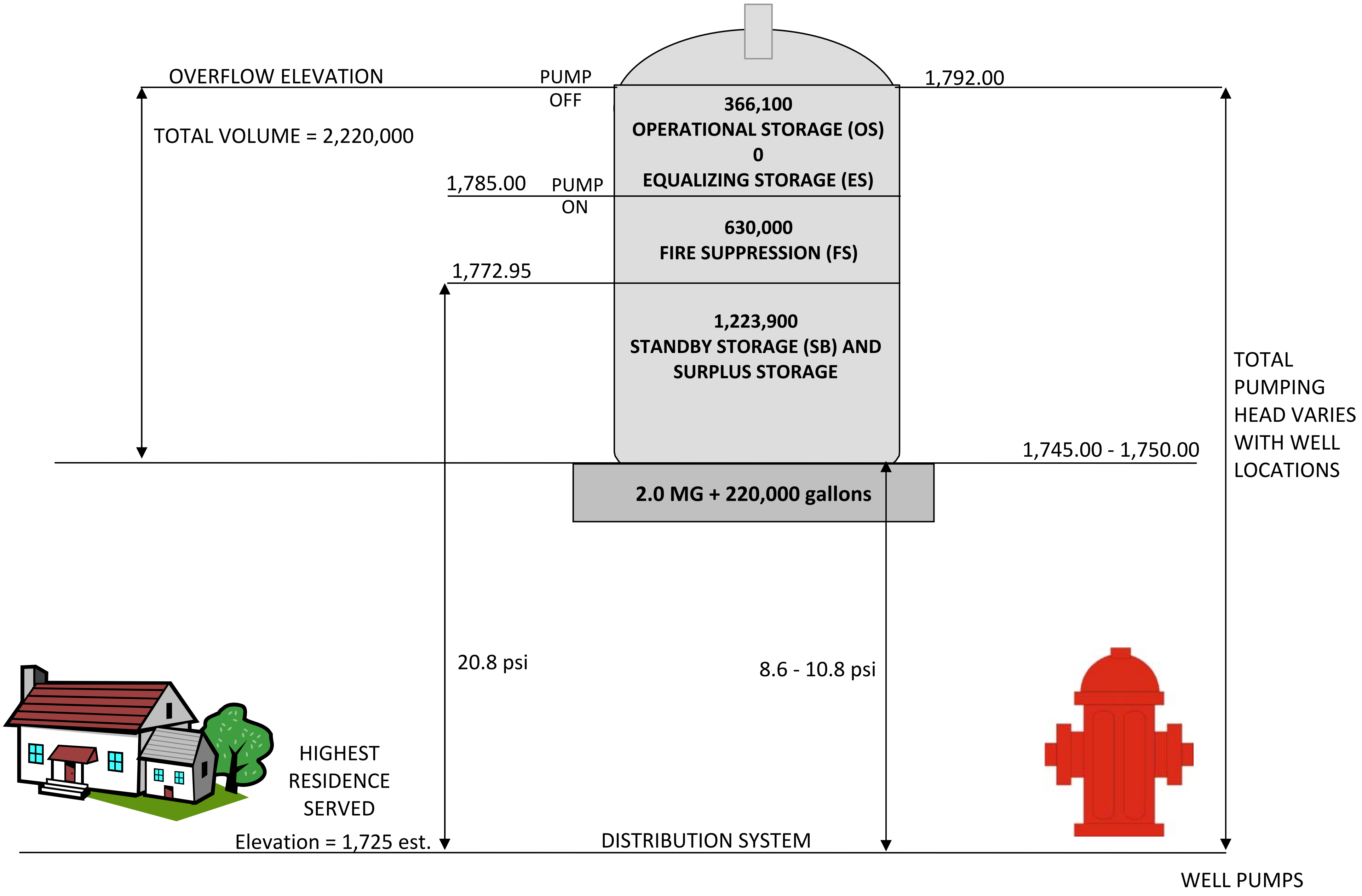
anderson perry & associates, inc.

WELL NO. 3 LOG

RESERVOIR STORAGE CALCULATIONS

	Year		
	2014	**2020**	**2034**
Flows			
ADD, gpd	836,000	827,000	808,200
ADD, gpd per ERU	314.3	306.9	309.9
PHD, gpm	2,438	2,436	2,357
Overall ERUs	2,660	2,695	2,608
2.0-MG Storage Volume	2,000,000	2,000,000	2,000,000
220,000-Gallon Storage Volume	220,000	220,000	220,000
2.0-MG Tank Height, feet	42	42	42
220,000 Gal Tank Height, feet	47	47	47
Operating Level, feet	7	7	7
Sum - Normal Source, gpm	2,900	2,900	2,900
Highest Fire Flow, gpm	3,500	3,500	3,500
Fire Duration, hour	3	3	3
Overflow Elevation, feet	1,792	1,792	1,792
2.0-MG Base Elevation, feet	1,750	1,750	1,750
220,000-Gallon Base Elevation, feet	1,745	1,745	1,745
Operational Storage, gallons			
2.0-MG Tank	333,333	333,333	333,333
220,000-Gallon Standpipe	32,766	32,766	32,766
Subtotal	**366,099**	**366,099**	**366,099**
Elevation, feet	1,785.00	1,785.00	1,785.00
Equalizing Storage, gallons	**0**	**0**	**0**
Elevation, feet	1,785.00	1,785.00	1,785.00
Fire Suppression, gallons	**630,000**	**630,000**	**630,000**
Elevation, feet	1,772.95	1,772.95	1,772.95
Standby Storage, gallons	**1,064,000**	**1,078,000**	**1,043,200**
Elevation, feet	1,752.61	1,752.34	1,753.01
Total	**2,060,099**	**2,074,099**	**2,039,299**
Available	**2,220,000**	**2,220,000**	**2,220,000**
Surplus	**159,901**	**145,901**	**180,701**

FIGURE D-1
Reservoir Storage Components (gallons)
Present Condition



3/5/2015
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FIGURE D-2
Reservoir Storage Components (gallons)
Year 2020 Projection

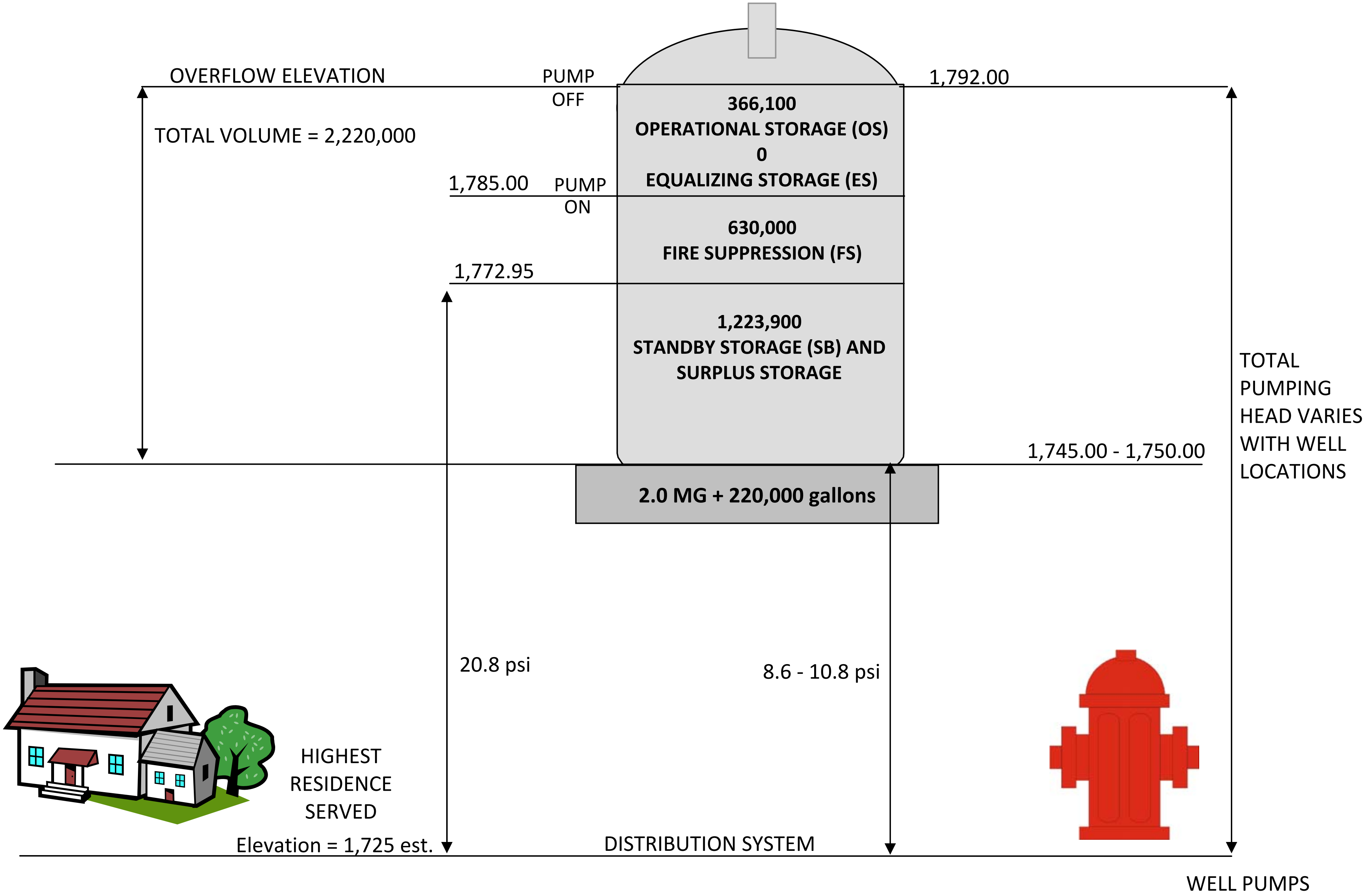

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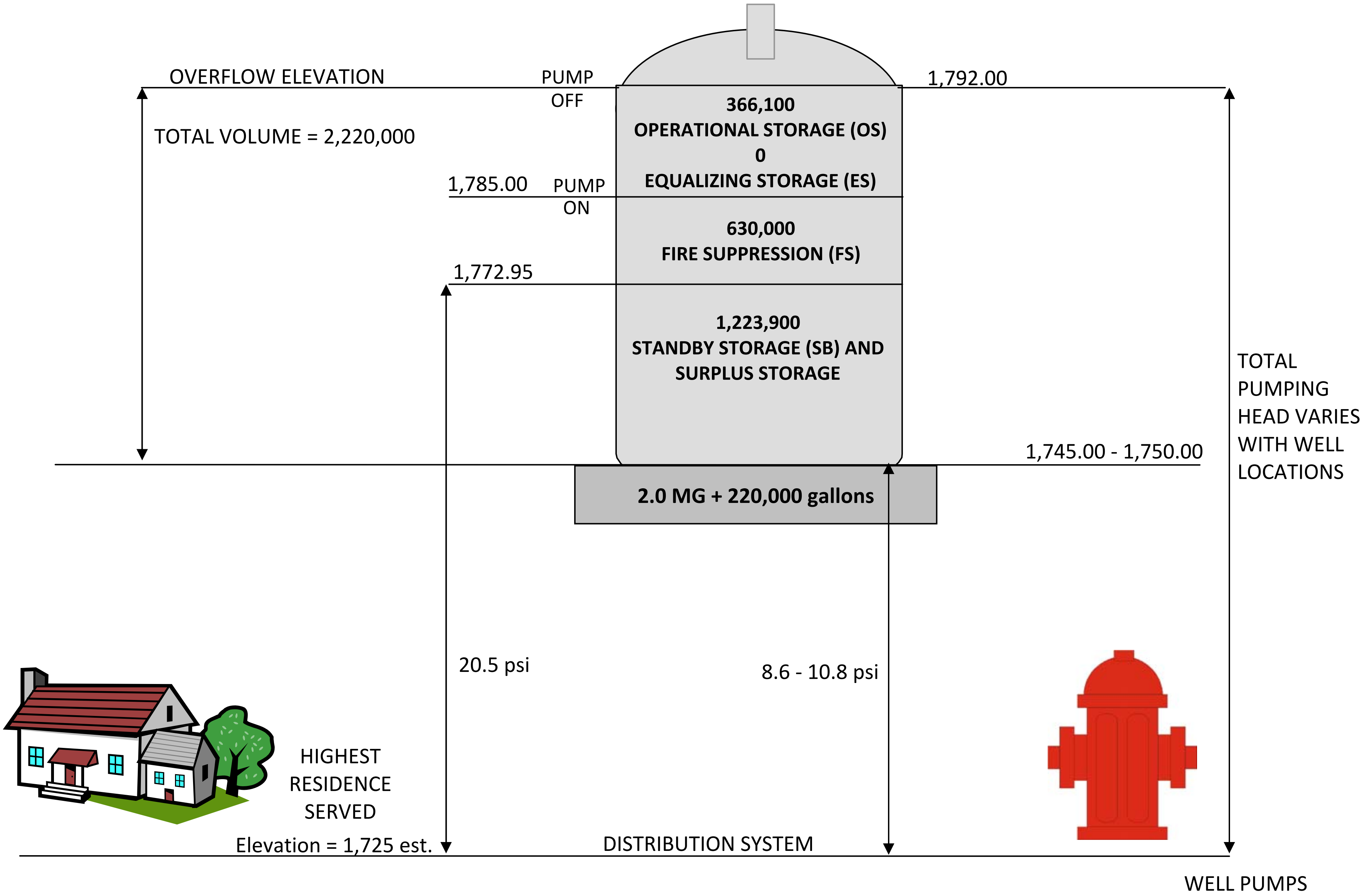
FIGURE D-3
Reservoir Storage Components (gallons)
Year 2034 Projection



3/5/2015
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TABLE D-1
Physical Capacity Analysis Summary

Basis	Calculation
Source Capacity (Annual Average) Based Source Volume Available, Va = 3,630 ac-ft/yr = 1,182,758,544 gal/yr ADD/ERU = 836,000 gpd / 2,660 ERUs = 314.2 gpd/ERUs	**Equation 6-1, DOH Water System Design Manual (2009)** N, ERUs = Va/(ADD X 365 days) = 1,182,758,544 gal / (314.2 gpd/ERUs X 365) = **10,313 ERUs** Excess ERUs = 10,313 - 2,660 = 7,653 ERUs
Source Capacity (Peak Day) Based Well No. 1: 700 gpm, 18 hrs/day Well No. 2: 1,100 gpm, 18 hrs/day Well No. 3: 1,100 gpm, 18 hrs/day Vd = 2,900 gpm X 18 hrs X 60 min/hr = 3,132,000 gpd MDD/ERU = 2,069,000 gpd / 2,660 ERUs = 777.8 gpd/ERUs	**Equation 6-2, DOH Water System Design Manual (2009)** N, ERUs = Vd/MDD All Sources = 3,132,000 gpd / 777.8 gpd/ERUs = **4,027 ERUs** Excess ERUs = 4,027 - 2,660 = 1,367 ERUs
Equalizing Storage Capacity Based (all sources) ES = (PHD - Q_S) X 150 min = (2,438 gpm - 2,900 gpm) X 150 min = 0 gal	**Sources have sufficient capacity to handle PHD; ES component is not applicable. Unlimited ERU capacity.**
Standby Storage Based Total = 2,220,000 gal OS + ES = 366,100 gal + 0 gal = 366,100 gal FSS = 630,000 gal SB = 1,064,000 gal Additional Storage = 159,900 gal Total Available SB Storage = 1,064,000 + 159,900 = 1,223,900 gal Total ERUs = 2,660	**Equation 6-7, DOH Water System Design Manual (2009)** N, ERUs = SB_T / (SB_i X t_d) Where: SB_i = 200 gpd/ERU and t_d = 2 days N, ERU's = 1,223,900 gal / (200 gpd/ERU X 2 days) = **3,059.7 ERUs** Excess ERUs = 3,059.7 – 2,660 = 399.7 ERUs
Total Capacity Related Storage (CRS) MDD = 778.2 gpd/ERU CRS = ES + SB + Additional Storage = 0 + 1,064,000 + 159,900 gal = 1,223,900 gal	**Equation 6-6, DOH Water System Design Manual (2009)** (present) N, ERUs = [CRS + (150 X (Q_S - (MDD / 1,440) X F)) – 2,700] / [(150 X (MDD / 1,440) X C) + (SB_i X t_d)] = [1,223,900 + (150 X (2,900 - (0.5404 X 125)) – 2,700)] / [(150 X 0.5404 X 1.8) + (200 X 2)] = [1,223,900 + 424,867 – 2,700] / [145.9 + 400] = 1,646,068 / 545.9 = **3,015.3 ERUs** Excess ERUs = 3,015.3 – 2,660 = 355.3 ERUs
Distribution System Facilities • The system was analyzed using the calibrated hydraulic computer model from the City of Dayton's 2007 Water System Plan. • Five areas in the City's system were identified as low pressure areas during periods of high water demand. Low pressures in four of the five areas (Upper Syndicate Hill, North Hill, Cemetery, and North Touchet Road) are a result of the relative differences in elevations between the City's reservoirs and service area locations. Further development of Upper Syndicate Hill and North Hill will not result in significant pressure changes. The Cemetery is for non-potable water use and therefore does not affect future development. A moratorium for new services outside the City's UGB limits any further pressure reductions on North Touchet Road. The fifth area (2nd Street southeast of the public schools) is a result of undersized mains during periods of fire flow demand. Larger water mains are recommended for this area.	

APPENDIX E

WUE and Water Rights Documentation

Technical Memorandum No. 1

Technical Memorandum No. 1
City of Dayton
Water System Plan

By: Dave Jepsen, PE, Anderson Perry & Associates, Inc. DJ
RE: Reclaimed Water Use Evaluation
Date: November 10, 2014

In this technical memorandum, the opportunities for reclaimed water use in the City of Dayton are evaluated as potential water use efficiency measures to be included in the City's Water Use Efficiency Program. Under the State of Washington's Water Use Efficiency Rules, evaluating reclaimed water opportunities is required for water systems with 1,000 or more service connections. Since Dayton has approximately 1,481 service connections, an evaluation of reclaimed water use opportunities was performed. After evaluating the basis and cost effectiveness of these opportunities, reclaimed water use does not currently appear to be a cost-effective water use efficiency measure for the City of Dayton.

Potential Opportunities for Reclaimed Water Use

Potential opportunities for reclaimed water use include using public water systems' reclaimed wastewater for irrigating public green spaces or industrial/power plant cooling, on-site wastewater treatment and recycling of effluent for non-potable uses in commercial buildings, and utilization of gray water for non-potable uses.

Currently, the City utilizes reclaimed water at its Wastewater Treatment Plant (WWTP) for limited irrigation and process wash down. After reviewing water use needs and reclaimed water use requirements, the best opportunity for expanding the City's use of reclaimed water appears to be irrigating the parks, school yards, ball fields, and local agricultural fields. Potential reclaimed water users, potential water savings, and the bases for these savings are presented in Table 1.

TABLE 1

Potential Reclaimed Water Users and Savings - 2014

Potential User	Estimated Savings (acre-feet per year)	Basis
Dayton City Cemetery	51.9	100 percent irrigation
Dayton WWTP	31.3	90 percent irrigation and process water
Dayton Youth Sport Complex	7.4	95 percent irrigation
Dayton Fish Pond Park	7.2	95 percent irrigation
School District Irrigation	4.8	95 percent irrigation
McGregor Company	4.7	95 percent industrial
Ag Link	4.0	90 percent industrial
Dayton General Hospital	2.0	15 percent irrigation
Total	**113.3**	-

The total potential savings with reclaimed water use is 113.3 acre-feet. The largest potential user is the City with 97.8 acre-feet, or approximately 86 percent of the total estimated reclaimed water use savings.

The targeted use for all but three of the potential users in Table 1 is turf irrigation during the dry season months. Two of the potential users (McGregor Company and Ag Link) could possibly utilize reclaimed water in their production of agricultural fertilizers, and the City's WWTP could use reclaimed water for operating the WWTP processes. Some top water users were not included in Table 1 because of the uncertainty of their operation and need (e.g., Seneca Food Corporation) and their use in residential areas (e.g., Cameron and Columbia Courts). Additional investigation of these users and their water uses is needed to determine whether reclaimed water use is feasible for these users.

Another potential user of reclaimed water is the Touchet Valley Golf Course, which is located outside the City limits and does not currently use City water for irrigation. While providing reclaimed water to the Touchet Valley Golf Course would be beneficial from a regional standpoint, it would not directly reduce water consumption of City users. However, the City may wish to provide reclaimed water to the golf course in the future to mitigate upcoming wastewater effluent discharge restrictions. Under its National Pollutant Discharge Elimination System (NPDES) permit issued by the Washington State Department of Ecology (Ecology), the City's WWTP effluent discharge limits will be modified, and the City will be required to eliminate its wastewater effluent discharge to the Touchet River between the months of May and October. Providing reclaimed water to the golf course would help mitigate effluent disposal and water rights issues. This alternative will be evaluated by the City in its Wastewater Facilities Plan, which is scheduled to be submitted to Ecology by November 2017.

Existing Reclaimed Water Facilities and WWTP

Currently, no existing reclaimed water production facilities or distribution system piping are present in the City of Dayton. However, the City's WWTP could be modified to provide reclaimed water.

Under NPDES Permit No. WA 002072 9, the City of Dayton operates a municipal WWTP for treating sanitary sewage generated within the City. The WWTP is located at 800 Stockton Road in the southwestern portion of town. The treatment process at the WWTP consists of clarification for primary treatment, trickling filters for secondary treatment, and ultraviolet lamps for disinfection. The average design flow of the WWTP is 0.69 million gallons per day.

The wastewater effluent produced by the City's WWTP is considered Class C reclaimed water quality (oxidized and disinfected). Reclaimed water used for irrigation of open access areas (i.e., golf courses, parks, playgrounds, school yards, and residential landscaping) requires Class A reclaimed water quality, which is the highest quality category of water recognized by the State. Essentially all of the proposed reclaimed water uses in Dayton require Class A reclaimed water quality. The only potential exception is the use of reclaimed water for process water at the City's WWTP. If workers are not exposed to the process water, Class C could be used, otherwise Class A reclaimed water would be required.

Reclaimed Water Treatment Facilities

For Dayton's WWTP to produce Class A reclaimed water, additional treatment processes and facilities would need to be constructed. These additional facilities would provide coagulation, flocculation, and filtration of the effluent. Standard treatment train designs for the production of Class A water include conventional filtration, direct filtration, and in-line filtration. One possible treatment train is a packaged water treatment plant (e.g., Siemens MicroFloc Trident) to provide coagulation and flocculation of the wastewater followed by a filter (e.g., Aqua-Aerobics Aqua Disk or Schreiber Fuzzy Filter). An order of magnitude cost for such a water treatment plant facility (assumed 175 gallons per minute) is approximately $500,000. In addition to the treatment process, a pumping facility and storage reservoir tank would be required to convey and store the effluent. The cost for conveyance and storage facilities is approximately $350,000. Total project cost including sales tax, engineering, special studies, contingency, legal, and financing would be approximately $1.3 million.

The current WWTP site does not appear to have sufficient room for constructing the proposed reclaimed water facilities. Consequently, additional land would be required adjacent to or near the existing WWTP. Including the anticipated costs for land and site piping, the conceptual total project cost for the reclaimed water treatment facilities is approximately $1.5 million.

Reclaimed Water Distribution System Infrastructure

A storage and distribution system would need to be installed to store and convey reclaimed water from the Dayton WWTP to the point of use. A new reclaimed water main (nominal 8-inch diameter) would need to be installed between the Dayton WWTP and at least the three potential highest reclaimed water use areas: 1) Dayton City Cemetery, 2) Dayton Youth Sports Complex, and 3) Dayton Fish Pond Park. Along existing City streets, across one river, and using a route that would stay off the City's main streets, the distance between the Dayton WWTP and these areas is approximately 2.5 miles. Assuming an installation cost of $110 per linear foot for 8-inch diameter pipe (including surface restoration), the construction cost for the reclaimed water main would be approximately $1.5 million.

In addition to the reclaimed water main, pumping facilities would be required to convey the water to the point of use. Given the vertical elevation difference between the Dayton WWTP and the City Cemetery, providing 60 pounds per square inch of pressure at the point of use, and accounting for friction loss, approximately 275 feet of head would likely be required. At least one booster pump station would be needed to lift the reclaimed water to the reclaimed water sites. An order of magnitude cost estimate for this pump station is $175,000.

The total order of magnitude construction cost for the proposed reclaimed water distribution system is $1.67 million. Total project cost for the distribution system including sales tax, engineering, contingency, legal, and financing is approximately $2.51 million.

In addition to the capital cost for construction, ongoing operation and maintenance (O&M) costs such as electrical costs for pumping, labor costs for attending to the system, treatment costs for chemical and labor used, and other miscellaneous charges would accrue. For the sake of simplicity, and to put the use of reclaimed water in the most favorable light, O&M expenses are assumed to be covered by the revenue collected by the City for use of the reclaimed water. Since additional restrictions apply when using reclaimed water, and reclaimed water is usually sold at cheaper rates than potable water, this assumption may not reflect reality.

Potential Barriers to Reclaimed Water Use

Potential barriers to implementing reclaimed water use in Dayton include the following:

- **Cost** – The cost of installing and operating a reclaimed water system is significant. Assuming a low interest loan of 2.0 percent over 20 years, the estimated annual debt service cost for a

$4.01 million loan is $254,410 per year. This annual debt service spread over 1,922 equivalent residential units (ERU) would result in an average monthly user fee increase of approximately $11.03 per ERU per month. Currently, the base user rate is $33.60 per month. For residential users, this represents an approximate 33 percent increase in the base rate.

- **Separation Distance between Reclaimed Water Main and Other Utilities** – The standard horizontal pipe separation for new reclaimed water in a developed utility corridor is 10 feet of separation between the reclaimed water main and the other water *and* sewer mains. Ideally, the reclaimed water main should be 18 inches below the bottom of the water main and 18 inches above a sewer main. When these minimum separation distances cannot be achieved, additional measures such as installing casing pipe and controlled density fill may be necessary. Depending on site conditions and location, these additional measures could increase the estimated costs of the reclaimed water main by 20 to 50 percent.
- **Public Perception** – Over the past 10 to 15 years, public acceptance of the use of properly treated wastewater in lieu of potable water for certain applications has increased. However, some public resistance to the use of reclaimed water is likely. Additional public education and outreach would likely be needed to address possible public objections and uncertainties.

Cost Effectiveness Evaluation

The cost effectiveness of a specific water use efficiency measure is typically estimated and considered when deciding whether or not to implement the measure. Exceptions include public education and metering, which are mandatory measures that must be implemented whether or not they are cost effective. For reclaimed water use in systems with 1,000 or more service connections, the following three cost-effective evaluation criteria must be considered.

- **Water System's Perspective** – This element evaluates the cost of using reclaimed water versus the cost of developing new supply sources or obtaining sufficient water rights. The estimated capital cost of constructing a reclaimed water system would result in an average increase of $11 per month, which is a 33 percent increase. If the City is unable to obtain sufficient fees to cover the O&M costs associated with the reclaimed water operation, this cost would be even greater.
- **Cost-Sharing Perspective** – This element reviews the possibility and cost effectiveness of sharing the cost of reclaimed water use with neighboring water systems and other water users. The closest water systems are in the City of Waitsburg (approximately 8.6 miles to the west) and the Lewis and Clark Trail State Park (approximately 4.8 miles to the west). Both systems are situated too far from Dayton for cost sharing purposes.
- **Societal Perspective** – This element evaluates the cost effectiveness of the reclaimed water use holistically, taking into account all the potential costs and benefits including environmental, recreational, and aesthetic benefits.

  Reducing the City's water demand through reclaimed water use would allow the City to maintain more groundwater in its aquifers. While this extra water could be beneficial if the City's water production was reduced, groundwater production and the water levels in the City's wells have historically been sustaining. Consequently, developing a new well source or utilizing reclaimed water is not currently necessary from a water demand standpoint. The more compelling environmental benefit to the area would be using reclaimed water to reduce surface water diversions from the Touchet River and Patit Creek. For this application, the reclaimed water would need to replace irrigation water diversions either to the Touchet Valley Golf Course or agricultural users in the area. As stated above, the City will further evaluate these reclaimed water use opportunities as part of its Wastewater Facilities Plan.

Summary and Recommendations

While opportunities for reclaimed water use in Dayton exist, the capital costs associated with the infrastructure needed to produce, store, and convey reclaimed water to the areas of use are significant. The projected cost is significant largely due to the substantial distance and elevation difference between the reclaimed water's point of production (the Dayton WWTP) and point of use.

Since constructing a reclaimed water system would result in a 33 percent increase in water rates and would provide minimal benefit to the City's water users, reclaimed water use does not currently appear to be a cost-effective water use efficiency measure for the City of Dayton. Instead, the City and its resources would best be served by concentrating efforts on reducing water demand and distribution system leakage (DSL). Replacing and upgrading some of the distribution system infrastructure and repairing leaks in the system would help reduce the City's DSL to below 10 percent, helping the City to meet its Water Use Efficiency Plan goals.

Technical Memorandum No. 2

Technical Memorandum No. 2
City of Dayton
Water System Plan

By: Dave Jepsen, PE, Anderson Perry & Associates, Inc. DJ
RE: Water Loss Control Action Plan (WLCAP)
Date: November 10, 2014

The State of Washington's Water Use Efficiency (WUE) Rules require a Distribution System Leakage (DSL) standard of 10 percent or less based on a 3-year rolling average. DSL is all unauthorized water and all authorized water that is not tracked or estimated. The City of Dayton's calculated rolling DSL for the past 3 years (2011 through 2013) is 12.5 percent. Since this average is above the State standard of 10 percent, the City is required to compile and implement a WLCAP. The purpose of this technical memorandum is to outline the City of Dayton's WLCAP.

WLCAP Requirements

The WLCAP requirements outlined in Chapter 6.7 of the Washington State Department of Health *Water Use Efficiency Guidebook* (2011) are summarized below.

- Complete an International Water Association (IWA) water audit and include a copy of the results within the WUE Program section of the Water System Plan
- Identify proposed water loss control methods
- Estimate the time necessary to achieve the DSL standard
- Include a budget demonstrating how controlling leakage will be funded
- Identify actions and benchmarks to achieve water loss reductions
- Implement the recommended "functional focus areas" within the Water Loss Control Planning Guide of the IWA water audit
- Establish a supply side goal, including a timeframe to achieve an Infrastructure Leakage Index (ILI) of 3.0 or lower
- Implement water loss control activities that strive to achieve an ILI of 3.0 or lower

IWA/American Water Works Association (AWWA) Water Audit

A water audit was performed using IWA/AWWA Water Audit Software, Version 5.0, which operates as a Microsoft Excel spreadsheet. The IWA/AWWA water audit features consistent definitions for the major forms of water consumption and water loss encountered in drinking water utilities and a set of rational performance indicators that evaluate utilities on system-specific attributes. This water balance format is shown in Table 1.

TABLE 1

IWA/AWWA Water Balance

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water
			Unbilled Unmetered Consumption	
	Water Losses	Apparent Losses	Unauthorized Consumption	
			Customer Metering Inaccuracies	
			Systematic Data Handling Errors	
		Real Losses	Leakage on Transmission and Distribution Mains	
			Leakage and Overflows at Utility's Storage Tanks	
			Leakage on Service Connections up to Point of Customer Metering	

The water audit's performance indicators (attached) help water utilities assess their water loss standing, benchmark themselves with other water utilities, and set performance targets. The water audit shows how much of each type of loss occurs and how much these losses cost. The key concept around this method is that all water is quantified, via measurement or estimate, as either a form of beneficial consumption or as wasteful loss. A cost is placed on each volume component to assess its financial impact on the water utility.

Along with quantifying volumes of real and apparent losses, the audit software rates the water audit data and provides guidance on the best steps (i.e., functional focus areas) to take based on the volume of losses, costs, and the data's degree of reliability.

Copies of the completed Water Audit Report, Grading Matrix, and Water Loss Control Planning Guide are attached. This water audit was completed based on 2013 water use consumption data. The water audit results are summarized below.

- Annual cost of water losses is an estimated $25,601.
- Apparent losses equal 8.36 gallons per connection per day.
- Real losses equal 56.83 gallons per connection per day, or a total of 27.86 million gallons per year.
- ILI was not calculated because the City's system is considered too small to provide a reliable ILI.
- Dayton's Water Audit Data Validity Score equals 64 out of 100, or a Level 3 out of 5
- Priority Areas for Attention (Functional Focus Areas)
    1. Volume from Own Sources
    2. Customer Retail Unit Cost
    3. Variable Production Cost

Proposed Water Loss Control Methods

The following water loss control methods are recommended for reducing the City's DSL.

Establish WUE Supply Side Goals – City adoption of a WUE supply goal of a DSL of less than 10 percent in the next 6 years is recommended.

Source Water Production Meter Replacement – The City is currently unable to test and calibrate its source water production meters without leaving the wells unmetered. The City has proposed purchasing a new water meter and sending the existing meter to the factory to be refurbished and recalibrated. The refurbished meter would then replace a meter in another well and that well's meter would be refurbished and recalibrated. The City would continue this process until all new or refurbished meters are installed. The last refurbished meter would then start the meter replacement rotation again in approximately 6 years.

Better Documentation and Tracking of Unbilled Authorized Consumption – The City has a system for tracking unbilled authorized consumption; however, documentation of water consumed by the Fire Department could be improved. Additional education and correspondence with the Fire Department is recommended.

Leak Detection – The amount of real water losses calculated in the water audit indicates that significant leakage is occurring within the system. Periodic leak detection on a portion of the City's water system should be conducted every year, as needed to detect and isolate leakage and lower the DSL to less than 10 percent.

Continued Water Meter Replacement – The City is currently in the process of replacing old water meters with new ones. This project should continue, with the oldest or non-functioning meters being replaced first.

Locate and Repair Water Main Leak off North Touchet River Road – A significant leak appears to be present on the 12-inch water main off North Touchet River Road that serves the Baileysburg area. The leak has not yet been located through site observations or leak detection. Efforts to locate this leak should continue and, once the leak is found, repairs should be made.

Water Main Repair and Replacement – Leaking water mains should be repaired. In some instances, due to an excessive number of leaks and repairs on the main, the water mains should be replaced.

WLCAP Summary

The proposed WLCAP for the City of Dayton, including start dates, budgets, comments, and additional potential measures, is summarized in Table 2. The intent of these measures and activities is for the City to achieve a DSL of less than 10 percent.

TABLE 2

Summary of Proposed WLCAP for the City of Dayton

Measure/Activity	Start Date	Budget	Frequency or Completion
Establish a WUE Supply Goal of a DSL of less than 10 percent	October 2014	N/A	Recommended for adoption as a 6-year goal
Install New and Refurbished Source Water Production Meters	October 2014	$25,000	Estimated cost for implementation at all wells; cost distributed between 2014 and 2015
Better Documentation and Tracking of Unbilled Authorized Consumption	January 2015	N/A	Initiate education and correspondence of WUE requirements with Fire Department
Leak Detection	January 2015	$3,500	Annually until DSL is less than 10 percent
Continued Water Meter Replacement	Ongoing	$5,000	
Locate and Repair Water Main Leak Off North Touchet River Road	Ongoing	Uncertain	Cost dependent on the location and extent of leak
Water Main Repair and Replacement	Ongoing	Repairs as needed. Replacement as needed, or as shown in Chapter 8 of the Water System Plan.	

Projected Compliance with the DSL Standard

With the City's current DSL (2013) of 11.2 percent, Dayton is close to complying with the State's DSL standard of less than 10 percent. With the proposed WLCAP, we believe the City will be able to comply with the DSL standard by Year 2020.

Attachments

- Performance Indicators for Non-Revenue Water and Water Losses
- IWA/AWWA Water Audit Report, Grading Matrix, and Water Loss Control Planning Guide

Performance Indicators for Non-Revenue Water and Water Losses*

Performance Indicator	Function	Comments
Volume of non-revenue water as a percentage of system input volume	Financial - Non-revenue water by volume	Can be calculated from a simple water balance; good only as a general financial indicator
Volume of non-revenue water as a percentage of the annual cost of running the water system	Financial - Non-revenue water by cost	Allows comparison of different unit costs for non-revenue water components
Volume of apparent losses per service connection per day	Operational - Apparent losses	A reference indicator once the volume of apparent losses has been calculated or estimated
Real losses as a percentage of system input volume	Operational - Inefficiency of use of water resources	Unsuitable for assessing efficiency of management of distribution systems
Normalized Real Losses – Gallons per service connection per day	Operational - Real losses	Good operational performance indicator for target-setting for real loss reduction
Unavoidable Annual Real Losses (UARL)	UARL (gallons/day) = (5.41Lm + 0.15Nc + 7.5Lp) x P Where Lm = Length of water mains, miles Nc = Number of service connections Lp = Total length of private pipe, miles Nc = Average distance from curbstop to customer meter, miles P = Average pressure in the system, psi	A theoretical reference value representing the technical low limit of leakage that could be achieved if all the current best technology could be successfully applied Systems do not need to set this level as a target unless water is unusually expensive, scarce, or both
ILI	Operational - Real losses	Ratio of Current Annual Real Losses to UARL; good for operational benchmarking for real loss control

* – *Based on information on AWWA's Water Wiser website*

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Dayton (18250 3)
Reporting Year: 2013 1/2013 - 12/2013

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<------------ Enter grading in column 'E' and 'J' ------------>

WATER SUPPLIED

					Master Meter and Supply Error Adjustments			
					Grade	Pcnt:		Value:
Volume from own sources:	+ ?	7	300.625	MG/Yr	3	-0.20%	● ○	MG/Yr
Water imported:	+ ?		0.000	MG/Yr			● ○	MG/Yr
Water exported:	+ ?		0.000	MG/Yr			● ○	MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 301.227 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

					Pcnt:		Value:
Billed metered:	+ ?	7	265.507	MG/Yr			
Billed unmetered:	+ ?			MG/Yr			
Unbilled metered:	+ ?			MG/Yr			
Unbilled unmetered:	+ ?		3.765	MG/Yr	1.25%	● ○	MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION: ? 269.273 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 31.955 MG/Yr

Apparent Losses

					Pcnt:		Value:
Unauthorized consumption:	+ ?		0.753	MG/Yr	0.25%	● ○	MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	7	2.682	MG/Yr	1.00%	● ○	MG/Yr
Systematic data handling errors:	+ ?		0.664	MG/Yr	0.25%	● ○	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 4.099 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 27.856 MG/Yr

WATER LOSSES: 31.955 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 35.720 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	7	23.8	miles
Number of active AND inactive service connections:	+ ?	7	1,343	
Service connection density:	?		56	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 3 70.0 psi

COST DATA

Total annual cost of operating water system:	+ ?	7	$475,658	$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	5	$2.93	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5	$342.74	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 64 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer retail unit cost (applied to Apparent Losses)
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

Water Audit Report for: City of Dayton (18250 3)
Reporting Year: 2013 1/2013 - 12/2013

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 64 out of 100 ***

System Attributes:

Apparent Losses: 4.099 MG/Yr
+ Real Losses: 27.856 MG/Yr
= **Water Losses:** **31.955** MG/Yr

? Unavoidable Annual Real Losses (UARL): See limits in definition MG/Yr

Annual cost of Apparent Losses: $16,054
Annual cost of Real Losses: $9,547 Valued at **Variable Production Cost**
Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:
- Non-revenue water as percent by volume of Water Supplied: 11.9%
- Non-revenue water as percent by cost of operating system: 5.7% Real Losses valued at Variable Production Cost

Operational Efficiency:
- Apparent Losses per service connection per day: 8.36 gallons/connection/day
- Real Losses per service connection per day: 56.83 gallons/connection/day
- Real Losses per length of main per day*: N/A
- Real Losses per service connection per day per psi pressure: 0.81 gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL): 27.86 million gallons/year

? Infrastructure Leakage Index (ILI) [CARL/UARL]:

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: Water Balance

Water Audit Report for: City of Dayton (18250 3)
Reporting Year: 2013 | 1/2013 - 12/2013
Data Validity Score: 64

<table>
<tr><td rowspan="8">Own Sources
(Adjusted for known errors)
<i>301.227</i></td><td>Water Exported
<i>0.000</i></td><td colspan="2"></td><td>Billed Water Exported</td><td></td></tr>
<tr><td rowspan="10">Water Supplied
<i>301.227</i></td><td rowspan="4">Authorized Consumption
<i>269.273</i></td><td rowspan="2">Billed Authorized Consumption
<i>265.507</i></td><td>Billed Metered Consumption (water exported is removed)
<i>265.507</i></td><td rowspan="2">Revenue Water
265.507</td></tr>
<tr><td>Billed Unmetered Consumption
<i>0.000</i></td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption
<i>3.765</i></td><td>Unbilled Metered Consumption
<i>0.000</i></td><td rowspan="8">Non-Revenue Water (NRW)
35.720</td></tr>
<tr><td>Unbilled Unmetered Consumption
<i>3.765</i></td></tr>
<tr><td rowspan="6">Water Losses
<i>31.955</i></td><td rowspan="3">Apparent Losses
<i>4.099</i></td><td>Unauthorized Consumption
<i>0.753</i></td></tr>
<tr><td>Customer Metering Inaccuracies
<i>2.682</i></td></tr>
<tr><td>Systematic Data Handling Errors
<i>0.664</i></td></tr>
<tr><td rowspan="3">Water Imported
<i>0.000</i></td><td rowspan="3">Real Losses
<i>27.856</i></td><td>Leakage on Transmission and/or Distribution Mains
<i>Not broken down</i></td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks
<i>Not broken down</i></td></tr>
<tr><td>Leakage on Service Connections
<i>Not broken down</i></td></tr>
</table>

AWWA Free Water Audit Software: Grading Matrix

WAS 5.0

The grading assigned to each audit component and the corresponding recommended improvements and actions are highlighted in yellow. Audit accuracy is likely to be improved by prioritizing those items shown in red

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
WATER SUPPLIED											
Volume from own sources:	Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)	Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing or electronic calibration conducted.	25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing or electronic calibration conducted.	Conditions between 2 and 4	50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing or electronic calibration conducted.	Conditions between 4 and 6	At least 75% of treated water production sources are metered, <u>or</u> at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually, with less than 10% found outside of +/- 3% accuracy. Procedures are reviewed by a third party knowledgeable in the M36 methodology.
Improvements to attain higher data grading for "Volume from own Sources" component:	▨	<u>to qualify for 2:</u> Organize and launch efforts to collect data for determining volume from own sources	<u>to qualify for 4:</u> Locate all water production sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered water production sources and replace any obsolete/defective meters		<u>to qualify for 6</u>: Formalize annual meter accuracy testing for all source meters; specify the frequency of testing. Complete installation of meters on unmetered water production sources and complete replacement of all obsolete/defective meters.		<u>to qualify for 8:</u> Conduct annual meter accuracy testing and calibration of related instrumentation on all meter installations on a regular basis. Complete project to install new, or replace defective existing, meters so that entire production meter population is metered. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing and calibration of related instrumentation for all meter installations. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to further improve meter accuracy.		<u>to maintain 10</u>: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Volume from own sources master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its sources of supply	Inventory information on meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined	No automatic datalogging of production volumes; daily readings are scribed on paper records without any accountability controls. Flows are not balanced across the water distribution system: tank/storage elevation changes are not employed in calculating the "Volume from own sources" component and archived flow data is adjusted only when grossly evident data error occurs.	Conditions between 2 and 4	Production meter data is logged automatically in electronic format and reviewed at least on a monthly basis with necessary corrections implemented. "Volume from own sources" tabulations include estimate of daily changes in tanks/storage facilities. Meter data is adjusted when gross data errors occur, or occasional meter testing deems this necessary.	Conditions between 4 and 6	Hourly production meter data logged automatically & reviewed on at least a weekly basis. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and/or error is confirmed by meter accuracy testing. Tank/storage facility elevation changes are automatically used in calculating a balanced "Volume from own sources" component, and data gaps in the archived data are corrected on at least a weekly basis	Conditions between 6 and 8	Continuous production meter data is logged automatically & reviewed each business day. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Tank/storage facility elevation changes are automatically used in "Volume from own sources" tabulations and data gaps in the archived data are corrected on a daily basis.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically balances flows from all sources and storages; results are reviewed each business day. Tight accountability controls ensure that all data gaps that occur in the archived flow data are quickly detected and corrected. Regular calibrations between SCADA and sources meters ensures minimal data transfer error.
Improvements to attain higher data grading for "Master meter and supply error adjustment" component:	▨	<u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature.	<u>to qualify for 4</u>: Install automatic datalogging equipment on production meters. Complete installation of level instrumentation at all tanks/storage facilities and include tank level data in automatic calculation routine in a computerized system. Construct a computerized listing or spreadsheet to archive input volumes, tank/storage volume changes and import/export flows in order to determine the composite "Water Supplied" volume for the distribution system. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps.		<u>to qualify for 6</u>: Refine computerized data collection and archive to include hourly production meter data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Use daily net storage change to balance flows in calculating "Water Supplied" volume. Necessary corrections to data errors are implemented on a weekly basis.		<u>to qualify for 8</u>: Ensure that all flow data is collected and archived on at least an hourly basis. All data is reviewed and detected errors corrected each business day. Tank/storage levels variations are employed in calculating balanced "Water Supplied" component. Adjust production meter data for gross error and inaccuracy confirmed by testing.		<u>to qualify for 10</u>: Link all production and tank/storage facility elevation change data to a Supervisory Control & Data Acquisition (SCADA) System, or similar computerized monitoring/control system, and establish automatic flow balancing algorithm and regularly calibrate between SCADA and source meters. Data is reviewed and corrected each business day.		<u>to maintain 10</u>: Monitor meter innovations for development of more accurate and less expensive flowmeters. Continue to replace or repair meters as they perform outside of desired accuracy limits. Stay abreast of new and more accurate water level instruments to better record tank/storage levels and archive the variations in storage volume. Keep current with SCADA and data management systems to ensure that archived data is well-managed and error free.
Water Imported:	Select n/a if the water utility's supply is exclusively from its own water resources (no bulk purchased/ imported water)	Less than 25% of imported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of imported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of imported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of imported water sources are metered, meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually for all meter installations. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Water Imported Volume" component: *(Note: usually the water supplier selling the water - "the Exporter" - to the utility being audited is responsible to maintain the metering installation measuring the imported volume. The utility should coordinate carefully with the Exporter to ensure that adequate meter upkeep takes place and an accurate measure of the Water Imported volume is quantified.)*		to qualify for 2: Review bulk water purchase agreements with partner suppliers; confirm requirements for use and maintenance of accurate metering. Identify needs for new or replacement meters with goal to meter all imported water sources.	To qualify for 4: Locate all imported water sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered imported water interconnections and replace obsolete/defective meters.		to qualify for 6: Formalize annual meter accuracy testing for all imported water meters, planning for both regular meter accuracy testing and calibration of the related instrumentation. Continue installation of meters on unmetered imported water interconnections and replacement of obsolete/defective meters.		to qualify for 8: Complete project to install new, or replace defective, meters on all imported water interconnections. Maintain annual meter accuracy testing for all imported water meters and conduct calibration of related instrumentation at least annually. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Conduct meter accuracy testing for all meters on a semi-annual basis, along with calibration of all related instrumentation. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		to maintain 10: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Continue to conduct calibration of related instrumentation on a semi-annual basis. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Water imported master meter and supply error adjustment:	Select n/a if the Imported water supply is unmetered, with Imported water quantities estimated on the billing invoices sent by the Exporter to the purchasing Utility.	Inventory information on imported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined. Written agreement(s) with water Exporter(s) are missing or written in vague language concerning meter management and testing.	No automatic datalogging of imported supply volumes; daily readings are scribed on paper records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Imported supply metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis by the Exporter with necessary corrections implemented. Meter data is adjusted by the Exporter when gross data errors are detected. A coherent data trail exists for this process to protect both the selling and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly Imported supply metered data is logged automatically & reviewed on at least a weekly basis by the Exporter. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected, and to correct for error confirmed by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling and the purchasing Utility.	Conditions between 6 and 8	Continuous Imported supply metered flow data is logged automatically & reviewed each business day by the Importer. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the Exporter. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling and purchasing Utility at least once every five years.
Improvements to attain higher data grading for "Water imported master meter and supply error adjustment" component:		to qualify for 2: Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the selling and purchasing Utility.	to qualify for 4: Install automatic datalogging equipment on Imported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the Exporters to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.		to qualify for 6: Refine computerized data collection and archive to include hourly Imported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.		to qualify for 8: Ensure that all Imported supply metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.		to qualify for 10: Conduct accountability checks to confirm that all Imported supply metered data is reviewed and corrected each business day by the Exporter. Results of all meter accuracy tests and data corrections should be available for sharing between the Exporter and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreement between the selling and the purchasing Utility; at least every five years.		to maintain 10: Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the Exporter to help identify meter replacement needs. Keep communication lines with Exporters open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.
Water Exported:	Select n/a if the water utility sells no bulk water to neighboring water utilities (no exported water sales)	Less than 25% of exported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of exported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of exported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Exported Volume" component: *(Note: usually, if the water utility being audited sells (Exports) water to a neighboring purchasing Utility, it is the responsibility of the utility exporting the water to maintain the metering installation measuring the Exported volume. The utility exporting the water should ensure that adequate meter upkeep takes place and an accurate measure of the Water Exported volume is quantified.)*		to qualify for 2: Review bulk water sales agreements with purchasing utilities; confirm requirements for use & upkeep of accurate metering. Identify needs to install new, or replace defective meters as needed.	To qualify for 4: Locate all exported water sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered exported water interconnections and replace obsolete/defective meters		to qualify for 6: Formalize annual meter accuracy testing for all exported water meters. Continue installation of meters on unmetered exported water interconnections and replacement of obsolete/defective meters.		to qualify for 8: Complete project to install new, or replace defective, meters on all exported water interconnections. Maintain annual meter accuracy testing for all exported water meters. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		to maintain 10: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Water exported master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its exported supply interconnections.	Inventory information on exported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined. Written agreement(s) with the utility purchasing the water are missing or written in vague language concerning meter management and testing.	No automatic datalogging of exported supply volumes; daily readings are scribed on paper records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Exported metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis, with necessary corrections implemented. Meter data is adjusted by the utility selling (exporting) the water when gross data errors are detected. A coherent data trail exists for this process to protect both the utility exporting the water and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly exported supply metered data is logged automatically & reviewed on at least a weekly basis by the utility selling the water. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and to correct for error found by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling (exporting) utility and the purchasing Utility.	Conditions between 6 and 8	Continuous exported supply metered flow data is logged automatically & reviewed each business day by the utility selling (exporting) the water. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and any error confirmed by meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling (exporting) Utility and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the utility selling (exporting) the water. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling Utility and purchasing Utility at least once every five years.
Improvements to attain higher data grading for "Water exported master meter and supply error adjustment" component:		<u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the utility selling (exporting) the water and the purchasing Utility.	<u>to qualify for 4</u>: Install automatic datalogging equipment on exported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the purchasing utilities to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.		<u>to qualify for 6</u>: Refine computerized data collection and archive to include hourly exported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.		<u>to qualify for 8</u>: Ensure that all exported metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.		<u>to qualify for 10</u>: Conduct accountability checks to confirm that all exported metered flow data is reviewed and corrected each business day by the utility selling the water. Results of all meter accuracy tests and data corrections should be available for sharing between the utility and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreements with the purchasing utilities; at least every five years.		<u>to maintain 10</u>: Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the purchasing utilities to help identify meter replacement needs. Keep communication lines with the purchasing utilities open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.
AUTHORIZED CONSUMPTION											
Billed metered:	n/a (not applicable). Select n/a only if the entire customer population is not metered and is billed for water service on a flat or fixed rate basis. In such a case the volume entered must be zero.	Less than 50% of customers with volume-based billings from meter readings; flat or fixed rate billing exists for the majority of the customer population	At least 50% of customers with volume-based billing from meter reads; flat rate billing for others. Manual meter reading is conducted, with less than 50% meter read success rate, remaining accounts' consumption is estimated. Limited meter records, no regular meter testing or replacement. Billing data maintained on paper records, with no auditing.	Conditions between 2 and 4	At least 75% of customers with volume-based, billing from meter reads; flat or fixed rate billing for remaining accounts. Manual meter reading is conducted with at least 50% meter read success rate; consumption for accounts with failed reads is estimated. Purchase records verify age of customer meters; only very limited meter accuracy testing is conducted. Customer meters are replaced only upon complete failure. Computerized billing records exist, but only sporadic internal auditing conducted.	Conditions between 4 and 6	At least 90% of customers with volume-based billing from meter reads; consumption for remaining accounts is estimated. Manual customer meter reading gives at least 80% customer meter reading success rate; consumption for accounts with failed reads is estimated. Good customer meter records exist, but only limited meter accuracy testing is conducted. Regular replacement is conducted for the oldest meters. Computerized billing records exist with annual auditing of summary statistics conducting by utility personnel.	Conditions between 6 and 8	At least 97% of customers exist with volume-based billing from meter reads. At least 90% customer meter reading success rate; <u>or</u> at least 80% read success rate with planning and budgeting for trials of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) in one or more pilot areas. Good customer meter records. Regular meter accuracy testing guides replacement of statistically significant number of meters each year. Routine auditing of computerized billing records for global and detailed statistics occurs annually by utility personnel, and is verified by third party at least once every five years.	Conditions between 8 and 10	At least 99% of customers exist with volume-based billing from meter reads. At least 95% customer meter reading success rate; <u>or</u> minimum 80% meter reading success rate, with Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) trials underway. Statistically significant customer meter testing and replacement program in place on a continuous basis. Computerized billing with routine, detailed auditing, including field investigation of representative sample of accounts undertaken annually by utility personnel. Audit is conducted by third party auditors at least once every three years.
Improvements to attain higher data grading for "Billed Metered Consumption" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	<u>to qualify for 2</u>: Conduct investigations or trials of customer meters to select appropriate meter models. Budget funding for meter installations. Investigate volume based water rate structures.	<u>to qualify for 4</u>: Purchase and install meters on unmetered accounts. Implement policies to improve meter reading success. Catalog meter information during meter read visits to identify age/model of existing meters. Test a minimal number of meters for accuracy. Install computerized billing system.		<u>to qualify for 6</u>: Purchase and install meters on unmetered accounts. Eliminate flat fee billing and establish appropriate water rate structure based upon measured consumption. Continue to achieve verifiable success in removing manual meter reading barriers. Expand meter accuracy testing. Launch regular meter replacement program. Launch a program of annual auditing of global billing statistics by utility personnel.		<u>to qualify for 8</u>: Purchase and install meters on unmetered accounts. If customer meter reading success rate is less than 97%, assess cost-effectiveness of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system for portion or entire system; <u>or</u> otherwise achieve ongoing improvements in manual meter reading success rate to 97% or higher. Refine meter accuracy testing program. Set meter replacement goals based upon accuracy test results. Implement annual auditing of detailed billing records by utility personnel and implement third party auditing at least once every five years.		<u>to qualify for 10</u>: Purchase and install meters on unmetered accounts. Launch Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system trials if manual meter reading success rate of at least 99% is not achieved within a five-year program. Continue meter accuracy testing program. Conduct planning and budgeting for large scale meter replacement based upon meter life cycle analysis using cumulative flow target. Continue annual detailed billing data auditing by utility personnel and conduct third party auditing at least once every three years.		<u>to maintain 10</u>: Continue annual internal billing data auditing, and third party auditing at least every three years. Continue customer meter accuracy testing to ensure that accurate customer meter readings are obtained and entered as the basis for volume based billing. Stay abreast of improvements in Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) and information management. Plan and budget for justified upgrades in metering, meter reading and billing data management to maintain very high accuracy in customer metering and billing.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Billed unmetered:	Select n/a if it is the policy of the water utility to meter all customer connections and it has been confirmed by detailed auditing that all customers do indeed have a water meter; i.e. no intentionally unmetered accounts exist	Water utility policy does <u>not</u> require customer metering; flat or fixed fee billing is employed. No data is collected on customer consumption. The only estimates of customer population consumption available are derived from data estimation methods using average fixture count multiplied by number of connections, or similar approach.	Water utility policy does <u>not</u> require customer metering; flat or fixed fee billing is employed. Some metered accounts exist in parts of the system (pilot areas or District Metered Areas) with consumption read periodically or recorded on portable dataloggers over one, three, or seven day periods. Data from these sample meters are used to infer consumption for the total customer population. Site specific estimation methods are used for unusual buildings/water uses.	Conditions between 2 and 4	Water utility policy <u>does</u> require metering and volume based billing in general. However, a liberal amount of exemptions and a lack of clearly written and communicated procedures result in up to 20% of billed accounts believed to be unmetered by exemption; or the water utility is in transition to becoming fully metered, and a large number of customers remain unmetered. A rough estimate of the annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 4 and 6	Water utility policy <u>does</u> require metering and volume based billing but established exemptions exist for a portion of accounts such as municipal buildings. As many as 15% of billed accounts are unmetered due to this exemption or meter installation difficulties. Only a group estimate of annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 6 and 8	Water utility policy <u>does</u> require metering and volume based billing for all customer accounts. However, less than 5% of billed accounts remain unmetered because meter installation is hindered by unusual circumstances. The goal is to minimize the number of unmetered accounts. Reliable estimates of consumption are obtained for these unmetered accounts via site specific estimation methods.	Conditions between 8 and 10	Water utility policy <u>does</u> require metering and volume based billing for all customer accounts. Less than 2% of billed accounts are unmetered and exist because meter installation is hindered by unusual circumstances. The goal exists to minimize the number of unmetered accounts to the extent that is economical. Reliable estimates of consumption are obtained at these accounts via site specific estimation methods.
Improvements to attain higher data grading for "Billed Unmetered Consumption" component:	▨	<u>to qualify for 2</u>: Conduct research and evaluate cost/benefit of a new water utility policy to require metering of the customer population; thereby greatly reducing or eliminating unmetered accounts. Conduct pilot metering project by installing water meters in small sample of customer accounts and periodically reading the meters or datalogging the water consumption over one, three, or seven day periods.	<u>to qualify for 4</u>: Implement a new water utility policy requiring customer metering. Launch or expand pilot metering study to include several different meter types, which will provide data for economic assessment of full scale metering options. Assess sites with access difficulties to devise means to obtain water consumption volumes. Begin customer meter installation.		<u>to qualify for 6</u>: Refine policy and procedures to improve customer metering participation for all but solidly exempt accounts. Assign staff resources to review billing records to identify errant unmetered properties. Specify metering needs and funding requirements to install sufficient meters to significant reduce the number of unmetered accounts.		<u>to qualify for 8</u>: Push to install customer meters on a full scale basis. Refine metering policy and procedures to ensure that all accounts, including municipal properties, are designated for meters. Plan special efforts to address "hard-to-access" accounts. Implement procedures to obtain a reliable consumption estimate for the remaining few unmetered accounts awaiting meter installation.		<u>to qualify for 10</u>: Continue customer meter installation throughout the service area, with a goal to minimize unmetered accounts. Sustain the effort to investigate accounts with access difficulties, and devise means to install water meters or otherwise measure water consumption.		<u>to maintain 10</u>: Continue to refine estimation methods for unmetered consumption and explore means to establish metering, for as many billed remaining unmetered accounts as is economically feasible.
Unbilled metered:	select n/a if all billing-exempt consumption is unmetered.	Billing practices exempt certain accounts, such as municipal buildings, but written policies do not exist; and a reliable count of unbilled metered accounts is unavailable. Meter upkeep and meter reading on these accounts is rare and not considered a priority. Due to poor recordkeeping and lack of auditing, water consumption for all such accounts is purely guesstimated.	Billing practices exempt certain accounts, such as municipal buildings, but only scattered, dated written directives exist to justify this practice. A reliable count of unbilled metered accounts is unavailable. Sporadic meter replacement and meter reading occurs on an as-needed basis. The total annual water consumption for all unbilled, metered accounts is estimated based upon approximating the number of accounts and assigning consumption from actively billed accounts of same meter size.	Conditions between 2 and 4	Dated written procedures permit billing exemption for specific accounts, such as municipal properties, but are unclear regarding certain other types of accounts. Meter reading is given low priority and is sporadic. Consumption is quantified from meter readings where available. The total number of unbilled, unmetered accounts must be estimated along with consumption volumes.	Conditions between 4 and 6	Written policies regarding billing exemptions exist but adherence in practice is questionable. Metering and meter reading for municipal buildings is reliable but sporadic for other unbilled metered accounts. Periodic auditing of such accounts is conducted. Water consumption is quantified directly from meter readings where available, but the majority of the consumption is estimated.	Conditions between 6 and 8	Written policy identifies the types of accounts granted a billing exemption. Customer meter management and meter reading are considered secondary priorities, but meter reading is conducted at least annually to obtain consumption volumes for the annual water audit. High level auditing of billing records ensures that a reliable census of such accounts exists.	Conditions between 8 and 10	Clearly written policy identifies the types of accounts given a billing exemption, with emphasis on keeping such accounts to a minimum. Customer meter management and meter reading for these accounts is given proper priority and is reliably conducted. Regular auditing confirms this. Total water consumption for these accounts is taken from reliable readings from accurate meters.
Improvements to attain higher data grading for "Unbilled Metered Consumption" component:	▨	<u>to qualify for 2</u>: Reassess the water utility's policy allowing certain accounts to be granted a billing exemption. Draft an outline of a new written policy for billing exemptions, with clear justification as to why any accounts should be exempt from billing, and with the intention to keep the number of such accounts to a minimum.	<u>to qualify for 4</u>: Review historic written directives and policy documents allowing certain accounts to be billing-exempt. Draft an outline of a written policy for billing exemptions, identify criteria that grants an exemption, with a goal of keeping this number of accounts to a minimum. Consider increasing the priority of reading meters on unbilled accounts at least annually.		<u>to qualify for 6</u>: Draft a new written policy regarding billing exemptions based upon consensus criteria allowing this occurrence. Assign resources to audit meter records and billing records to obtain census of unbilled metered accounts. Gradually include a greater number of these metered accounts to the routes for regular meter reading.		<u>to qualify for 8</u>: Communicate billing exemption policy throughout the organization and implement procedures that ensure proper account management. Conduct inspections of accounts confirmed in unbilled metered status and verify that accurate meters exist and are scheduled for routine meter readings. Gradually increase the number of unbilled metered accounts that are included in regular meter reading routes.		<u>to qualify for 10</u>: Ensure that meter management (meter accuracy testing, meter replacement) and meter reading activities for unbilled accounts are accorded the same priority as billed accounts. Establish ongoing annual auditing process to ensure that water consumption is reliably collected and provided to the annual water audit process.		<u>to maintain 10</u>: Reassess the utility's philosophy in allowing any water uses to go "unbilled". It is possible to meter and bill all accounts, even if the fee charged for water consumption is discounted or waived. Metering and billing all accounts ensures that water consumption is tracked and water waste from plumbing leaks is detected and minimized.
Unbilled unmetered:	▨	Extent of unbilled, unmetered consumption is unknown due to unclear policies and poor recordkeeping. Total consumption is quantified based upon a purely subjective estimate.	Clear extent of unbilled, unmetered consumption is unknown, but a number of events are randomly documented each year, confirming existence of such consumption, but without sufficient documentation to quantify an accurate estimate of the annual volume consumed.	Conditions between 2 and 4	Extent of unbilled, unmetered consumption is partially known, and procedures exist to document certain events such as miscellaneous fire hydrant uses. Formulae is used to quantify the consumption from such events (time running multiplied by typical flowrate, multiplied by number of events).	Default value of 1.25% of system input volume is employed	Coherent policies exist for some forms of unbilled, unmetered consumption but others await closer evaluation. Reasonable recordkeeping for the managed uses exists and allows for annual volumes to be quantified by inference, but unsupervised uses are guesstimated.	Conditions between 6 and 8	Clear policies and good recordkeeping exist for some uses (ex: water used in periodic testing of unmetered fire connections), but other uses (ex: miscellaneous uses of fire hydrants) have limited oversight. Total consumption is a mix of well quantified use such as from formulae (time running multiplied by typical flow, multiplied by number of events) or temporary meters, and relatively subjective estimates of less regulated use.	Conditions between 8 and 10	Clear policies exist to identify permitted use of water in unbilled, unmetered fashion, with the intention of minimizing this type of consumption. Good records document each occurrence and consumption is quantified via formulae (time running multiplied by typical flow, multiplied by number of events) or use of temporary meters.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Unbilled Unmetered Consumption" component:		to qualify for 5: Utilize the accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use. to qualify for 2: Establish a policy regarding what water uses should be allowed to remain as unbilled and unmetered. Consider tracking a small sample of one such use (ex: fire hydrant flushings).	to qualify for 5: Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use. to qualify for 4: Evaluate the documentation of events that have been observed. Meet with user groups (ex: for fire hydrants - fire departments, contractors to ascertain their need and/or volume requirements for water from fire hydrants).		to qualify for 5: Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process, and should focus on other components since the volume of unbilled, umetered consumption is usually a relatively small quatity component, and other larger-quantity components should take priority.	to qualify for 6 or greater: Finalize policy and begin to conduct field checks to better establish and quantify such usage. Proceed if top-down audit exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policy and procedures for various unmetered usages. For example, ensure that a policy exists and permits are issued for use of fire hydrants by persons outside of the utility. Create written procedures for use and documentation of fire hydrants by water utility personnel. Use same approach for other types of unbilled, unmetered water usage.		to qualify for 10: Refine written procedures to ensure that all uses of unbilled, unmetered water are overseen by a structured permitting process managed by water utility personnel. Reassess policy to determine if some of these uses have value in being converted to billed and/or metered status.		to maintain 10: Continue to refine policy and procedures with intention of reducing the number of allowable uses of water in unbilled and unmetered fashion. Any uses that can feasibly become billed and metered should be converted eventually.
APPARENT LOSSES											
Unauthorized consumption:		Extent of unauthorized consumption is unknown due to unclear policies and poor recordkeeping. Total unauthorized consumption is guesstimated.	Unauthorized consumption is a known occurrence, but its extent is a mystery. There are no requirements to document observed events, but periodic field reports capture some of these occurrences. Total unauthorized consumption is approximated from this limited data.	conditions between 2 and 4	Procedures exist to document some unauthorized consumption such as observed unauthorized fire hydrant openings. Use formulae to quantify this consumption (time running multiplied typical flowrate, multiplied by number of events).	Default value of 0.25% of volume of water supplied is employed	Coherent policies exist for some forms of unauthorized consumption (more than simply fire hydrant misuse) but others await closer evaluation. Reasonable surveillance and recordkeeping exist for occurrences that fall under the policy. Volumes quantified by inference from these records.	Conditions between 6 and 8	Clear policies and good auditable recordkeeping exist for certain events (ex: tampering with water meters, illegal bypasses of customer meters); but other occurrences have limited oversight. Total consumption is a combination of volumes from formulae (time x typical flow) and subjective estimates of unconfirmed consumption.	Conditions between 8 and 10	Clear policies exist to identify all known unauthorized uses of water. Staff and procedures exist to provide enforcement of policies and detect violations. Each occurrence is recorded and quantified via formulae (estimated time running multiplied by typical flow) or similar methods. All records and calculations should exist in a form that can be audited by a third party.
Improvements to attain higher data grading for "Unauthorized Consumption" component:		to qualify for 5: Use accepted default of 0.25% of volume of water supplied to qualify for 2: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)	to qualify for 5: Use accepted default of 0.25% of system input volume to qualify for 4: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)		to qualify for 5: Utilize accepted default value of 0.25% of volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process.	to qualify for 6 or greater: Finalize policy updates to clearly identify the types of water consumption that are authorized from those usages that fall outside of this policy and are, therefore, unauthorized. Begin to conduct regular field checks. Proceed if the top-down audit already exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policies to ensure that all known occurrences of unauthorized consumption are outlawed, and that appropriate penalties are prescribed. Create written procedures for detection and documentation of various occurrences of unauthorized consumption as they are uncovered.		to qualify for 10: Refine written procedures and assign staff to seek out likely occurrences of unauthorized consumption. Explore new locking devices, monitors and other technologies designed to detect and thwart unauthorized consumption.		to maintain 10: Continue to refine policy and procedures to eliminate any loopholes that allow or tacitly encourage unauthorized consumption. Continue to be vigilant in detection, documentation and enforcement efforts.
Customer metering inaccuracies:	select n/a only if the entire customer population is unmetered. In such a case the volume entered must be zero.	Customer meters exist, but with unorganized paper records on meters; no meter accuracy testing or meter replacement program for any size of retail meter. Metering workflow is driven chaotically with no proactive management. Loss volume due to aggregate meter inaccuracy is guesstimated.	Poor recordkeeping and meter oversight is recognized by water utility management who has allotted staff and funding resources to organize improved recordkeeping and start meter accuracy testing. Existing paper records gathered and organized to provide cursory disposition of meter population. Customer meters are tested for accuracy only upon customer request.	Conditions between 2 and 4	Reliable recordkeeping exists; meter information is improving as meters are replaced. Meter accuracy testing is conducted annually for a small number of meters (more than just customer requests, but less than 1% of inventory). A limited number of the oldest meters are replaced each year. Inaccuracy volume is largely an estimate, but refined based upon limited testing data.	Conditions between 4 and 6	A reliable electronic recordkeeping system for meters exists. The meter population includes a mix of new high performing meters and dated meters with suspect accuracy. Routine, but limited, meter accuracy testing and meter replacement occur. Inaccuracy volume is quantified using a mix of reliable and less certain data.	Conditions between 6 and 8	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for various types of meters.	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Statistically significant number of meters are tested in audit year. This testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for these meters.	Good records of all active customer meters exist and include as a minimum: meter number, account number/location, type, size and manufacturer. Ongoing meter replacement occurs according to a targeted and justified basis. Regular meter accuracy testing gives a reliable measure of composite inaccuracy volume for the customer meter population. New metering technology is embraced to keep overall accuracy improving. Procedures are reviewed by a third party knowledgeable in the M36 methodology.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Customer meter inaccuracy volume" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	to qualify for 2: Gather available meter purchase records. Conduct testing on a small number of meters believed to be the most inaccurate. Review staffing needs of the metering group and budget for necessary resources to better organize meter management.	to qualify for 4: Implement a reliable record keeping system for customer meter histories, preferably using electronic methods typically linked to, or part of, the Customer Billing System or Customer Information System. Expand meter accuracy testing to a larger group of meters.		to qualify for 6: Standardize the procedures for meter recordkeeping within an electronic information system. Accelerate meter accuracy testing and meter replacements guided by testing results.		to qualify for 8: Expand annual meter accuracy testing to evaluate a statistically significant number of meter makes/models. Expand meter replacement program to replace statistically significant number of poor performing meters each year.		to qualify for 9: Continue efforts to manage meter population with reliable recordkeeping. Test a statistically significant number of meters each year and analyze test results in an ongoing manner to serve as a basis for a target meter replacement strategy based upon accumulated volume throughput.	to qualify for 10: Continue efforts to manage meter population with reliable recordkeeping, meter testing and replacement. Evaluate new meter types and install one or more types in 5-10 customer accounts each year in order to pilot improving metering technology.	to maintain 10: Increase the number of meters tested and replaced as justified by meter accuracy test data. Continually monitor development of new metering technology and Advanced Metering Infrastructure (AMI) to grasp opportunities for greater accuracy in metering of water flow and management of customer consumption data.
Systematic Data Handling Errors:	Note: all water utilities incur some amount of this error. Even in water utilities with unmetered customer populations and fixed rate billing, errors occur in annual billing tabulations. Enter a positive value for the volume and select a grading.	Policies and procedures for activation of new customer water billing accounts are vague and lack accountability. Billing data is maintained on paper records which are not well organized. No auditing is conducted to confirm billing data handling efficiency. An unknown number of customers escape routine billing due to lack of billing process oversight.	Policy and procedures for activation of new customer accounts and oversight of billing records exist but need refinement. Billing data is maintained on paper records or insufficiently capable electronic database. Only periodic unstructured auditing work is conducted to confirm billing data handling efficiency. The volume of unbilled water due to billing lapses is a guess.	Conditions between 2 and 4	Policy and procedures for new account activation and oversight of billing operations exist but needs refinement. Computerized billing system exists, but is dated or lacks needed functionality. Periodic, limited internal audits conducted and confirm with approximate accuracy the consumption volumes lost to billing lapses.	Conditions between 4 and 6	Policy and procedures for new account activation and oversight of billing operations is adequate and reviewed periodically. Computerized billing system is in use with basic reporting available. Any effect of billing adjustments on measured consumption volumes is well understood. Internal checks of billing data error conducted annually. Reasonably accurate quantification of consumption volume lost to billing lapses is obtained.	Conditions between 6 and 8	New account activation and billing operations policy and procedures are reviewed at least biannually. Computerized billing system includes an array of reports to confirm billing data and system functionality. Checks are conducted routinely to flag and explain zero consumption accounts. Annual internal checks conducted with third party audit conducted at least once every five years. Accountability checks flag billing lapses. Consumption lost to billing lapses is well quantified and reducing year-by-year.	Conditions between 8 and 10	Sound written policy and procedures exist for new account activation and oversight of customer billing operations. Robust computerized billing system gives high functionality and reporting capabilities which are utilized, analyzed and the results reported each billing cycle. Assessment of policy and data handling errors are conducted internally and audited by third party at least once every three years, ensuring consumption lost to billing lapses is minimized and detected as it occurs.
Improvements to attain higher data grading for "Systematic Data Handling Error volume" component:		to qualify for 2: Draft written policy and procedures for activating new water billing accounts and oversight of billing operations. Investigate and budget for computerized customer billing system. Conduct initial audit of billing records by flow-charting the basic business processes of the customer account/billing function.	to qualify for 4: Finalize written policy and procedures for activation of new billing acocunts and overall billing operations management. Implement a computerized customer billing system. Conduct initial audit of billing records as part of this process.		to qualify for 6: Refine new account activation and billing operations procedures and ensure consistency with the utility policy regarding billing, and minimize opportunity for missed billings. Upgrade or replace customer billing system for needed functionality - ensure that billing adjustments don't corrupt the value of consumption volumes. Procedurize internal annual audit process.		to qualify for 8: Formalize regular review of new account activation process and general billing practices. Enhance reporting capability of computerized billing system. Formalize regular auditing process to reveal scope of data handling error. Plan for periodic third party audit to occur at least once every five years.		to qualify for 10: Close policy/procedure loopholes that allow some customer accounts to go unbilled, or data handling errors to exist. Ensure that billing system reports are utilized, analyzed and reported every billing cycle. Ensure that internal and third party audits are conducted at least once every three years.		to maintain 10: Stay abreast of customer information management developments and innovations. Monitor developments of Advanced Metering Infrastructure (AMI) and integrate technology to ensure that customer endpoint information is well-monitored and errors/lapses are at an economic minimum.
SYSTEM DATA											
Length of mains:		Poorly assembled and maintained paper as-built records of existing water main installations makes accurate determination of system pipe length impossible. Length of mains is guesstimated.	Paper records in poor or uncertain condition (no annual tracking of installations & abandonments). Poor procedures to ensure that new water mains installed by developers are accurately documented.	Conditions between 2 and 4	Sound written policy and procedures exist for documenting new water main installations, but gaps in management result in a uncertain degree of error in tabulation of mains length.	Conditions between 4 and 6	Sound written policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper records with regular field validation; or electronic records and asset management system in good condition. Includes system backup.	Conditions between 6 and 8	Sound written policy and procedures exist for permitting and commissioning new water mains. Electronic recordkeeping such as a Geographical Information System (GIS) and asset management system are used to store and manage data.	Conditions between 8 and 10	Sound written policy exists for managing water mains extensions and replacements. Geographic Information System (GIS) data and asset management database agree and random field validation proves truth of databases. Records of annual field validation should be available for review.
Improvements to attain higher data grading for "Length of Water Mains" component:		to qualify for 2: Assign personnel to inventory current as-built records and compare with customer billing system records and highway plans in order to verify poorly documented pipelines. Assemble policy documents regarding permitting and documentation of water main installations by the utility and building developers; identify gaps in procedures that result in poor documentation of new water main installations.	to qualify for 4: Complete inventory of paper records of water main installations for several years prior to audit year. Review policy and procedures for commissioning and documenting new water main installation.		to qualify for 6: Finalize updates/improvements to written policy and procedures for permitting/commissioning new main installations. Confirm inventory of records for five years prior to audit year; correct any errors or omissions.		to qualify for 8: Launch random field checks of limited number of locations. Convert to electronic database such as a Geographic Information System (GIS) with backup as justified. Develop written policy and procedures.		to qualify for 10: Link Geographic Information System (GIS) and asset management databases, conduct field verification of data. Record field verification information at least annually.		to maintain 10: Continue with standardization and random field validation to improve the completeness and accuracy of the system.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Number of active AND inactive service connections:	▨	Vague permitting (of new service connections) policy and poor paper recordkeeping of customer connections/billings result in suspect determination of the number of service connections, which may be 10-15% in error from actual count.	General permitting policy exists but paper records, procedural gaps, and weak oversight result in questionable total for number of connections, which may vary 5-10% of actual count.	Conditions between 2 and 4	Written account activation policy and procedures exist, but with some gaps in performance and oversight. Computerized information management system is being brought online to replace dated paper recordkeeping system. Reasonably accurate tracking of service connection installations & abandonments; but count can be up to 5% in error from actual total.	Conditions between 4 and 6	Written new account activation and overall billing policies and procedures are adequate and reviewed periodically. Computerized information management system is in use with annual installations & abandonments totaled. Very limited field verifications and audits. Error in count of number of service connections is believed to be no more than 3%.	Conditions between 6 and 8	Policies and procedures for new account activation and overall billing operations are written, well-structured and reviewed at least biannually. Well managed computerized information management system exists and routine, periodic field checks and internal system audits are conducted. Counts of connections are no more than 2% in error.	Conditions between 8 and 10	Sound written policy and well managed and audited procedures ensure reliable management of service connection population. Computerized information management system, Customer Billing System, and Geographic Information System (GIS) information agree; field validation proves truth of databases. Count of connections recorded as being in error is less than 1% of the entire population.
Improvements to attain higher data grading for "Number of Active and Inactive Service Connections" component:	**Note: The number of Service Connections does not include fire hydrant leads/lines connecting the hydrant to the water main**	to qualify for 2: Draft new policy and procedures for new account activation and overall billing operations. Research and collect paper records of installations & abandonments for several years prior to audit year.	to qualify for 4: Refine policy and procedures for new account activation and overall billing operations. Research computerized recordkeeping system (Customer Information System or Customer Billing System) to improve documentation format for service connections.		to qualify for 6: Refine procedures to ensure consistency with new account activation and overall billing policy to establish new service connections or decommission existing connections. Improve process to include all totals for at least five years prior to audit year.		to qualify for 8: Formalize regular review of new account activation and overall billing operations policies and procedures. Launch random field checks of limited number of locations. Develop reports and auditing mechanisms for computerized information management system.		to qualify for 10: Close any procedural loopholes that allow installations to go undocumented. Link computerized information management system with Geographic Information System (GIS) and formalize field inspection and information system auditing processes. Documentation of new or decommissioned service connections encounters several levels of checks and balances.		to maintain 10: Continue with standardization and random field validation to improve knowledge of system.
Average length of customer service line:	Note: if customer water meters are located outside of the customer building next to the curb stop or boundary separating utility/customer responsibility, then the auditor should answer "Yes" to the question on the Reporting Worksheet asking about this. If the answer is Yes, the grading description listed under the Grading of 10(a) will be followed, with a value of zero automatically entered at a Grading of 10. See the Service Connection Diagram worksheet for a visual presentation of this distance.	Gradings 1-9 apply if customer properties are unmetered, if customer meters exist and are located inside the customer building premises, or if the water utility owns and is responsible for the entire service connection piping from the water main to the customer building. In any of these cases the average distance between the curb stop or boundary separating utility/customer responsibility for service connection piping, and the typical first point of use (ex: faucet) or the customer meter must be quantified. Gradings of 1-9 are used to grade the validity of the means to quantify this value. (See the "Service Connection Diagram" worksheet)									Either of two conditions can be met for a grading of 10: a) Customer water meters exist outside of customer buildings next to the curb stop or boundary separating utility/customer responsibility for service connection piping. If so, answer "Yes" to the question on the Reporting Working asking about this condition. A value of zero and a Grading of 10 are automatically entered in the Reporting Worksheet. b). Meters exist inside customer buildings, or properties are unmetered. In either case, answer "No" to the Reporting Worksheet question on meter location, and enter a distance determined by the auditor. For a Grading of 10 this value must be a very reliable number from a Geographic Information System (GIS) and confirmed by a statistically valid number of field checks.
		Vague policy exists to define the delineation of water utility ownership and customer ownership of the service connection piping. Curb stops are perceived as the breakpoint but these have not been well-maintained or documented. Most are buried or obscured. Their location varies widely from site-to-site, and estimating this distance is arbitrary due to the unknown location of many curb stops.	Policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. The piping from the water main to the curb stop is the property of the water utility; and the piping from the curb stop to the customer building is owned by the customer. Curb stop locations are not well documented and the average distance is based upon a limited number of locations measured in the field.	Conditions between 2 and 4	Good policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. Curb stops are generally installed as needed and are reasonably documented. Their location varies widely from site-to-site, and an estimate of this distance is hindered by the availability of paper records of limited accuracy.	Conditions between 4 and 6	Clear written policy exists to define utility/customer responsibility for service connection piping. Accurate, well-maintained paper or basic electronic recordkeeping system exists. Periodic field checks confirm piping lengths for a sample of customer properties.	Conditions between 6 and 8	Clearly worded policy standardizes the location of curb stops and meters, which are inspected upon installation. Accurate and well maintained electronic records exist with periodic field checks to confirm locations of service lines, curb stops and customer meter pits. An accurate number of customer properties from the customer billing system allows for reliable averaging of this length.	Conditions between 8 and 10	
Improvements to attain higher data grading for "Average Length of Customer Service Line" component:	▨	to qualify for 2: Research and collect paper records of service line installations. Inspect several sites in the field using pipe locators to locate curb stops. Obtain the length of this small sample of connections in this manner.	to qualify for 4: Formalize and communicate policy delineating utility/customer responsibilities for service connection piping. Assess accuracy of paper records by field inspection of a small sample of service connections using pipe locators as needed. Research the potential migration to a computerized information management system to store service connection data.		to qualify for 6: Establish coherent procedures to ensure that policy for curb stop, meter installation and documentation is followed. Gain consensus within the water utility for the establishment of a computerized information management system.		to qualify for 8: Implement an electronic means of recordkeeping, typically via a customer information system, customer billing system, or Geographic Information System (GIS). Standardize the process to conduct field checks of a limited number of locations.		to qualify for 10: Link customer information management system and Geographic Information System (GIS), standardize process for field verification of data.		to maintain 10: Continue with standardization and random field validation to improve knowledge of service connection configurations and customer meter locations.
Average operating pressure:	▨	Available records are poorly assembled and maintained paper records of supply pump characteristics and water distribution system operating conditions. Average pressure is guesstimated based upon this information and ground elevations from crude topographical maps. Widely varying distribution system pressures due to undulating terrain, high system head loss and weak/erratic pressure controls further compromise the validity of the average pressure calculation.	Limited telemetry monitoring of scattered pumping station and water storage tank sites provides some static pressure data, which is recorded in handwritten logbooks. Pressure data is gathered at individual sites only when low pressure complaints arise. Average pressure is determined by averaging relatively crude data, and is affected by significant variation in ground elevations, system head loss and gaps in pressure controls in the distribution system.	Conditions between 2 and 4	Effective pressure controls separate different pressure zones; moderate pressure variation across the system, occasional open boundary valves are discovered that breech pressure zones. Basic telemetry monitoring of the distribution system logs pressure data electronically. Pressure data gathered by gauges or dataloggers at fire hydrants or buildings when low pressure complaints arise, and during fire flow tests and system flushing. Reliable topographical data exists. Average pressure is calculated using this mix of data.	Conditions between 4 and 6	Reliable pressure controls separate distinct pressure zones; only very occasional open boundary valves are encountered that breech pressure zones. Well-covered telemetry monitoring of the distribution system (not just pumping at source treatment plants or wells) logs extensive pressure data electronically. Pressure gathered by gauges/dataloggers at fire hydrants and buildings when low pressure complaints arise, and during fire flow tests and system flushing. Average pressure is determined by using this mix of reliable data.	Conditions between 6 and 8	Well-managed, discrete pressure zones exist with generally predictable pressure fluctuations. A current full-scale SCADA System or similar realtime monitoring system exists to monitor the water distribution system and collect data, including real time pressure readings at representative sites across the system. The average system pressure is determined from reliable monitoring system data.	Conditions between 8 and 10	Well-managed pressure districts/zones, SCADA System and hydraulic model exist to give very precise pressure data across the water distribution system. Average system pressure is reliably calculated from extensive, reliable, and cross-checked data. Calculations are reported on an annual basis as a minimum.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Average Operating Pressure" component:	▨	<u>to qualify for 2</u>: Employ pressure gauging and/or datalogging equipment to obtain pressure measurements from fire hydrants. Locate accurate topographical maps of service area in order to confirm ground elevations. Research pump data sheets to find pump pressure/flow characteristics	<u>to qualify for 4</u>: Formalize a procedure to use pressure gauging/datalogging equipment to gather pressure data during various system events such as low pressure complaints, or operational testing. Gather pump pressure and flow data at different flow regimes. Identify faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) and plan to properly configure pressure zones. Make all pressure data from these efforts available to generate system-wide average pressure.		<u>to qualify for 6</u>: Expand the use of pressure gauging/datalogging equipment to gather scattered pressure data at a representative set of sites, based upon pressure zones or areas. Utilize pump pressure and flow data to determine supply head entering each pressure zone or district. Correct any faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) to ensure properly configured pressure zones. Use expanded pressure dataset from these activities to generate system-wide average pressure.		<u>to qualify for 8</u>: Install a Supervisory Control and Data Acquisition (SCADA) System, or similar realtime monitoring system, to monitor system parameters and control operations. Set regular calibration schedule for instrumentation to insure data accuracy. Obtain accurate topographical data and utilize pressure data gathered from field surveys to provide extensive, reliable data for pressure averaging.		<u>to qualify for 10</u>: Annually, obtain a system-wide average pressure value from the hydraulic model of the distribution system that has been calibrated via field measurements in the water distribution system and confirmed in comparisons with SCADA System data.		<u>to maintain 10</u>: Continue to refine the hydraulic model of the distribution system and consider linking it with SCADA System for real-time pressure data calibration, and averaging.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
COST DATA											
Total annual cost of operating water system:		Incomplete paper records and lack of financial accounting documentation on many operating functions makes calculation of water system operating costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to estimate the major portion of water system operating costs	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. However, gaps in data are known to exist, periodic internal reviews are conducted but not a structured financial audit.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited periodically by utility personnel, but not a Certified Public Accountant (CPA).	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited at least annually by utility personnel, and at least once every three years by third-party CPA.	Conditions between 8 and 10	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited annually by utility personnel and annually also by third-party CPA.
Improvements to attain higher data grading for "Total Annual Cost of Operating the Water System" component:		to qualify for 2: Gather available records, institute new financial accounting procedures to regularly collect and audit basic cost data of most important operations functions	to qualify for 4: Implement an electronic cost accounting system, structured according to accounting standards for water utilities		to qualify for 6: Establish process for periodic internal audit of water system operating costs; identify cost data gaps and institute procedures for tracking these outstanding costs		to qualify for 8: Standardize the process to conduct routine financial audit on an annual basis. Arrange for CPA audit of financial records at least once every three years		to qualify for 10: Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		to maintain 10: Maintain program, stay abreast of expenses subject to erratic cost changes and long-term cost trend, and budget/track costs proactively
Customer retail unit cost (applied to Apparent Losses):	Customer population unmetered, and/or only a fixed fee is charged for consumption.	Antiquated, cumbersome water rate structure is used, with periodic historic amendments that were poorly documented and implemented; resulting in classes of customers being billed inconsistent charges. The actual composite billing rate likely differs significantly from the published water rate structure, but a lack of auditing leaves the degree of error indeterminate.	Dated, cumbersome water rate structure, not always employed consistently in actual billing operations. The actual composite billing rate is known to differ from the published water rate structure, and a reasonably accurate estimate of the degree of error is determined, allowing a composite billing rate to be quantified.	Conditions between 2 and 4	Straight-forward water rate structure in use, but not updated in several years. Billing operations reliably employ the rate structure. The composite billing rate is derived from a single customer class such as residential customer accounts, neglecting the effect of different rates from varying customer classes.	Conditions between 4 and 6	Clearly written, up-to-date water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average residential rate using volumes of water in each rate block.	Conditions between 6 and 8	Effective water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average composite consumption rate, which includes residential, commercial, industrial, institutional (CII), and any other distinct customer classes within the water rate structure.	Conditions between 8 and 10	Current, effective water rate structure is in force and applied reliably in billing operations. The rate structure and calculations of composite rate - which includes residential, commercial, industrial, institutional (CII), and other distinct customer classes - are reviewed by a third party knowledgeable in the M36 methodology at least once every five years.
Improvements to attain higher data grading for "Customer Retail Unit Cost" component:		to qualify for 2: Formalize the process to implement water rates, including a secure documentation procedure. Create a current, formal water rate document and gain approval from all stakeholders	to qualify for 4: Review the water rate structure and update/formalize as needed. Assess billing operations to ensure that actual billing operations incorporate the established water rate structure		to qualify for 6: Evaluate volume of water used in each usage block by residential users. Multiply volumes by full rate structure.	Launch effort to fully meter the customer population and charge rates based upon water volumes	to qualify for 8: Evaluate volume of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		to qualify for 10: Conduct a periodic third-party audit of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		to maintain 10: Keep water rate structure current in addressing the water utility's revenue needs. Update the calculation of the customer unit rate as new rate components, customer classes, or other components are modified.
Variable production cost (applied to Real Losses):	Note: if the water utility purchases/imports its entire water supply, then enter the unit purchase cost of the bulk water supply in the Reporting Worksheet with a grading of 10	Incomplete paper records and lack of documentation on primary operating functions (electric power and treatment costs most importantly) makes calculation of variable production costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to roughly estimate the basic operations costs (pumping power costs and treatment costs) and calculate a unit variable production cost.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. Electric power and treatment costs are reliably tracked and allow accurate weighted calculation of unit variable production costs based on these two inputs and water imported purchase costs (if applicable). All costs are audited internally on a periodic basis.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Pertinent additional costs beyond power, treatment and water imported purchase costs (if applicable) such as liability, residuals management, wear and tear on equipment, impending expansion of supply, are included in the unit variable production cost, as applicable. The data is audited at least annually by utility personnel.	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent primary and secondary variable production and water imported purchase (if applicable) costs tracked. The data is audited at least annually by utility personnel, and at least once every three years by a third-party knowledgeable in the M36 methodology.	Conditions between 8 and 10	Either of two conditions can be met to obtain a grading of 10: 1) Third party CPA audit of all pertinent primary and secondary variable production and water imported purchase (if applicable) costs on an annual basis. or: 2) Water supply is entirely purchased as bulk imported water, and unit purchase cost serves as the variable production cost
Improvements to attain higher data grading for "Variable Production Cost" component:		to qualify for 2: Gather available records, institute new procedures to regularly collect and audit basic cost data and most important operations functions.	to qualify for 4: Implement an electronic cost accounting system, structured according to accounting standards for water utilities		to qualify for 6: Formalize process for regular internal audits of production costs. Assess whether additional costs (liability, residuals management, equipment wear, impending infrastructure expansion) should be included to calculate a more representative variable production cost.		to qualify for 8: Formalize the accounting process to include direct cost components (power, treatment) as well as indirect cost components (liability, residuals management, etc.). Arrange to conduct audits by a knowledgable third-party at least once every three years.		to qualify for 10: Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		to maintain 10: Maintain program, stay abreast of expenses subject to erratic cost changes and budget/track costs proactively

AWWA Free Water Audit Software:
Determining Water Loss Standing

WAS v5.0

Water Audit Report for: City of Dayton (18250 3)
Reporting Year: 2013 1/2013 - 12/2013
Data Validity Score: 64

Water Loss Control Planning Guide

	Water Audit Data Validity Level / Score				
Functional Focus Area	**Level I** (0-25)	**Level II** (26-50)	**Level III** (51-70)	**Level IV** (71-90)	**Level V** (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service

For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.

Technical Memorandum No. 3

Technical Memorandum No. 3
City of Dayton
Water System Plan

By: Dave Jepsen, PE, Anderson Perry & Associates, Inc. DJ
RE: Water Use Efficiency (WUE) Program
Date: November 10, 2014

In this technical memorandum, WUE measures are evaluated and recommended for the City of Dayton to incorporate into its WUE Program. WUE measures consist of activities that result in any beneficial reduction in water losses, waste, use, or demand. Efficient water use benefits the water purveyor, customers, and environment by improving water quality, reducing water system expenses, reducing the need for upgrades, and protecting water resources.

WUE requirements are described in the Washington State Department of Health's (DOH) *Water Use Efficiency Guidebook* (2011). The main elements of these rules include:

- Current Water Conservation/WUE Activities
- Water Metering and Data Collection Requirements of Production and Consumption Meters
- Water Supply Characteristics
- Water Demand Forecasting
- Distribution System Leakage (DSL) Standard
- WUE Program Elements and Goals

Each of these elements and how they pertain to the City's water system are discussed below.

Current Water Conservation/WUE Activities

The City is currently adhering to the Water Conservation Program outlined in the City's existing Water System Plan (Anderson Perry & Associates, Inc., 2007). The status of the City's current water conservation measures is summarized in Table 1.

TABLE 1

Status of Current Water Conservation Measures

Measure/Activity	Status
Program Promotion - Provide water conservation brochures and pamphlets at City Hall and the library.	Brochures are currently available at City Hall. Library management is no longer under City administration.
Source Meters - Test and calibrate source well meters once every 5 years, or as needed.	Installation of new flowmeter at Well No. 2 and reconditioned flowmeters at the other wells is proposed for 2014.
Customer Assistance - Provide conservation literature and limited technical assistance.	Three guides for using water efficiently are available on the City's website: • Ideas for Lawn Watering and Maintenance • Ideas for Indoor Water Usage • Ideas for Gardening and Landscaping
Bill Showing Consumption History - Consider obtaining the ability to show percentage increase/decrease in billing software when upgrading or replacing the existing software.	The City has not yet upgraded its billing software, but plans to purchase new software that will have this capability.
Service Meters - Replace an average of 130 new water meters each year and compile a service meter inventory.	Installed approximately 526 new meters since 2007 and compiled the service meter inventory.
Unaccounted for Water/Leak Detection - Budget annually for regular leak detection in the system and install a master meter on the 12-inch main serving users south of the City.	Performed periodic leak detection; master meter was installed in 2007.
Single-Family/Multi-Family Kits - Conduct survey of customers on the potential participation and type of desired kit items; review findings with the Council and decide a course of action.	Survey was not conducted.
Landscape Management, Playfields – Xeriscaping - Continue current WUE irrigation practices.	Existing practices have been maintained. Underground sprinkler and timer system was installed at Little League park.
Conservation Pricing - Periodically review adopted conservation rates (inclining block rate).	Rates are reviewed annually during the budget process.
Water Audit - Perform annual and monthly water audits of the water produced and used.	Performed annual audits in conformance with WUE rules.
Survey Customers About Potential Rebates - Conduct a customer survey on potential participation in a utility rebate program for items such as ultra-low flow toilets, front-loading washers, and toilet valve flappers.	Survey was not conducted.
Reevaluation of Reclaimed Water Opportunities - Reevaluate reclaimed water opportunities with respect to the Wastewater Treatment Plant's effluent discharge.	Started work on the Wastewater Facilities Plan, which will include an evaluation of reclaimed water use opportunities.

Water Metering/Data Collection Requirements of Production and Consumption Meters

WUE rules require that all production and consumption in municipal systems be metered. The City is in compliance with this rule as all active sources and customers are currently metered.

Water Supply Characteristics

The City relies on groundwater from three wells (Nos. 1, 2, and 3) to supply its potable water needs. All three wells are deep (greater than 1,000 feet below ground) basalt wells. The combined instantaneous total well capacity is 2,900 gallons per minute (gpm).

The City has a total of two water rights with diversions of up to 2,700 gpm, instantaneous flows, and an annual volume of 3,630 acre-feet per year.

Water quality from all the City's sources is acceptable and within the State's drinking water standards.

Water Demand Forecasting

Water demand forecasting is typically tied to historical population growth and the region's demographic trends. Most projections are based on the extrapolation of past trends from an area or region. While history may not repeat itself, past trends serve as an initial basis for population projections. Future water demand is also affected by a community's WUE. The ability to conserve and use water efficiently factors into future water demand projections.

DSL Standard

The WUE rules require a DSL standard of 10 percent or less based on a 3-year rolling average. DSL is all unauthorized water and all authorized water that is not tracked or estimated. As discussed in Chapter 2 of the Water System Plan and Technical Memorandum No. 2, the City's calculated rolling DSL for the past 3 years (2011 through 2013) is 12.5 percent. Since this average is above the State standard of 10 percent, the City is required to compile and implement a Water Loss Control Action Plan (WLCAP). Recommendations for this plan are provided in Technical Memorandum No. 2.

WUE Program Elements and Goals

The WUE program elements and goals establish the framework for the City to implement cost-effective WUE measures. The City's existing and proposed WUE program elements and goals, including the evaluated and adopted water conservation and WUE measures, are discussed below.

In the 2007 Water System Plan, the City adopted unaccounted-for water goals of 15 percent by Year 2012 and 10 percent by Year 2026. Due to inconsistent use and interpretation, the term "unaccounted-for" water is no longer readily used and has been replaced by the term "non-revenue" water. DOH's *Water Use Efficiency Guidebook* (2011) utilizes two terms related to water loss: 1) authorized consumption and 2) DSL. Given the changes in terminology and water loss definitions, the City's unaccounted-for water goals are currently referred to as DSL goals.

With the City's current DSL (2013) of 11.2 percent, Dayton is close to complying with the State's DSL standard of less than 10 percent. The City will likely be able to comply with the standard before Year 2026. Consequently, for its new Water System Plan, we recommend the City adopt a supply side goal of a DSL of less than 10 percent by Year 2020.

In addition to a supply side goal, the City also adopted a demand side goal to reduce overall water consumption by 2 percent as defined in average gallons per day over a 6-year period. Because the City adopted this goal at its June 3, 2009 City Council meeting, this goal supersedes the City's conservation objectives presented in the existing Water System Plan (Anderson Perry & Associates, Inc., 2007).

The City's historical annual water use for 2005 to 2006 and 2010 to 2013 is summarized in Table 2.

TABLE 2

Historical Annual Service Water Use, 2005 to 2006 and 2010 to 2013

Year	Water Use (gallons)		
	Inside City	Outside City	Total
2005-2006	200,910,721*	32,967,382	**233,878,103***
2010-2011	171,546,993	17,589,415	**189,136,408**
2011-2012	188,999,756	16,809,947	**205,809,703**
2012-2013	200,037,819	19,147,454	**219,185,273**

** – Corrected value – Different than the value shown in the previous Water System Plan (Anderson Perry & Associates, Inc., 2007)*

Though water use within Dayton has increased over the last 3 years, usage is still less than the annual water use observed in 2005 to 2006. Given this reduction in water usage, and possible population growth in the City over the next 6 years, a more modest demand side goal of 1 percent reduction is recommended instead of the existing goal of 2 percent water usage reduction.

Implemented and Evaluated WUE Measures

DOH's *Water Use Efficiency Guidebook* (2011) lists the measures that a municipal water purveyor must implement and evaluate. With 1,481 water service connections, the City must implement five mandatory WUE measures, evaluate conservation rates and reclaimed water use opportunities, and evaluate or implement five additional WUE measures. These steps are summarized as follows:

- Install and operate production meters on all sources
- Install and operate consumption meters on all services
- Perform meter calibration
- Implement a WLCAP to control leakage
- Educate customers about WUE practices
- Evaluate consumer rates that encourage water demand efficiency
- Evaluate reclaimed water use opportunities (for systems with 1,000 or more service connections)
- Evaluate or implement five additional measures

These proposed WUE measures are discussed further below, and the City's proposed WUE program is summarized at the end of this section.

Install and Operate Production and Consumption Meters and Perform Meter Calibration

Since production meters are already installed and operating at all of Dayton's current production sources, the City is in compliance with this WUE requirement. However, the City has not had a formal, scheduled testing of the well production meters because they are unable to test the meters without leaving the wells unmetered. The City has proposed purchasing a new flowmeter for Well No. 2 and reconditioning this well's existing meter. The reconditioned meter would then be installed in Well No. 3. The flowmeter from Well No. 3 would be reconditioned and installed in Well No. 1. The flowmeter from Well No. 1 would be reconditioned and serve as a spare meter. This meter would start the flowmeter replacement and reconditioning cycle again in approximately 6 years.

Consumption meters are installed and operating on all of the City's services in accordance with the WUE requirement. The City is in the process of replacing meters, with approximately 42 percent of the meters replaced since 2007. Continued meter replacement is planned depending on the number of meters that fail, available time for staff to install the meters, and budget.

Implement a WLCAP to Control Leakage

Since the City's 3-year DSL rolling average (12.5 percent) is above the 10 percent DSL standard, the City is required to compile and implement a WLCAP. The main elements of the plan are summarized below. See Technical Memorandum No. 2 for more information.

- Establish a WUE Supply Side Goal of a DSL Less than 10 Percent
- Install New and Refurbished Source Water Production Meters
- Better Documentation and Tracking of Unbilled Authorized Consumption
- Leak Detection
- Continued Water Meter Replacement
- Locate and Repair Water Main Leak off North Touchet River Road
- Water Main Repair and Replacement

Customer Education about WUE Practices

Under the State's WUE rules, customer education on WUE measures is required at least once per year. Implementing customer education measures more than once a year is considered an additional WUE measure.

The goal of WUE education is to inform customers about the importance of efficient water use. Customer education may take the form of mailers, workshops, or individual WUE reviews. Education topics can range over a wide variety of conservation issues including the following:

- Detecting and fixing leaks
- Low water use landscaping (Xeriscape™) and irrigation practices
- Efficient water use when washing cars or other outdoor uses
- Potential curtailment activities
- General conservation awareness

The American Water Works Association and DOH have developed a significant amount of education materials such as pamphlets, videos, CD-ROM computer programs, and other materials to assist water providers in their customer education efforts. Information is available on a variety of topics, and materials can be obtained for practically any age group, demographic, or purpose at little or no cost to the water provider.

The effectiveness of customer education measures on water conservation is difficult to predict. During periods of drought, public awareness is high and education may result in significant water consumption reductions, while at other times effectiveness may depend on the program.

Presently, the City's public education efforts primarily consist of messages included in the annual Consumer Confidence Reports, guides for using water efficiently on the City's website (http://www.daytonwa.com/index.php/city-hall/public-works), and WUE brochures displayed at City Hall. We recommend the City continue these existing customer education efforts.

Water Conservation Rate Pricing

A proper water rate structure supports and encourages water conservation. The ideal conservation rate structure encourages maximum participation in WUE efforts while simultaneously providing revenue stability, user equality, and easy implementation and administration. The City currently uses the rate structure shown in Table 3, with prices shown in terms of $/cubic feet (cf) and $/gallon.

TABLE 3

City's Water Rates

Tier	Volume (cf)	Price	Volume (gallons)	Price
Base	0 to 800	$33.60	0 to 5,984	$33.60
1	801 to 50,000	$0.00772/cf	5,985 to 374,026	$1.03/1,000 gallons
2	50,001 to 100,000	$0.00849/cf	374,027 to 748,052	$1.135/1,000 gallons
3	>100,000	$0.00882/cf	>748,053	$1.179/1,000 gallons

While this rate structure provides excellent revenue stability, we recommend the City consider adjusting the prices and volume allowances of the inclining block tiers to provide incentive for users consuming water over the base rate to conserve water. An overwhelming majority of the City's water customers fall within the first tier block with consumption from 801 to 50,000 cubic feet. The range of water usage within this tier is too large to promote WUE. This first tier should be divided into at least two, or maybe three tiers.

The ranges of the remaining two existing tiers for usage above 50,001 cubic feet could remain the same. To remain an inclining block rate structure, the prices of these two upper tiers would need to be revised to reflect any price changes made to the lower block rate tiers.

The price difference in the City's existing tiered rates is relatively small, with only a 10 percent difference between Tiers 1 and 2 and an approximately 4 percent difference between Tiers 2 and 3. To effectively promote WUE with tiered rates, the rate difference typically ranges between 25 and 100 percent.

The City may also wish to revisit how much water is provided with the base rate. Currently, the base rate allowance includes 800 cubic feet of water, or 5,984 gallons per month. A number of cities and small towns in Eastern Washington provide a volume allowance with their base water rate to assist lower income residents. Most communities provide a monthly base rate volume allowance between 3,000 and 5,000 gallons per month. The City's current allowance of 5,984 gallons is thus on the upper end of the monthly volume allowances of most communities in the area.

The City attempted to reduce the monthly volume allowance from 800 to 400 cubic feet (2,992 gallons), but restored the 800 cubic feet allowance after significant public opposition. The reduction in the base volume allowance likely failed because the move was viewed as a rate increase. City customers may be willing to accept a reduction in the monthly volume allowance if this change was made in conjunction with a reduction in the base rate charge and the addition of a new tier rate that did not increase their monthly water bills for usages under 800 cubic feet (i.e., a rate revenue neutral change).

Reclaimed Water

Under the State's WUE rules, evaluating reclaimed water opportunities and the use of three-element cost-effectiveness evaluation criteria are required for water systems with 1,000 or more service connections. This evaluation was completed and discussed in Technical Memorandum No. 1.

While opportunities for reclaimed water use in Dayton exist, the capital costs associated with the infrastructure needed to produce, store, and convey reclaimed water to the areas of use are significant. Given this substantial cost and the anticipated minimal savings of potable water, at this time, we believe the City and its resources would best be served by concentrating efforts on reducing the system's DSL through its WLCAP.

Additional WUE Measures

In addition to the above mandatory WUE measures, evaluating or implementing five additional measures is required. The City has already implemented the following three additional measures:

- Implementation of a Water Conservation Rate Structure – As discussed above, the City's current rate structure is a base rate (800 cubic feet allowance) with three inclining blocks.
- WUE Information on the City's Website – Three WUE guides are available on the City's website.
- Customer Notification of Possible Leak – The City notifies customers when unusual or abnormally high meter readings may indicate a possible leak on the house side of the meter.

The following is a list of potential measures the City could implement as its final WUE measures. This list is not exhaustive, but represents typical measures that would assist the City in achieving its WUE goals. The potential measures of single- and multi-family water conservation kits and rebates for ultra-low flow toilets and water efficient clothes washers were evaluated in the City's existing Water System Plan (Anderson Perry & Associates, Inc., 2007). Since these potential measures were found not to be cost effective, they are not evaluated below.

- **Additional WUE Information Handouts** – The City would provide additional informational handouts in the customers' bills (over the once per year requirement).
- **Consumption History on Customer Water Bills** – The City has started the process of obtaining a new utility billing program. This new program will be capable of including a customer's 12-month consumption history on the bill.
- **Notification of Annual Top 15 Water Users** – The City would notify the top 15 water users in a given year of their total annual use and their ranking as one of the City's top water users. Suitable WUE information would be included with the notification. This measure would inform the City's top water users of their annual water consumption compared to other top users and the City's total annual water consumption.
- **New Customer Water System Informational Packets** – The City would give packets to new water system customers with information on WUE measures, system policies, user rates, cross-connection control, and other helpful information.

- **WUE Educational Display Board(s)** – The City would compile a display board showing the importance and benefits of efficient water use. This board could be displayed at City Hall, the library (with permission), or public events.

A brief comparison of these proposed measures in terms of the water system, cost-sharing, and societal perspectives is provided in Table 4.

TABLE 4

Perspective Comparison of Proposed Additional WUE Measures

Proposed Measure	Perspective		
	Water System	Cost-Sharing	Societal
Additional WUE Information Handouts Advantages: Sent to all customers Disadvantages: Unknown effectiveness	$150 per year	Possible – Coordinate purchase of materials with another water supplier	Educational* – All customers
Consumption History on Customer Water Bills Advantages: Provides direct customer feedback Disadvantages: Limited effectiveness in winter when meters are not read	Cost included in Utility Billing Program – some start-up time and processing	Limited (Specific to City)	Provides direct feedback to all customers on their water use
Notification of Annual Top 15 Water Users Advantages: Provides annual water use information to largest users including residential, multi-family, commercial, and industrial Disadvantages: Unknown effectiveness	$50 per year – As a large user, the City would notify itself of its top annual uses	Limited (Specific to City)	Informs the largest water users with the possible largest savings, includes multiple user classes
New Customer Water System Informational Packets Advantages: Introduce WUE to new customers Disadvantages: Limited audience	$25 per year	Limited – But would cover all user groups	Educational* – Limited to new customers
WUE Educational Display Board(s) Advantages: Portable, use of multiple venues Disadvantages: Needs periodic updates, unknown effectiveness	$100 startup	Possible – If generic in material, could utilize with another water supplier	Educational* – Wide venues for display and outreach

** – Water savings from educational WUE measures are difficult to ascertain*

At a meeting on October 27, 2014, the City's Public Works Committee recommended implementing consumption history on customer water bills and providing water system informational packets to new customers as the City's two additional WUE measures

Summary

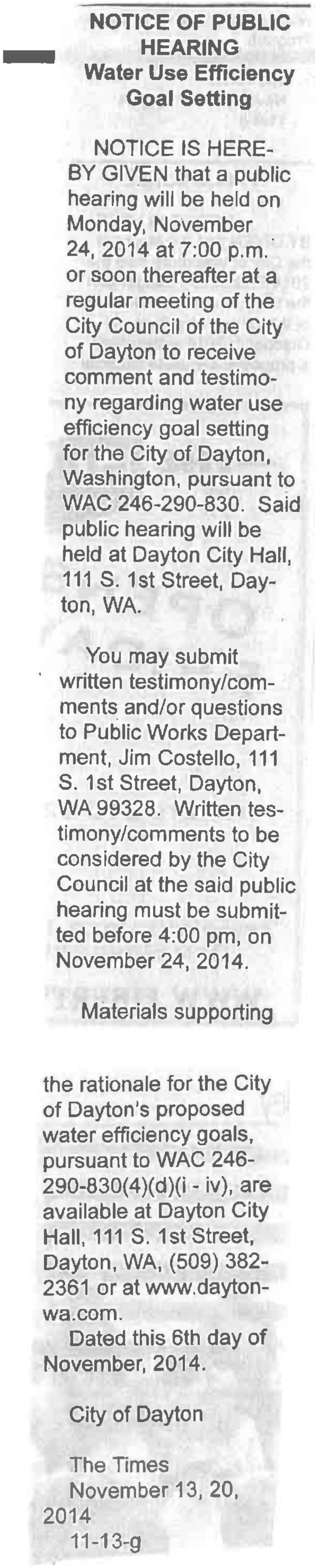
The City's proposed WUE program, including start dates, budget, comments, and additional potential measures, is summarized in Table 5. These measures and activities are intended to help the City meet its WUE goals outlined above.

TABLE 5

Summary of Dayton's Proposed WUE Program

Measure/Activity	Start Date	Budget	Activity
Install and Operate Production and Consumption Meters			
Production meters already installed	N/A	N/A	In compliance
Test and calibrate production meters at each well once every 6 years or as needed • Well No. 2: New flowmeter head • Well No. 3: Reconditioned Well No. 2 head • Well No. 1: Reconditioned Well No. 3 head	October 2014 February 2015 August 2015	$25,000	Flowmeter heads will be reconditioned and recalibrated; reconditioned head from Well No. 1 will be used as a spare
Consumption meters already installed	N/A	N/A	In compliance
Implement a WLCAP to Control Leakage (from Technical Memorandum No. 2)			
Establish a WUE Supply Goal of a DSL of less than 10 percent	October 2014	N/A	Recommended for adoption as a 6-year goal
Install New and Refurbished Source Water Production Meters	See above		
Better Documentation and Tracking of Unbilled Unauthorized Consumption	January 2015	N/A	Initiate education and correspondence of WUE requirements with Fire Department
Leak Detection	January 2015	$3,500	Annually, as needed, until DSL is less than 10 percent
Continued Water Meter Replacement	Ongoing	$5,000	
Locate and Repair Water Main Leak off North Touchet River Road	Ongoing	Uncertain	Cost dependent on the location and extent of leak
Water Main Repair and Replacement	Ongoing	Repairs as needed. Replacement as needed, or as shown in Chapter 8 of the Water System Plan	
Customer Education about WUE Practices			
Education materials sent to customers annually	Ongoing	$50	
Water Conservation Rate Pricing			
Conservation rate structure in place; recommend adding an additional tier block and adjusting the blocks' quantity allowance	January 2016	N/A	Start implementation with budget meetings in October 2015
Additional Measures (Five Mandatory)			
Implement a Water Conservation Rate Structure	Existing	N/A	Already in place
WUE Information on the City's Website	Existing	N/A	Already in place
Customer Notification of Possible Leak	Existing	N/A	City notifies customers based on unusual meter readings
Two Additional Measures to be Selected by City Staff and/or Council			
Additional WUE Information Handouts	Potential	$150	Estimated cost for materials and postage
Consumption History on Customer Water Bills*	Potential	N/A	Would be part of new Utility Billing Program that the City is looking to obtain
Notification of the Annual Top 15 Water Users	Potential	$50	Estimated cost for materials and postage
New Customer Water System Informational Packets*	Potential	$25	Estimated cost for materials and printing
WUE Educational Display Board(s)	Potential	$100	Estimated cost for materials

** – Recommended by City's Public Works Committee on October 27, 2014*



NOTICE OF PUBLIC HEARING
Water Use Efficiency Goal Setting

NOTICE IS HEREBY GIVEN that a public hearing will be held on Monday, November 24, 2014 at 7:00 p.m. or soon thereafter at a regular meeting of the City Council of the City of Dayton to receive comment and testimony regarding water use efficiency goal setting for the City of Dayton, Washington, pursuant to WAC 246-290-830. Said public hearing will be held at Dayton City Hall, 111 S. 1st Street, Dayton, WA.

You may submit written testimony/comments and/or questions to Public Works Department, Jim Costello, 111 S. 1st Street, Dayton, WA 99328. Written testimony/comments to be considered by the City Council at the said public hearing must be submitted before 4:00 pm, on November 24, 2014.

Materials supporting the rationale for the City of Dayton's proposed water efficiency goals, pursuant to WAC 246-290-830(4)(d)(i - iv), are available at Dayton City Hall, 111 S. 1st Street, Dayton, WA, (509) 382-2361 or at www.daytonwa.com.

Dated this 6th day of November, 2014.

City of Dayton

The Times
November 13, 20, 2014
11-13-g

Proof of Publication

The Times Case No. 2012093526

STATE OF WASHINGTON,)
) ss.
County of Walla Walla)

Kenneth S. Graham, being first duly sworn on oath, deposes and says: That he is the Publisher of The Times, a weekly newspaper which has been established, published in the English language, and circulated continuously as a weekly newspaper in the City of Waitsburg, and in said County and State, and of general circulation in said County for more than six (6) months prior to the date of the first publication of the Notice hereto attached.

That said newspaper is the official newspaper of the City of Waitsburg and the County of Walla Walla.

That The Times was, on the 14th day of June, 1955, approved as a legal newspaper by the Superior Court of said Walla Walla County, and that the annexed is a true copy of a

Public Notice- 11-13-g
NOTICE OF PUBLIC HEARING

as it appeared in the regular and entire issue of said newspaper itself and not in a supplement thereof for a period of 2 weeks, commencing on the 13th day of November, 2014 and ending on the 20th day of November 2014, and that said newspaper was regularly distributed to its subscribers during all of this period.

That the full amount is **$62.30** at the rate of $6.95 per column inch.

, Publisher

Subscribed and sworn to before me this
13th day of November, 2014

Notary Public in and for the State of Washington,
Residing at Waitsburg, Washington 99361

NOTICE OF PUBLIC HEARING
Water Use Efficiency Goal Setting

NOTICE IS HEREBY GIVEN that a public hearing will be held on **Monday, November 24, 2014 at 7:00 p.m.** or soon thereafter at a regular meeting of the City Council of the City of Dayton to receive comment and testimony regarding water use efficiency goal setting for the City of Dayton, Washington, pursuant to WAC 246-290-830. Said public hearing will be held at **Dayton City Hall, 111 S. 1st Street, Dayton, WA.**

You may submit written testimony/comments and/or questions to Public Works Department, Jim Costello, 111 S. 1st Street, Dayton, WA 99328. Written testimony/comments to be considered by the City Council at the said public hearing must be submitted **before 4:00 pm, on November 24, 2014**.

Materials supporting the rationale for the City of Dayton's proposed water efficiency goals, pursuant to WAC 246-290-830(4)(d)(i - iv), are available at Dayton City Hall, 111 S. 1st Street, Dayton, WA, (509) 382-2361 or at www.daytonwa.com.

Dated this 6th day of November, 2014.

City of Dayton
Published: November 13 and 20, 2014, *The Times*

DAYTON CITY COUNCIL
111 S. 1st Street, Dayton, WA 99328

PRELIMINARY AGENDA
REGULAR MEETING
Monday, November 24, 2014
7:00 p.m.
Craig George, Mayor

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1. **CALL TO ORDER**
   - A. Roll Call
2. **CONSENT AGENDA - Action**
   - A. City Council Minutes for October 27, 2014, and October 29, 2014
   - B. City Council Minutes for November 10, 2014 - Table
   - C. Claims Vouchers as audited by Finance Committee
   - D. Payroll Warrants for November 15, 2014
3. **SPECIAL GUESTS AND PUBLIC COMMENT**
   - A. Public Hearing - Receive public comment/ input on the City's Water Use Efficiency Goal Setting
   - B. Public Hearing - Receive public comment/ input on the Final Budget for 2015
4. **COMMITTEE/BOARD/COMMISSION REPORTS**
5. **REPORTS OF CITY OFFICERS**
6. **UNFINISHED BUSINESS**
   - A. Consideration of 2014 Comprehensive Plan Amendments - Karen Scharer, Planning Director
7. **NEW BUSINESS**
8. **FINAL PUBLIC COMMENT**
9. **ADJOURN**

DAYTON CITY COUNCIL MINUTES
Regular Meeting
Monday, November 24, 2014
112 S. 1st Street
Dayton, WA 99328

1. CALL TO ORDER: Mayor Pro-Tem Delphine Bailey calls the meeting to order at approximately 7:00 p.m.

Roll Call:	Present – Michael Paris, Kathy Berg, Christine Broughton, Byron Kaczmarski, Art Hall Absent – Craig George (excused), Dain Nysoe (excused)
Public:	Michael Haight, Jim Kime, Dave Jepsen, Rick Turner
Staff:	Planning Director Karen Scharer, Public Works Director Jim Costello, City Clerk-Treasurer Trina Cole

2. CONSENT AGENDA:

Action: Hall makes a motion, Broughton seconds the motion, the motion carries unanimously, to approve the Consent Agenda as presented: A) Regular City Council Minutes of October 27, 2014 and Special City Council Meeting Minutes October 29, 2014; B) Table November 10, 2014 City Council Meeting Minutes; Claims Voucher Nos. 39409-39410, as audited by the Finance Committee totaling $16,932.50; C) November 13, 2014 Payroll Warrant Nos. 36315 - 36338 totaling $30,277.44.

3. SPECIAL GUESTS/PUBLIC COMMENT

Bailey closes the regular meeting at 7:03 p.m. and opens the public hearing to receive public input on the City's Water Use Efficiency Goal Setting. There is no public comment. The public hearing is closed at 7:04 p.m. and the regular meeting is re-opened at 7:04 p.m.

Fire Chief Rick Turner, Fire District 3, reports on the District's 2014 activities including its Station Relocation Project, the purchase of a new ambulance, work on a pre-fire plan for downtown businesses, hiring additional personnel, statistics for ambulance services inside/outside city limits and firefighting statistics for inside/outside city limits and the number of fire hydrant upgrades planned for 2015.

4. COMMITTEE/BOARD/ COMMISSIONER REPORTS

Public Safety – There is no report.
Public Works – There is no report.
Finance – George reports that there is a 2015 Budget Workshop scheduled for October 29, 2014 at 5:15 p.m.

Parks/Public Grounds – There is no report.
Planning/Economic Development – There is no report.
Personnel – Paris reports that the Personnel Committee is discussing the replacement of the Assistant Public Works Director position due to the retirement of Sal Benavides effective December 26.
Emergency Management – There is no report.
SEWEDA – There is no report.
Chamber of Commerce – There is no report.

Commissioners – There is no report.

5. REPORTS OF CITY OFFICIALS

Sheriff – There is no reports.

Public Works – Costello introduces Dave Jepsen, Anderson Perry & Associates, Inc. Mr. Jepsen summarizes the process for setting Water Use Efficiency Goals as part of the Water System Plan Update and the goals that of which include: 1) Distribution System Leakage (DSL) of less than 10 percent by the Year 2020 (supply side goal); and 2) One percent reduction in Average Daily Demand (ADD) from current 2014 values by the Year 2020 (demand side goal).

City Clerk/Treasurer – Cole reports that the RFP for a new integrated municipal finance software has been distributed.

Planning Director – Scharer reports on attendance at a Liquor Control Board meeting in Waitsburg.

City Attorney - There is no report.

Mayor Pro-Tempore – There is no report.

Mayor – There is no report.

6. UNFINISHED BUSINESS

Action: Council considers approving the list of 2014 Comprehensive Plan Amendments to be included in the annual Comp Plan update. Paris makes a motion to approve the list of 2014 Comp Plan Amendments as presented. Berg seconds the motion. Michael Paris, Kathy Berg, Christine Broughton, Byron Kaczmarski, Art Hall vote in favor. Bailey abstains. The motion carries.

7. NEW BUSINESS

There is no new business.

8. FINAL PUBLIC COMMENT

There is no final comment.

9. ADJOURN

With no further business to come before the Council, the regular meeting is adjourned 7:53 p.m.

Craig George

Craig George, Mayor

ATTEST:

Trina Cole

Trina Cole, City Clerk-Treasurer

Approved:

December 15, 2014

Date

DAYTON CITY COUNCIL MINUTES
Regular Meeting
Monday, December 15, 2014
112 S. 1st Street
Dayton, WA 99328

1. CALL TO ORDER: Mayor Craig George calls the meeting to order at approximately 7:00 p.m.

Roll Call: Present – Michael Paris, Kathy Berg, Dain Nysoe, Christine Broughton, Byron Kaczmarski, Art Hall

Staff: Sal Benavides, Assistant Public Works Director; Karen Scharer, Planning Director; James Costello, Public Works Director; Deb Hays, Deputy City Clerk; Columbia County Sheriff Rocky Miller; City Clerk-Treasurer Trina Cole

2. CONSENT AGENDA:

Action: Bailey makes a motion, Hall seconds the motion, and the motion carries unanimously to approve the Consent Agenda as presented: A) City Council Meeting Minutes of November 10, 2014, November 24, 2014 and December 1, 2014; B) Claims Voucher Nos. 39457 - 39487, as audited by the Finance Committee totaling $23,035.46.

3. SPECIAL GUESTS/PUBLIC COMMENT

There are no special guests or public comment.

4. COMMITTEE/BOARD/ COMMISSIONER REPORTS

Public Safety – There is no report.

Public Works – There is no report.

Finance – There is no report.

Parks/Public Grounds – There is no report.

Planning/Economic Development – There is no report.

Personnel – There is no report.

Emergency Management – There is no report.

SEWEDA – There is no report.

Chamber of Commerce – Berg reports that the Dayton Chamber of Commerce has updated its website.

Commissioners – There is no report.

5. REPORTS OF CITY OFFICIALS

Sheriff – Miller reports that several arrests have been made and is currently updating the Sheriff's website.

Public Works – There is no report.

City Clerk/Treasurer – There is no report.

Planning Director – Scharer reports that a public hearing will be held December 16, 2014 to receive public comment on the proposed 2014 Comp Plan Amendments and there are opening on the Planning Commission and Dayton Historic Preservation Commission.

City Attorney - There is no report.

Mayor Pro-Tempore – There is no report.

Mayor – There is no report.

6. UNFINISHED BUSINESS

Action: Council considers Resolution No. 1255, a Resolution of the City of Dayton, Washington, setting the City of Dayton's Water Use Efficiency Goals Pursuant to Chapter 246-290 WAC. Hall makes a motion to approve Resolution No. 1255. Nysoe seconds the motion. There is no discussion. Motion carries unanimously.

Action: Council considers Ordinance No. 1872, and ordinance of the City of Dayton, Washington Amending Title 1, Chapter 2 of the Dayton Municipal Code, Establishing the Date, Time and Place of City of Dayton City Council Meetings. Bailey makes a motion to approve Ordinance No. 1872. Broughton seconds the motion. There is no discussion. The motion carries unanimously.

7. NEW BUSINESS

There is no new business.

8. FINAL PUBLIC COMMENT

The Mayor, City Council and Staff thank Sal Benavides for his year of service. Mayor George presents a Plaque of Recognition for his 28 plus years serving the community of Dayton. Mr. Benavides thanks Mayor, City Council and Staff for their support through the years.

9. ADJOURN

With no further business to come before the Council, the regular meeting is adjourned 7:53 p.m.

Craig George, Mayor

Authenticated by:

Trina Cole

Trina Cole, City Clerk-Treasurer

Approved:

Date 1/12/2015

CERTIFICATE RECORD No. 1 PAGE No. 31-D UNDER DECLARATION OF CLAIM No. 51

STATE OF WASHINGTON, COUNTY OF Columbia

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and the rules and regulations of the State Supervisor of Hydraulics thereunder.

THIS IS TO CERTIFY That CITY OF DAYTON of Dayton, Washington has filed in the office of the State Supervisor of Hydraulics of Washington Declaration of Claim No. 51 to withdraw ground waters of the State from a Deep turbine pump well, located within Lot 2, Block A of Humes Addition, Dayton, Washington

for the purpose of Municipal and industrial supply

The right to the use of said ground waters has been sustained and approved by the Supervisor of Hydraulics in accordance with Chapter 263, Laws of Washington for 1945, and is hereby entered of record in Volume 1 *of Ground Water Certificates at page* 31-D*; the right approved has a priority of* April 1936*; the amount of water which the Declarant is entitled to withdraw for the aforesaid purpose is limited to the amount actually beneficially used and shall not exceed* 700 *gallons per minute;* 1130 *acre-feet per year; and is appurtenant to the following described lands or place of use:*

City of Dayton, Columbia County, Washington

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 12th *day of* March, 1948

DRAWER 2 U FRAME 6 0 6

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

THIS CERTIFICATE SUPERSEDES GROUND WATER DECLARATION CERTIFICATE NO. 31-D ISSUED MARCH 12, 1946

CERTIFICATE OF WATER RIGHT

☐ Surface Water (issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
April 1936			31-D

NAME
CITY OF DAYTON

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
111 South First Street	Dayton	Washington	99328

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
three (3) wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	700	1130

QUANTITY, TYPE OF USE, PERIOD OF USE
700 gallons per minute, 1130 acre feet per year, continuously, for municipal and industrial supply.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL
#1) Lot 2, Bloc A, Humes Addition, within the SE¼NE¼ of Sec. 30; #2) 1550 feet South and 1150 feet from the Northwest corner of Sec. 32, within the NE¼NE¼SW¼NW¼ of Sec. 32; #3) Lots 14 & 15, Block 10, Days Railroad Addition, within the SW¼NW¼ of Sec. 30.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
ALL WITHIN	---	10	39 E	32	Columbia

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Dayton.

FILED FOR RECORD
AUG 2 6 1993
at 10:45 AM.
COLUMBIA COUNTY AUDITOR
DAYTON, WASHINGTON

FILE NO. 4926

PROVISIONS

This superseding certificate adds two (2) points of withdrawal as provided by Chapter 90.03.380 and 90.44.020 RCW and supersedes Ground Water Declaration Certificate No. 31-D dated March 12, 1946.

T[illegible]otal amount of water withdrawn and used for municipal supply from Well Nos. 2 and 3 under this authorization and Ground Water Certificate No. G3-26587C shall not exceed 2700 gallons per minute, 3630 acre feet per eyar, less that amount, up to 700 gallons per minute and 1130 acre feet per year, withdrawn from Well No. 1.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 and/or WAC 508-64-020 through WAC 508-64-040.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Spokane, Washington,

this 25th day of August, 1993.

Department of Ecology

by
GARY E. HANSON, Section Supervisor

ENGINEERING DATA
OK

FOR COUNTY USE ONLY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
July 1, 1980	G3-26587	G3-26587P	G3-26587C

NAME
CITY OF DAYTON

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
111 South First	Dayton	Washington	99328

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
two (2) wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	2000	2500

QUANTITY, TYPE OF USE, PERIOD OF USE
2000 gallons per minute, 2500 acre feet per year, continuously, for municipal use.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
Well No. 2) 1550 feet south and 1150 feet east from the NW corner of Sec. 32

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼NE¼SW¼NW¼	32	10	39 E.	32	Columbia

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
Well #1) Lot 14 & 15	10	Days Railroad Addition - Sec. 30

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the City of Dayton.

2000 gallons per minute, 2500 acre feet per year for continuous municipal water supply, less all that water withdrawn under Touchet River Adjudication Certificate No. 10 and Ground Water Certificate No. 3566.

The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required.

This authorization to make use of public waters of the state is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise.

Maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An airline and gage may be installed in addition to the access port.

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Spokane *Washington, this* 29th *day of* June *, 19*83

DONALD W. MOOS, Director
Department of Ecology

ENGINEERING DATA
OK. HEF

by John L. Arnquist
JOHN L. ARNQUIST, Regional Manager

FOR COUNTY USE ONLY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
July 1, 1980	G3-26587	G3-26587P	G3-26587C

NAME
Dayton, City of

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
111 S First	Dayton	Washington	99328

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Three (3) wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	2,000	2,500

QUANTITY, TYPE OF USE, PERIOD OF USE

2,000 gallons per minute, 2,500 acre-feet per year for continuous municipal supply.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL

1). (Added well) Lot 2, Block A, Humes Addition (SE¼ NE ¼), Section 30 (1920' South and 620' West of the NE corner of Section 30.
2). 1,550 feet south and 1,150 feet east from the NW corner of Section 32 (NE¼ NE ¼ SW ¼ NW¼), Section 32.
3). Lot's 14 & 15, Block 10, Days Railroad Addition (SW ¼ NW ¼), Section 30 (2460' South and 435' East of the NW corner of Section 30.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
ALL WITHIN		10	39 E.	32	Columbia

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the City of Dayton

DESCRIPTION OF PROPOSED WORKS

Three (3) wells, pumps, distribution lines.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
STARTED	COMPLETED	October 1, 2022

REPORT

BACKGROUND

Application: An application for change was submitted by the City of Dayton to the Department of Ecology on November 1, 1996. The application was accepted and processed. The applicant proposes to add a point of withdrawal to Ground Water Certificate No. G3-26587C. The well to be added is actually the oldest of the three (3) city wells, but it had not been included before.

Notice: A notice of application was duly published in accordance with RCW 90.03.280 in the Dayton Chronicle on February 6th and 12th, 1997. No protest letters were submitted.

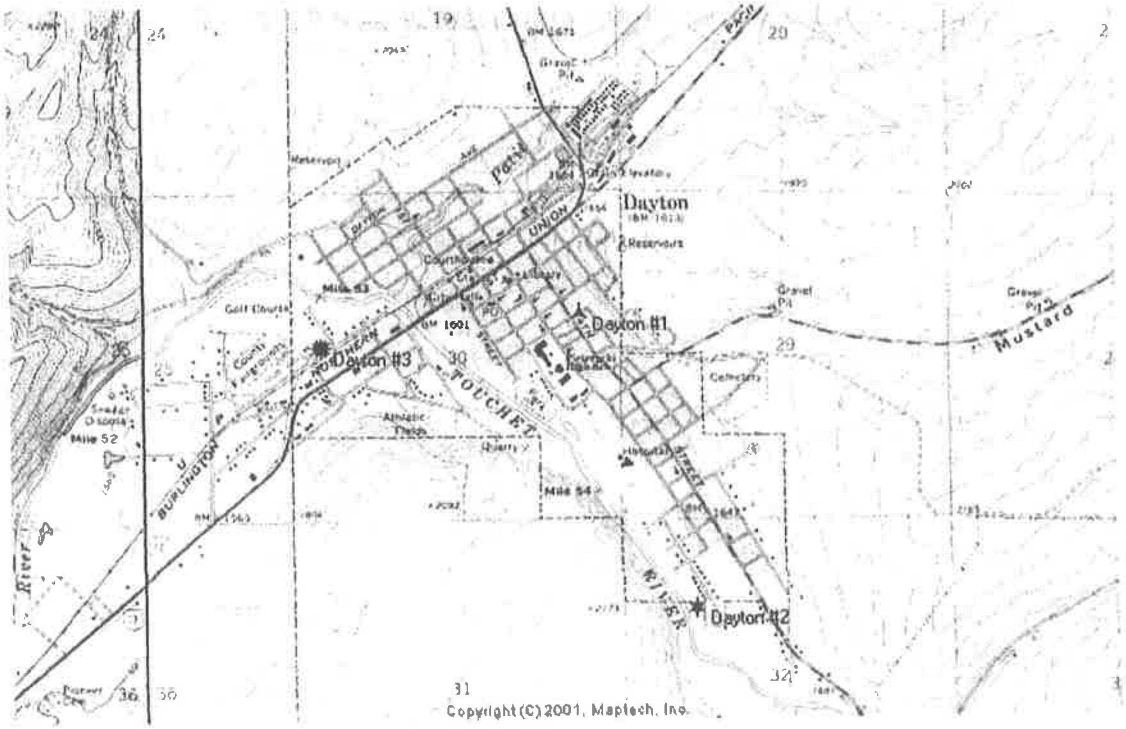
SEPA: This application was determined to be categorically exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW, on December 31, 1996.

INVESTIGATION

In considering the proposed change, the investigation included, but was not limited to, research and review of (1) appropriate rules and statutes; (2) Certificate of Ground Water Right No. G3-26587C, and other water rights/claims/applications in the vicinity of the subject property; (3) water well reports for the subject wells, and other wells in the vicinity; (4) USGS topographic maps and Farm Services Administration (FSA) maps and records; (5) water use records; and (6) analysis by staff hydrogeologists; A site visit was conducted by Lynn Maser of Ecology with Jim Costello on December 6, 2001.

Project Description

The three (3) Dayton city wells have been in use for decades. All three (3) are now covered under Ground Water Right No. 31-D after a superceding certificate was issued for that right to add the two (2) newer wells. This change is intended to add the oldest well (#1) to G3-26587C (which already covers the two newer wells), so that both of the city's main water rights reflect the fact that the city uses three (3) inter-tied wells.



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Existing Water Rights/Claims

The subject water right for this application issued as follows:

Certificate of Ground Water Right No. G3-26587C

Priority Date:	July 1, 1980
Qi:	2,000 gallons per minute
Qa:	2,500 acre-feet per year
Purpose:	Municipal supply
Source:	Two wells: 1). (now referred to as #3) Lot 14 & 15, Block 10, Days Railroad Addition (SW ¼ NW ¼), Section 30; 2). 1,550 feet south and 1,150 feet east from the NW corner of Section 32 (NE¼ NE ¼ SW ¼ NW¼), Section 32; all within T. 10 N., R. 39 E.W.M.
Place of Use:	Area served by City of Dayton.

Other Existing Water Rights

Ground water right No. 31-D, as noted, is the other main city water right. The superceding certificate is for the same three (3) wells, 700 gpm, and 1,130 acre feet per year for the area served by the city.

The city had another water right application, G3-28878, for the same three (3) wells but it was determined that that application was unnecessary and it was ultimately rejected.

The City of Dayton also enjoys Surface Water Certificate No. 261, which is for Five (5) cfs, continuously, for fish propagation. That right was originally for a sawmill pond and was in the name of Scott, but was changed in 1996 to reflect the current usage for fishing ponds in a town park.

The City of Dayton is the name of record on Surface Water Right No. 2189, which is for 0.93 cfs for "elevating and cooling purposes by Blue Mountain Canneries, Inc." That right may be now exercised by Seneca Inc. for the local cannery. There is also a sizable (700 gpm) ground water right on record for the cannery, which is No. 54-D.

The Dayton School District has a current permit (G3-29424P) for a newer well for non-agricultural irrigation of recreation fields just west of the Touchet River in town. The permit is for 80 gpm, 21 acre-feet, and irrigation of 6 acres.

The City also had two (2) old rights for two (2) separate infiltration trenches. Touchet River Adjudicated Surface Water Certificate No. 10 was for 1.55 cfs from a trench or the river, and Ground Water Right No. 3566 was for a trench/sump in the amount of 278 gpm, 214 acre-feet. Neither of these rights has been exercised in recent memory and been intentionally abandoned by the city. In 1996-1997 the City apparently signed voluntary relinquishment forms to formalize the fact that these rights were no longer used. Unfortunately, those forms could not be found, so voluntary relinquishment forms were mailed to the city, so that the fact that these rights are no longer used can be formalized in writing.

Vol Rel
Cert No. 10
1/02

Area Hydrology

The following geologic and ground water availability information is taken from a report prepared by Mr. Ruben C. Newcomb, Engineering Geologist and is published as an appendix to the Water System Study for the City of Dayton, Washington by Anderson, Perry and Associates.

"The Dayton area is part of the vast Columbia Plateaus and is underlain by layered lava bedrock known as the Columbia River Basalt. Alluvial gravels, a few tens of feet thick, underlie the valley plains, and loessial soils mantle these gravels as well as the basalt bedrock of the uplands and the canyon sides.

The basalt bedrock consists of accordantly layered 30 to 100-foot thick lava flows lying one above the other to a total thickness of several thousand feet. The top part of some of the individual lava flows is porous and rubbly and transmits ground water. These permeable stratigraphic zones allow the ground water to move horizontally or down the inclination of the layering. The regional movement of the ground water is northwestward from the upwarped arch of the Blue Mountain toward lower levels and outflows in the canyons adjacent to the Snake River and the lower part of the Touchet River Valley. In the Dayton area the pressure level of the confined water in basalt is about 400 feet below the surface and that general pressure level appears to have been maintained despite the pumpage from the two (2) deep wells during the last 40 years. However, no data on the static water level in the wells have been systematically maintained.

In places the alluvial gravel beneath the valley plains contains unconfined ground water which is perched far above the regional pressure level of the basalt ground water, as is the Touchet River in much of its course throughout this part of its valley. The local areas of saturation in the shallow gravel are amenable to spot withdrawals for small irrigation supplies but are generally unsuitable for municipal supplies.

The basalt commonly yields water to wells at an average of 1 gallon per minute per foot of depth that the well penetrates below the water pressure level. This average is based on a minimum diameter of 10 or 12-inches, at least 300 feet of penetration and a pumping depression of the water level by 1,200 feet. The city well No. 1 and the Blue Mountain Cannery well produce at about this average yield."

Evaluation of Certificate No. G3-26587C

While the Superior Court, through an adjudicative process, is the only authority that can make a final determination as to a water right's extent, validity and priority, Ecology can make a tentative determination of these factors for purposes of making decisions on change applications.

Certificate of Ground Water Certificate No. G3-26587C originally authorized the withdrawal of water from two (2) wells in the amount of 2,000 gallons per minute, 2,500 acre-feet per year, for municipal use.

The quantities of water issued through the original change, being 2,000 gallons per minute, 2,500 acre-feet per year, for municipal use, can still be considered as valid for purposes of this change, although they may be reduced at the proof of appropriation stage to those quantities actually perfected.

Assessment of the Proposed Changes

All three (3) wells withdraw water from the same body of public ground water, the basalt aquifer. Well #1 was drilled in 1952 to a depth of about 1,300', with no static water level information available. Well #2 was drilled in 1981 to a depth of 1,445 feet and had a static water level of 613'. Well #3 was also drilled in 1981 and was 1,180 feet deep and had a static water level of 541'. Current water level measurements have been requested for two (2) of the wells, but well #1 does not currently have an airline or way of measuring the static water level.

FINDINGS

Applications for change of ground water rights permits and certificates are governed by RCW 90.44.100, which states in part that: the holder of a valid right to withdraw public ground waters may, without losing priority of right, construct wells at a new location in substitution for, or in addition to, those at the original location, or he may change the manner or place of use of water. Such amendment shall be issued by the Department only on the conditions that:

- The change must not cause detriment or injury to existing rights;
- The change must not be detrimental to the public welfare;
- The change shall not allow for the enhancement of the right perfected under the original certificate; and
- All new points of withdrawal must tap the same body of public ground water as authorized under the original certificate.
- A valid right exists which is eligible for the proposed change

No Impairment to Existing Rights:

The proposed change has been evaluated as to the potential for impairment to existing water rights in the area. Well #1 has been in use since 1952, so there will actually be no change in water usage.

No Detriment to the Public Welfare:

There are no findings in this investigation to indicate that there would be any detrimental impact to the public welfare through issuance of the proposed change.

No Enhancement of the Original Certificate:

No withdrawal of water over and above what has been historically put to beneficial use would be authorized through approval of this change. Likewise, approval of this change does not change the quantity limits specified in the water right(s).

Under this authorization (G3-26587C), and Ground Water Certificate No. 31-D the combined totals shall not exceed 2,700 gallons per minute, 3,630 acre feet per year from the three (3) wells. In Dayton, on high demand days when all three (3) wells are pumping the system could be at the instantaneous limit, because the wells have pumping capacities of (1) 1,100 gpm, (2) 600 gpm, and (3) 1,100 gpm. The authorization, again, is for only 2,700 gpm. In terms of acre feet, the overall annual quantity pumped, the city's new water system plan has figures (996,000 gallons per day average) that indicate that the city pumped about 1,120 acre feet in 1998. That number includes a fairly high (31%) amount of "lost and unaccounted for" water. The city's water system plan has goals for reducing the amount of lost and unaccounted for water over the next twenty years. The plan also has numbers for projected population growth over the same period. So, the population is expected to increase from 1998's 2636 people to 3127 by the year 2020. Meanwhile, the projected demand for water per capita is decreasing because of system improvements. Factoring these things in, the expectation is that by the year 2020 the average daily demand for water will be up to 1,084,420 from 1998's 996,408 gallons per day. This modest increase suggests that the City will still be well below the annual acre-feet amounts specified in these two water rights. Consequently, the acre-feet may be reduced at the proof of appropriation stage to those quantities actually perfected.

Same body of public ground w[illegible]r:

All three (3) wells are deep wells withdrawing water from the same body of public ground water as the wells authorized for use in the original right.

Validity of water right:

This right has been put to beneficial use, to the extent of 2,000 gpm, for municipal supply, and is eligible to be changed. All three (3) of these wells have been used for municipal supply for decades and have not been abandoned.

CONCLUSION

It is the conclusion of this examiner that, in accordance with RCW 90.44.100, this application for change to add Well No. 1 will not enlarge the right conveyed by the original certificate, nor will it impair existing rights or be detrimental to the public welfare.

RECOMMENDATIONS

The applicant's request to add Well #1 located in the SE¼ NE ¼), Section 30, Township 10 N., Range 39 EWM, is hereby approved, subject to the following provisions:

"The total amount of water withdrawn and used for municipal supply under this authorization, and Ground Water Certificate No. 31-D shall not exceed 2,700 gallons per minute, 3,630 acre feet per year from the three wells."

"The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used."

"This authorization to make use of public waters of the State is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise."

"A superseding certificate of water right will not be issued until a final examination is made."

"Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An airline and gauge may be installed in addition to the access port."

"All water wells constructed within the State shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells)."

"An approved measuring device shall be installed and maintained in accordance with the rule "Requirements for measuring and Reporting Water Use", Chapter 173-173 WAC. Water use data shall be recorded weekly and shall be submitted annually to Ecology by January 31st of each calandar year, 45 days after the end of the irrigation season.

The rule above describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements.

At a minimum, the following information shall be included with each submittal of water use data: owner, contact name if different, mailing address, daytime phone number, WRIA, Permit or Certificate No., source name, annual quantity used including units, maximum rate of diversion including units, and period of use. In the future, Ecology may require additional parameters to be reported or more frequent reporting.

Options: The following are examples of additional conditions or information that might be required. If reporting requirements (Qa or Qi) outlined in WAC 173-173-060 are changed, include a justification for the change. For example, if monthly readings are to be reported, the following language could serve as justification; "Ecology is requiring submittal of monthly meter readings to collect seasonal information for water resource planning, management and compliance.

Use of the water. e.g. irrigation, domestic, frost protection.

Monthly meter readings including units *(e.g. for all surface water in fish critical basins and other ground water or surface water > 1cfs).*

Peak flow including units for each month.

Department of Health WFI water system number and source number if a public water system.

Daily recording.

Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information.

Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions."

"Use of water under this authorization shall be contingent upon the water right holder's utilization of up to date water conservation practices and maintenance of efficient water delivery systems consistent with established regulation requirements and facility capabilities."

"The water quantities and uses recommended and/or the number of acres to be irrigated may be reduced at the time of issuance of a final water right commensurate with the capacity of the installed system and the uses and/or the number of acres actually irrigated."

DATED this 30th day of September, 2002 in Spokane, Washington.

Cindy A. Christian
for Lynn Maser
Water Resources Program – Department of Ecology
Eastern Region - Walla Walla Field Office

LM:kay
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S. P. No. [illegible]

CERTIFICATE RECORD No. 8 PAGE No. 3566-A

STATE OF WASHINGTON, COUNTY OF Columbia

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That CITY OF DAYTON, WASHINGTON has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a sump located within Commercial Avenue between Willow and Cherry Streets; and between Blocks 6 and 11, Days Railroad Addition Sec. 30, Twp. 10 N., R. 39 E., W. M. for the purpose of municipal supply under and subject to provisions contained in Ground Water Permit No. 5092 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 8 at page 3566-A; that the right hereby confirmed dates from July 21, 1959; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 278 gallons per minute; 214.2 acre-feet per year for municipal supply.

A description of the lands to which such ground water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

City of Dayton, Columbia County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 26th day of February, 1960.

[illegible]

Sh

M. G. Walker

State Supervisor of Water Resources.

Department of Ecology
Eastern Regional Office
Water Resources Program
4601 North Monroe
Spokane, WA 99205-1295

yoce

Document Title: Voluntary Relinquishment of Certificate of Record of Touchet River Adjudicated Surface Water Certificate No. 10

Agency: Department of Ecology
Eastern Regional Office
4601 North Monroe
Spokane, WA 99205-1295

Applicant: City of Dayton
111 South First
Dayton, WA 99328

LEGAL DESCRIPTION

¼¼	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
				32	Columbia

PARCEL # N/A

Relinquishment of
Certificate Record of Touchet River Adjudicated Surface Water Certificate No. 10
State of Washington, County of Columbia
Certificate of Surface Water Right

1. The undersigned, City of Dayton, is the holder of Touchet River Adjudicated Surface Water Certificate No. 10, dated December 6, 1930, issued by the Department of Ecology or one of its predecessor agencies.

2. Said Certificate authorizes diversion of public waters of the State of Washington from the Touchet River (infiltration trench & well) in the amount of 1.55 cubic feet per second at a point in the SW¼SW¼ of Section 2, Township 9 N., Range 39 E.W.M., for use of municipal supply in the area served by the City of Dayton.

3. The authorized place of use for this right is the Area Served by the City of Dayton. The undersigned has signatory authority for the City of Dayton.

4. The Undersigned has no further requirement(s) for the rights to divert, utilize and put to beneficial use the waters embodied in said Certificate.

5. The Undersigned has not assigned or otherwise transferred their interest in the rights embodied in said Certificate.

6. The Undersigned therefore quitclaims and relinquishes all rights embodied in said Touchet River Adjudicated Surface Water Right Certificate No. 10 to the State of Washington.

7. This document shall be recorded by the State of Washington in Columbia County wherein the lands affected by said right are located.

Dated this 10th day of January, 2002.

City of Dayton
Certificate Holder

State of Washington)
)
County of Columbia)

On this day personally appeared before me James S Costello, to me known to be the individual(s) described in and who executed the within and foregoing instrument, and acknowledged that (he) (she) (they) signed the same as (his) (her) (their) free and voluntary act and deed, for the uses and purposes therein mentioned.

Given under my hand and official seal this 29th day of January, 2002.

Dana M. Martin
Notary Public in and for the State of Washington

Residing in Dayton Washington

DANA M. MARTIN
8-17-02

ENGINEERING DATA
OK cac

LM:mjw

APPENDIX F

Wellhead Protection Plan

(shown as Appendix R of
Dayton's 2001 Water System Plan)

APPENDIX R

DAYTON WELLHEAD PROTECTION PLAN

This appendix presents the Wellhead Protection Plan for the city of Dayton in compliance with the requirements of WAC 246-290-135.

WELLHEAD PROTECTION AREA (WHPA) DELINEATIONS

DEFINITION OF A WELLHEAD PROTECTION AREA

A wellhead protection area (WHPA) is defined as the surface and subsurface area surrounding a well that supplies a public water system through which contaminants are likely to pass and eventually reach the well (DOH, 1995). In Washington, WHPAs are based on time-of-travel criteria, or the theoretical distance a particle of water travels in a proscribed period of time. At a minimum, the DOH requires communities to look at the following five WHPAs:

- sanitary control area
- 6-month time-of-travel WHPA
- 1-year time-of-travel WHPA
- 5-year time-of-travel WHPA
- 10-year time-of-travel WHPA

A discussion of the WHPAs is provided in the following sections.

Sanitary Control Zone

The sanitary control area is the protective area around the wellhead as required by WAC 246-290-135. According to this statute, the minimum sanitary control area for wells is 100 feet, unless engineering justification supports a smaller area. Conversely, the DOH may require a larger sanitary control area if geological and hydrological data support such a decision.

Time-of-Travel WHPAs

The time-of-travel WHPAs are determined by estimating the travel distance of a hypothetical particle of water traveling through the aquifer to a pumping well for a selected travel time, (e.g., 1 year). The WHPAs define aquifer management regions around the well that can be used to identify and control potential sources of contamination. The management of WHPAs is often done incrementally with the most aggressive management strategies being applied in the 6-month and 1-year WHPAs.

Time-of-travel WHPAs are based on several assumptions. First, time-of-travel criteria do not consider vertical movement of water or contaminants from the land surface to the screened interval of the well. Therefore, time-of-travel zones tend to be inherently conservative. Also, it is assumed that contaminants move at the same rate as water in the subsurface, where actual contaminants may move slower or faster than water. This assumption is also typically conservative because the soil matrix, biological process, and chemical processes tend to retard the transport of contaminants in the subsurface.

Time-of-travel criteria may not be applicable in every situation. The DOH note that in some areas of the state, time-of-travel criteria may not be appropriate if the capture zone is recharged in less than 10 years, if complicated geographic features are present, or if a significant contribution to the well is from a nearby surface source. In these settings, alternate WHPA delineation criteria may be used with DOH approval. Because the City of Dayton's wells do not meet these conditions, time-of-travel criteria are appropriate. A discussion of the 6-month, 1-year, 5-year, and 10-year time-of-travel zones is provided in the following sections.

6-Month Time-of-Travel Zone

The six-month time-of-travel zone represents the surface area overlying the portion of aquifer supplying water to the well within a six-month period. Aggressive management strategies are recommended in the six-month time-of-travel zone because of the limited time a purveyor can respond to contamination in this zone. The six-month time-of-travel zone is vulnerable to both microbial and chemical contamination. EPA literature suggests that bacteria and viruses survive less than one year in groundwater, so potential sources of microbial contamination should be monitored carefully. Similarly, limited response times for mitigation actions following chemical contamination require aggressive control of potential sources of chemical contamination within this zone.

1-Year Time-of-Travel Zone

The one-year time-of-travel zone represents the surface area overlying the portion of aquifer supplying water to the well within a one-year period. As in the six month time-of-travel zone, the susceptibility of the one-year time-of-travel zone to both microbial and chemical contamination requires aggressive controls of potential contamination sources.

5-Year Time-of-Travel Zone

The five-year time-of-travel zone represents the surface area overlying the portion of aquifer supplying water to the well within a five-year period. Microbial contamination in the five-year time-of-travel zone is not a major concern, because existing literature suggests that bacteria and viruses cannot survive for more than one year in groundwater. However, chemical contamination is a concern and potential sources of chemical contamination should be monitored closely. The primary difference between the five-year time-of-travel zone and the zones closer to the well is that the five-year zone provides an increased response time to mitigate the effects of chemical releases.

10-Year Time-of-Travel Zone

The ten-year time-of-travel zone represents the surface area overlying the portion of aquifer supplying water to the well within a ten-year period. The purpose of the ten-year zone is to control high risk chemical contamination sources, and to encourage long-term planning for contaminant risk reduction. Public education of contamination prevention measures is a key management tool used in protecting this zone.

WELLHEAD PROTECTION AREA DELINEATION METHODS

Several methods exist for delineating wellhead protection areas. These methods range in complexity and cost of implementation. Table R-1 summarizes the relative costs and complexity of the common delineation models.

TABLE R-1
Costs and Complexity of Common Delineation Methods

Delineation Method	Relative Cost	Relative Complexity
Calculated Fixed Radius Model	Low	Low
Analytical Model	High	Medium
Numerical Model	High	High

A discussion of the delineation methods evaluated for the purposes of this plan is presented in the following sections.

Calculated Fixed Radius Model (CFR)

The CFR model is a simple volumetric flow model used to calculate WHPAs based on time-of-travel criteria. This method involves drawing a circular boundary around a well for a specified time-of-travel (i.e., 1-year). This delineation method is a required element of DOH susceptibility assessments and is calculated by using the following equation:

$Qt = n\pi Hr^2$, where

Q = Pumping rate of the well in ft^3/year
n = Aquifer porosity (assumed to be 0.22 if no other information is available)
H = Screened or open interval of the well in feet
t = Time-of travel selected in years (i.e., 1-Year, 5-Years, etc.)
r = CFR radius of the WHPA in feet

This equation is solved for the radius of the WHPA, which defines a circular time-of-travel zone around the well extended vertically through the aquifer. The CFR denotes a cylinder with a soil matrix pore volume equal to the volume of water pumped during the selected time of travel.

Analytical Model

Analytical models make use of established groundwater flow equations to provide a more accurate delineation of WHPAs. Dozens of equations have been developed for differing hydrogeologic settings and conditions, most of which are based on time-of-travel criteria. Analytical models require more information about hydrogeological conditions than the CFR method, but tend to be more accurate. WHPAs delineated with analytical models tend to be elongated in shape with the majority of the WHPA lying upgradient of the well in the direction of groundwater flow.

Numerical Model

Numerical models are generally accepted as the superior method for the delineation of WHPAs. Numerical models require a significant amount of field information and are based on the formation of a grid that simulates the aquifer in question. At each node in the grid, data on water surface elevation, hydraulic conductivity, and aquifer thickness are input. These data are the input for a matrix of equations that simulate the behavior of the aquifer under varying pumping conditions. These models can be either two-dimensional or three-dimensional and are typically used when complex geologic features are present.

DETERMINATION OF WHPA DELINEATION METHOD

Following a review of the WHPA delineation methods discussed in the previous sections, it was determined that the CFR method is the simplest, most conservative, and generally the most appropriate wellhead delineation method for the city of Dayton at this time. The City understands that because Well No. 3 has been ranked high in susceptibility that the DOH wellhead protection plan guidance document recommends analytical modeling of the delineation area. *The City will complete an analytical model of the Well No. 3 wellhead protection area in its first biennial update in 2002. The City will continue to evaluate the adequacy of its WHPAs during its biennial updates and will determine if more rigorous delineation methods are appropriate in the future.*

Source Delineations

A summary of the WHPA radii and areas for each of the sources is provided in Table R-2. Because Well No. 1 is an emergency well, the City is not required to include it in wellhead protection planning. However, in preparation for future use of the well, the City has delineated the wellhead protection area for Well No. 1.

TABLE R-2
City of Dayton WHPA Characteristics

Source	CFR (in feet)				Area (in acreage)
	6-Month	1-Year	5-Year	10-Year	10-Year
Well No. 1	510	721	1,612	2,280	375
Well No. 2	587	831	1,858	2,627	498
Well No. 3	727	1029	2,300	3,254	764

INVENTORY OF POTENTIAL SOURCES OF CONTAMINATION

After delineating the wellhead protection areas (WHPAs) associated with the three wells located in the city of Dayton, an inventory of existing and potential sources of groundwater contamination was compiled and mapped. Inventorying potential sources of groundwater contamination provides a comprehensive source of information about risks from potential sources of contamination.

DATA COLLECTION METHODOLOGY

In order to facilitate the update of this plan according to the biennial schedule outlined in WAC 246-290-135, existing databases of potential contamination sources were explored. The databases were augmented with a site specific inventory for the city of Dayton WHPAs based on a survey of high risk businesses, septic tanks, and private wells. The following sections provide a discussion of the available data used to form the potential contamination source inventory and maps of the locations of these sources within the Dayton WHPAs.

Available Data and Databases

The DOE maintains an active hazardous materials management program that manages hazardous materials in the entire State and stores data related to hazardous materials spills, transport, storage and cleanup. The following DOE databases are available:

- Businesses which handle substances that require a material safety data sheet and must be reported under the Emergency Planning Community Right-To-Know Act (EPCRA)
- Businesses that treat, transport, store, or dispose of hazardous wastes (HAZMAT)
- Businesses that own and operate underground storage tanks (USTs)
- Sites occupied by leaking underground storage tanks (LUSTs)
- Confirmed or suspected sites of contamination (CSCS)
- State waste cleanup sites
- Voluntary cleanup sites
- Solid waste facilities or landfills

High Risk Businesses

In addition to the available DOE databases of potential contamination sources, a search of high risk businesses was performed based on EPA literature. Table R-3 summarizes types of businesses that may be a risk in WHPAs along with corresponding contaminant types.

TABLE R-3
Potential Sources of Groundwater Contamination (EPA/625/R-93/002)

Source	Contaminants
Naturally Occurring Sources	
Rocks and soils	*Aesthetic Contaminants*: Iron and iron bacteria; manganese; calcium and magnesium (hardness) *Health and Environmental Contaminants:* Arsenic; asbestos; metals; chlorides; fluorides; sulfates; and microorganisms
Contaminated water	Excessive sodium; bacteria; viruses; low pH (acid) water
Decaying organic matter	Bacteria
Geological radioactive gas	Radionuclides (radon, etc.)
Natural hydrogeological events and formations	Salt-water/brackish water intrusion (or intrusion of other poor quality water); contamination through sink-hole infiltration in limestone terrains
Agricultural Sources	
Animal feedlots and burial areas	Livestock sewage wastes; nitrates; phosphates; chloride; chemical sprays and dips for controlling insect, bacterial, viral, and fungal pests on livestock; coliform (4) and non-coliform bacteria; viruses
Manure spreading areas and storage pits	Livestock sewage wastes; nitrates
Livestock waste disposal areas	Livestock sewage wastes; nitrates
Crop areas and irrigation sites	Pesticides (5), fertilizers (6), gasoline, motor oils from chemical applicators
Chemical storage areas and containers	Pesticides (5); fertilizers (6); residues
Farm machinery areas	Automotive wastes (7); welding wastes
Agricultural drainage wells and canals	Pesticides (5), fertilizers (6); bacteria; salt water (in areas where the fresh-saltwater interfaces lies at shallow depth and where the water table is lowered by channelization, pumping, or other causes)
Residential Sources	
Common household maintenance and hobbies	*Common Household Products.* (8) Household cleaners; oven cleaners; drain cleaners; toilet cleaners; disinfectants; metal polishes; jewelry cleaners; shoe polishes; synthetic detergents; bleach; laundry soil and stain removers; spot removers and dry cleaning fluid; solvents; lye or caustic soda; household pesticides (9), photochemicals; printing ink; other common products *Wall and Furniture Treatments:* Paints; varnishes; stains; dyes; wood preservatives (creosote); paint and lacquer thinners; paint and varnish removers and deglossers; paint brush cleaners; floor and furniture strippers *Mechanical Repair and Other Maintenance Products:* Automotive wastes (9); waste oils; diesel fuel; kerosene; #2 heating oil; grease; degreasers for garages; metal degreasers; asphalt/roofing tar; tar removers; lubricants; rustproofers; car wash detergents; car waxes/polishes; rock salt; refrigerants
Lawns and gardens	Fertilizers (5); herbicides and other pesticides used for lawn and garden maintenance (10)
Swimming pools	Swimming pool maintenance chemicals (11)
Septic systems, cesspools, and sewer lines	Septage; coliform and non-coliform bacteria (4); viruses; nitrates; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides (9) (10), paints; paint thinner; photographic chemicals; swimming pool chemicals (11); septic tank/cesspool cleaner chemicals (12); elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate
Underground storage tanks	Home heating oil
Apartments and condominiums	Swimming pool chemicals (11); pesticides for lawn and garden maintenance and cockroach, termite, ant, rodent, and other pest control (9), (10); wastes from onsite sewage treatment plants; household hazardous wastes (8)

TABLE R-3
Potential Sources of Groundwater Contamination (continued)

Source	Contaminants
Municipal Sources	
Schools and government offices and grounds	Solvents; pesticides (9), (10); acids; alkalis; waste oils; machinery/vehicle servicing wastes; gasoline and oil from storage tanks; building wastes (13)
Park lands	Fertilizers (6); herbicides (10); insecticides (9)
Public and residential areas infested with mosquitoes, gypsy moths, ticks, ants, or other pests	Pesticides (5), (9)
Highways, road maintenance depots, and deicing operations	Herbicides in highway rights-of-way (5),(10); road salt (sodium and calcium chloride); road salt anti-caking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anti-corrosives (phosphate and chromate); automotive wastes (7)
Municipal sewage treatment plans and sewer lines	Municipal wastewater; sludge; (14) treatment chemicals (15)
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments	sewage wastewater; nitrates; other liquid wastes; microbiological contaminants
Land areas applied with wastewater or wastewater byproducts	Organic matter; nitrate; inorganic salts; heavy metals; coliform and non-coliform bacteria (4); viruses; nitrates; sludge (14); non-hazardous wastes (16)
Storm water drains and basins	Urban runoff; gasoline; oil; other petroleum products; road salt; microbiological contaminants
Combined sewer overflows (municipal sewers and storm water drains)	Municipal wastewater; sludge (14); treatment chemicals (15); urban runoff; gasoline; oil; other petroleum products; road salt; microbial contaminants
Recycling/reduction facilities	residential and commercial solid waste residues
Municipal waste landfills	Leachate; organic and inorganic chemical contaminants; waste from households (8) and businesses (13); nitrates; oils; metals
Open dumping and burning sites, closed dumps	Organic and inorganic chemicals; metals; oils; wastes from households (8) and businesses (13)
Municipal incinerators	Heavy metals; hydrocarbons; formaldehyde; methane; ethane; ethylene; acetylene; sulfur and nitrogen compounds
Water supply wells, monitoring wells, older wells, domestic and livestock wells, unsealed and abandoned wells, and test hole wells	Surface runoff; effluents from barnyards, feedlots, septic tanks, or cesspools; gasoline; used motor oil; road salt
Sumps and dry wells	Storm water runoff; spilled liquids; used oil; antifreeze; gasoline; other petroleum products; road salt; pesticides;(5) and a wide variety of other substances
Drainage wells	Pesticides (9), (10); bacteria
Well pumping that causes interaquifer leakage, induced filtration, landward migration of sea water in coastal areas; etc.	Saltwater; excessively mineralized water
Artificial groundwater	Stormwater runoff; excess irrigation water; stream flow; cooling water; treated sewage effluent; other substances that may contain contaminants, such as nitrates, metals, detergents, synthetic organic compounds, bacteria, and viruses

TABLE R-3
Potential Sources of Groundwater Contamination (continued)

Source	Contaminants
Commercial Sources	
Airports, abandoned airfields	Jet fuels; deicers; diesel fuel; chlorinated solvents; automotive wastes (7); heating oil; building wastes (13)
Auto repair shops	Waste oils; solvents; acids; paints; automotive wastes (7); cutting oils
Barber and beauty shops	Perm solutions; dyes; miscellaneous chemicals contained in hair rinses
Boat yards and marinas	Diesel fuels; oil; septage from boat waste disposal areas; wood preservative and treatment chemicals; paints; waxes; varnishes; automotive wastes (7)
Bowling alleys	Epoxy; urethane-based floor finish
Car dealerships	Automotive wastes (7), waste oils; solvents; miscellaneous wastes
Car washes	Soaps; detergents; waxes; miscellaneous chemicals
Campgrounds	Septage; gasoline; diesel fuel from boats; pesticides for controlling pests (5), (9), household hazardous wastes from recreational vehicles (RVs) (8)
Carpet stores	glues and other adhesives; fuel from storage tanks if forklifts are used
Cemeteries	Leachate; lawn and garden maintenance chemicals (10)
Construction trade areas and materials	Solvents; asbestos; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy waste; miscellaneous chemical wastes
Country clubs	Fertilizers (6); herbicides (5),(10), pesticides for controlling pests (9); swimming pool chemicals (11); automotive wastes
Dry cleaners	Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methylchloroform, ammonia, peroxides, rust removers, etc.)
Funeral services and crematories	Formaldehyde; wetting agents; fumigants; solvents
Furniture repair/finishing shops	Paints; solvents; degreasing and solvent recovery sludges
Gasoline services stations	Oils; solvents; miscellaneous wastes
Golf courses	Fertilizers (6); herbicides (5), (10) pesticides for controlling pests (9)
Hardware/lumber/parts stores	Hazardous chemical products in inventories; heating oil and fork lift fuel from storage tanks; wood-staining and treating products such as creosote
Heating oil companies, USTs	Heating oil; wastes from truck maintenance areas (7)
Horticultural practices, garden nurseries, florists	Herbicides, insecticides, fungicides, and other pesticides (10)
Jewelry/metal plating shops	Sodium and hydrogen cyanide; metallic salts; hydrochloric acid; sulfuric acid;
Laundromats	Detergents; bleaches; fabric dyes
Medical institutions	X-ray developers (17); infectious, radiological, and biological wastes; disinfectants; asbestos; beryllium; dental acids; miscellaneous chemicals
Office buildings	Building wastes (13); lawn/garden maintenance chemicals (10); gasoline; oil
Paint stores	Paints; paint thinners; lacquers; varnishes; other wood treatments
Pharmacies	Spilled and returned products
Photography shops, photo labs	Biosludges; silver sludges; cyanides; miscellaneous sludges
Print shops	Solvents; inks; dyes; oils; photographic chemicals
Railroad tracks and yards	Diesel fuel; herbicides for rights-of-way; creosote for preserving wood ties
Research laboratories	X-ray developers (17); infectious, radiological, and biological wastes; drugs; asbestos; disinfectants; beryllium; solvents; infectious materials; disinfectants
Scrap and junk yards	Any wastes from businesses (13) and households (8); oils
Sports and hobby shops	Gunpowder and ammunition; rocket engine fuel; model airplane glue
Above and underground tanks	Heating oil; diesel fuel; gasoline; petroleum products; commercial chemicals
Transportation services for passenger transit	Waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes (7)
Veterinary services	Solvents; infectious materials; vaccines; drugs; disinfectants (quaternary ammonia, peroxides, bleach); x-ray developers and fixers (17)

TABLE R-3
Potential Sources of Groundwater Contamination (continued)

Source	Contaminants
Industrial Sources (Presently Operated or Torn Down Facilities) (18)	
Asphalt plants	Petroleum derivatives
Communications equipment manufacturers	Nitric, hydrochloric, and sulfuric acid wastes; heavy metal sludges; copper-contaminated etchant (e.g., ammonium persulfate); cutting oil and degreasing solvent (trichloroethane, Freon, or trichloroethylene); waste oils; corrosive soldering flux; paint sludge; waste plating solution
Electric and electronic equipment manufacturers and storage facilities	Cyanides; metal sludges; caustics (chromic acid); solvents; oils; alkalis; acids; paints and paint sludges; calcium fluoride sludges; methylene chloride; perchloroethylene; trichloroethane; acetone; methanol; toluene; PCBs
Electroplaters	Boric, hydrochloric, hydrofluoric, and sulfuric acids; sodium and potassium hydroxide; chromic acid; sodium and hydrogen cyanide; metallic salts
Foundries and metal fabricators	Paint wastes; acids; heavy metals; metal sludges; plating wastes; oils; solvents; explosive wastes
Furniture/fixtures manufacturers	Paints; solvents; degreasing sludges; solvent recovery sludges
Machine and metalworking shops	Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (tetrachlorethylene); metal marking fluids; mold-release agents
Mining operations, underground storage mines	Mine spoils or tailings that often contain metals; acids; highly corrosive mineralized waters; metal sulfides
Unsealed abandoned mines used as waste pits	Metals, acids; minerals; sulfides; other hazardous and nonhazardous chemicals (16)
Paper mills	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals (16), organic sludges; sodium hydroxide; chlorine; hypochlorite; chlorine dioxide; hydrogen peroxide
Petroleum production and storage companies, secondary recovery of petroleum	Hydrocarbons; oil-field brines (highly mineralized salt solutions)
Industrial pipelines	Corrosive fluids; hydrocarbons; other hazardous and nonhazardous material and wastes (16)
Photo processing laboratories	Cyanides; ;Biosludges; silver sludges; miscellaneous sludges
Plastics materials and synthetics producers	Solvents; oils; miscellaneous organics and inorganics (phenols, resins); paint wastes; cyanides; acids; alkalis; wastewater treatment sludges; cellulose esters; surfactant; glycols; phenols; formaldehyde; peroxides; etc.
Primary metal industries (blast furnaces, steel works, rolling mills)	Heavy metal wastewater treatment sludge; pickling liquor; waste oil; acid tar sludge; alkaline cleaners; degreasing solvents; slag; metal dust
Publishers, printers, and allied industries	Solvents; inks; dyes; oils; miscellaneous organics; photographic chemicals
Public utilities (phone, electric power, gas)	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way
Public utilities (phone, electric power, gas)	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way
Sawmills and planers	Treated wood residue (copper quinolate, mercury, sodium bazide); tanner gas; paint sludges; solvents; creosote; coating and gluing wastes
Stone, clay, and glass manufacturers	Solvents; oils and grease; alkalis; acetic wastes; asbestos; heavy metal sludges; phenolic solids or sludges; metal finishing sludge
Welders	Oxygen, acetylene
Wood preserving facilities	wood preservatives; creosote

TABLE R-3
Potential Sources of Groundwater Contamination (continued)

Source	Contaminants
Industrial Sources	
Material stockpiles	Acid drainage; other hazardous and nonhazardous wastes (16)
Waste tailing ponds (commonly for the disposal of mining wastes)	Acids; metals; dissolved solids; radioactive ores; other hazardous and nonhazardous wastes (15)
Transport and transfer stations (trucking terminals and rail yards)	Fuel tanks; repair shop wastes (7), other hazardous and nonhazardous wastes (15)
Above-ground and underground storage tanks and containers	Heating oil; diesel and gasoline fuel; other petroleum products; hazardous and nonhazardous materials and wastes (16)
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments	Hazardous and nonhazardous liquid wastes (16); septage; sludge (14)
Chemical landfills	Leachate; hazardous and nonhazardous wastes (16); nitrates
Radioactive waste disposal sites	Radioactive wastes from medical facilities, power plants, and defense operations; radionuclides (uranium, plutonium)
Unattended wet and dry excavation sites (unregulated dumps)	A wide range of substances; solid and liquid wastes; oil-field brines; spent acids form steel mill operations; snow removal piles containing large amounts of salt
Operating and abandoned production and exploratory wells (for gas, oil, coal, geothermal, and heat recovery); test hole wells; monitoring and excavation wells	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals (16)
Dry wells	Saline water from wells pumped to keep them dry
Injection wells	Highly toxic wastes; hazardous and nonhazardous industrial wastes (16); oil-field brines
Well drilling operations	Brines associates with oil and gas operations

(1) In general, groundwater contamination stems from the *misuse and improper disposal* of liquid and solid wastes; the *illegal dumping or abandonment* of household, commercial, or industrial chemicals; the *accidental spilling* of chemicals from trucks, railways, aircraft, handling facilities, and storage tanks; or the *improper siting, design, construction, operation, or maintenance* of agricultural, residential, municipal, commercial, and industrial drinking water wells and liquid and solid waste disposal facilities. Contaminants also can stem from *atmospheric pollutants,* such as airborne sulfur and nitrogen compounds, which are created by smoke, flue dust, aerosols, and automobile emissions, fall as acid rain, and percolate through the soil. When the sources listed in t his table are used and managed properly, groundwater contamination is not likely to occur.

(2) Contaminants can reach groundwater from activities occurring on the land surface, such as industrial waste storage; from sources below the land surface but above the water table, such as septic systems; from structures beneath the water table, such as wells; or from contaminated recharge water.

(3) This table lists the most common wastes, but not all potential wastes. For example, it is not possible to list all potential contaminants contained in storm water runoff or research laboratory wastes.

(4) Coliform bacteria can indicate the presence of pathogenic (disease-causing) microorganisms that may be transmitted in human feces. Diseases such as typhoid fever, hepatitis, diarrhea, and dysentery can result from sewage contamination of water supplies.

(5) Pesticides include herbicides, insecticides, rodenticides, fungicides, and avicides. EPA has registered approximately 50,000 different pesticide products for use in the United States. Many are highly toxic and quite mobile in the subsurface. An EPA survey found that the most common pesticides found in drinking water wells were DCPA (iacthal) and atrazine, which EPA classifies as *moderately toxic* (Class 3) and *slightly toxic* (Class 4) materials, respectively.

(6) The EPA National Pesticides Survey found that the use of fertilizers correlates to nitrate contamination of groundwater supplies.

(7) Automotive wastes can include gasoline; antifreeze; automatic transmission fluid; battery acid; engine and radiator flushes; engine and metal degreasers; hydraulic (brake) fluid; and motor oils.

(8) Toxic or hazardous components of common household products re noted in Table 3-2.

(9) Common household pesticides for controlling pests such as ants, termites, bees, wasps, flies, cockroaches, silverfish, mites, ticks, fleas, worms, rats, and mice can contain active ingredients including napthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons, arsenic, strychnine, kerosene, nitrosamines, and dioxin.

(10) Common pesticides used for lawn and garden maintenance (i.e., weed killers, and mite, grub, and aphid controls) include such chemicals as 2.4-D; chlorphyrifos; diazinon; benomyl; captan; dicofol; and methoxychlor.

(11)Swimming pool chemicals can contain free and combined chlorine; bromine; iodine; mercury-based, copper-based, and quaternary algicides; cyanuric acid; calcium or sodium hypochlorite; muriatic acid; sodium carbonate.

(12)Septic tank/cesspool cleaners include synthetic organic chemicals such a 1,1,1 trichloroethane, tetrachloroethylene, carbon tetrachloride, and methylene chloride.

(13) Common wastes from public and commercial buildings include automotive wastes; rock salt; and residues from cleaning products that may contain chemicals such as xylenols, glycol esters, isopropanol, 1,1,1 trichloroethane, sulfonates, chlorinated phenolys, and cresols.

(14) Municipal wastewater treatment sludge can contain organic matter; nitrates; inorganic salts; heavy metals; coliform and noncoliform bacteria; and viruses.

(15) Municipal wastewater treatment chemicals include calcium oxide; alum; activated alum, carbon, and silica; polymers; ion exchange resins; sodium hydroxide; chlorine; ozone; and corrosion inhibitors.

(16) The Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as a solid waste that may cause an increase in mortality or serious illness or pose a substantial threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise managed. A waste is hazardous if it exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity. Not covered by RCRA regulations are domestic sewage; irrigation waters or industrial discharges allowed by the Clean Water Act; certain nuclear and mining wastes; household wastes; agricultural wastes (excluding some pesticides); and small quantity hazardous wastes (i.e. less than 220 pounds per month) generated by businesses.

(17) X-ray developers and fixers may contain reclaimable silver, glutaldehyde, hydroquinone, phenedone, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

(18) This table lists potential groundwater contaminants from many common industries, but it does not address all industries.

Susceptibility Assessment Inventory

The City completed required DOH Susceptibility Assessments in 1995; these assessments are included at the end of this appendix. Part of the assessments required the identification of preliminary inventory items for inclusion in a WHPP. Several of these inventory items have already been discussed as part of the available DOE databases, including USTs, LUSTs, and landfills. Additional inventory items include septic tanks, private wells (both active and abandoned), wastewater treatment lagoons, stormwater injection wells and collection basins, areas of high population (greater than 1 house per acre), pesticide application areas.

WELLHEAD CONTAMINANT INVENTORY

Following a preliminary review of the available databases and susceptibility assessments, a wellhead contaminant inventory was identified. Table R-4 summarizes the City of Dayton contaminant inventory and Figures R-1, R-2, R-3, and R-4 show the locations of these inventory items.

TABLE R-4
Dayton Well Contaminant Inventory

Site	Contaminant Source	Address	I.D. #	Description
1	Columbia County Farm Bureau Aqua Plant	108 N. Pine Street	68755121	Hazardous Materials, EPCRA
2	Columbia County Farm Bureau Office Store	207 N 3rd Street	13635797	Hazardous Materials
3	Dayton Acclimation Pond		3841831	High Risk Business
4	Dayton Chemical Inc.	106 Patit Road	62481757	Hazardous Materials, EPCRA
5	Dayton City STP	111 S. 1st Street	42834827	High Risk Business
6	Dayton Tractor & Machine Inc.	36710 Hwy 12	7684232	Hazardous Materials, EPCRA
7	Shell Service Center	401 W. Main Street	85257979	Hazardous Materials UST
8	Skyline Fluid Power Inc.	109 N. Front Street	41637325	Hazardous Materials, EPCRA
9	WA DA Columbia 1	251 N. Pine Street	49756867	Hazardous Materials
10	Green Giant Pillsbury Company	711 E. Main Street P.O. Box 26	438	UST EPCRA

TABLE R-4
Dayton Well Contaminant Inventory (continued)

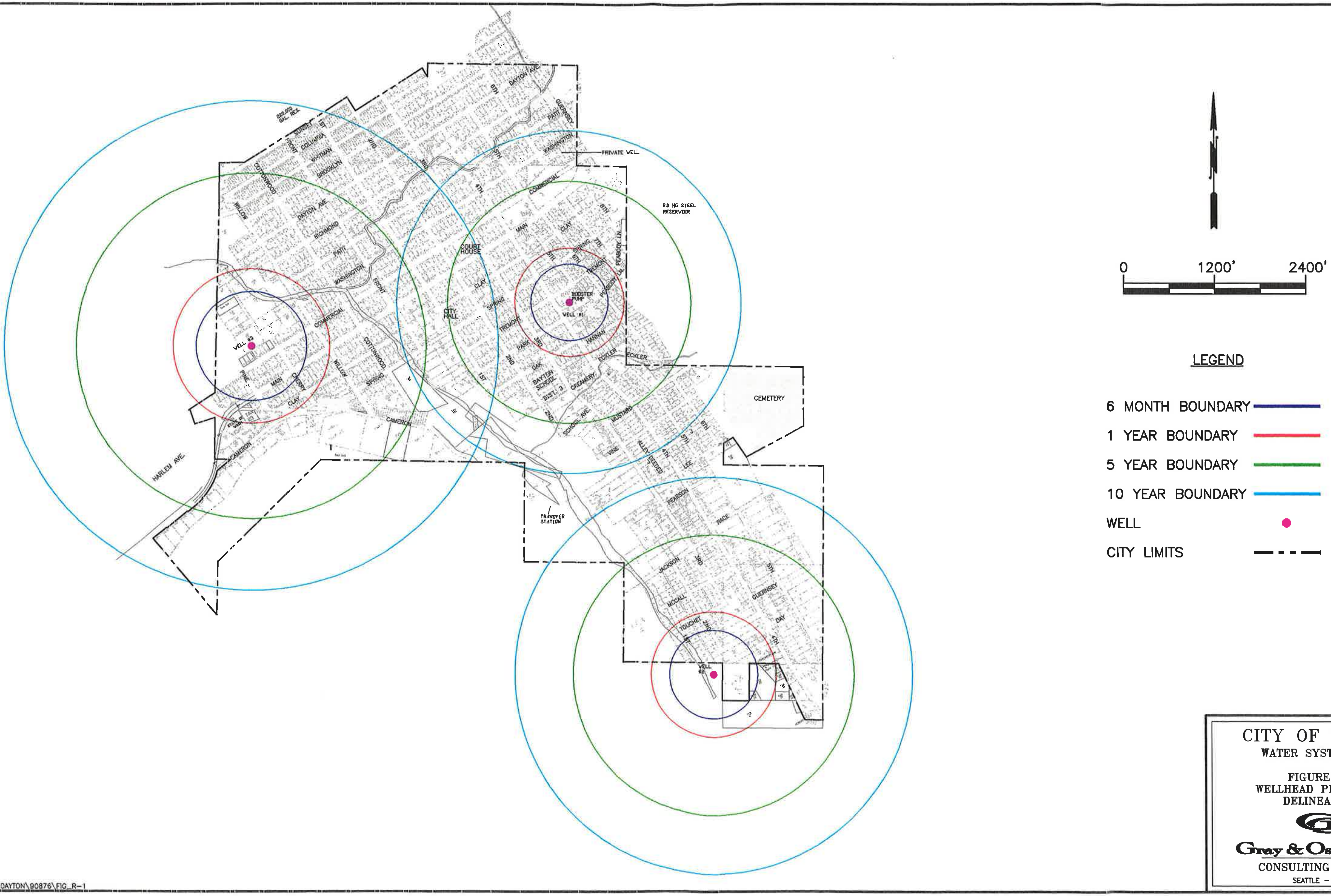
Site	Contaminant Source	Address	I.D. #	Description
11	Columbia County School District No. 2	609 S. 2nd Street	463	UST
12	City of Dayton, City Shop	302 S. Cottonwood	2664	UST LUST
13	Himmelberger Oil Co.	P.O. Box 28	2917	UST
14	D& D Distributors	518 W. Main Street	3262	UST, LUST
15	Jackpot	401 W. Main Street	4133	UST
16	Broughton Land Co	200 E. Main Street	4891	UST
17	Chevron	3rd & Main Street	5042	UST
18	Columbia County Hospital District	1012 S. 3rd Street	5297	UST
19	Western Financial Service	206 W. Main Street	5829	UST
20	Mcgregor Co	120 Cameron Street	8009	UST
21	Dayton Chemicals Bulk Plant	401 W. Main Street	9610	UST
22	Columbia County Farm Bureau, Inc.	207 N. 3rd Street	9617	UST, LUST
23	Shell Service Center	176 E. Main Street	10703	UST
24	Carl Rowe Jr.	1109 S. 4th Street	11170	UST
25	Griffen James & Dirk	507 E. Main Street	11960	UST
26	Jamison's P D Q Food Mart	403 E. Main Street	97296	UST
27	The General Store	426 W. Main Street	100649	UST
28	Ok Tire Service	425 & 427 E. Main Street	102322	UST
29	Zinks Store	209 Front St. / Box 415	11342	UST

WELLHEAD SUSCEPTIBILITY

In general, the risk of contamination from the inventory sources identified in the last section is considered to be low. The City has notified the owners of the inventory items in Table R-4 with the sample identification letter presented at the end of this appendix.

CONTINGENCY PLAN

Contingency planning is an important component of a wellhead protection program. Careful planning cannot always account for unanticipated incidents. A properly prepared and updated contingency plan helps ensure the water system personnel and officials are prepared to respond to emergency situations.

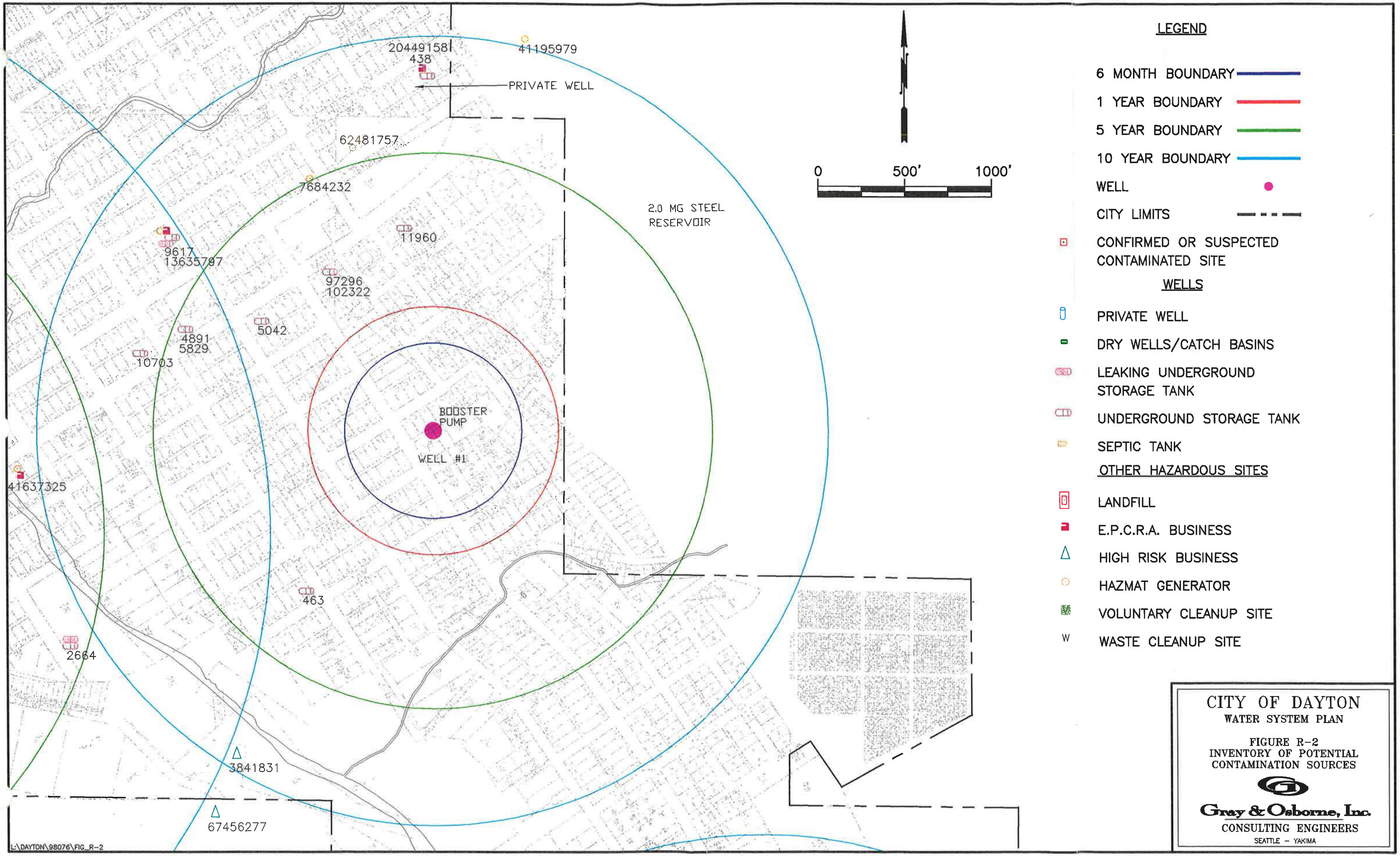


CITY OF DAYTON
WATER SYSTEM PLAN

FIGURE R-1
WELLHEAD PROTECTION
DELINEATIONS

Gray & Osborne, Inc.
CONSULTING ENGINEERS
SEATTLE – YAKIMA

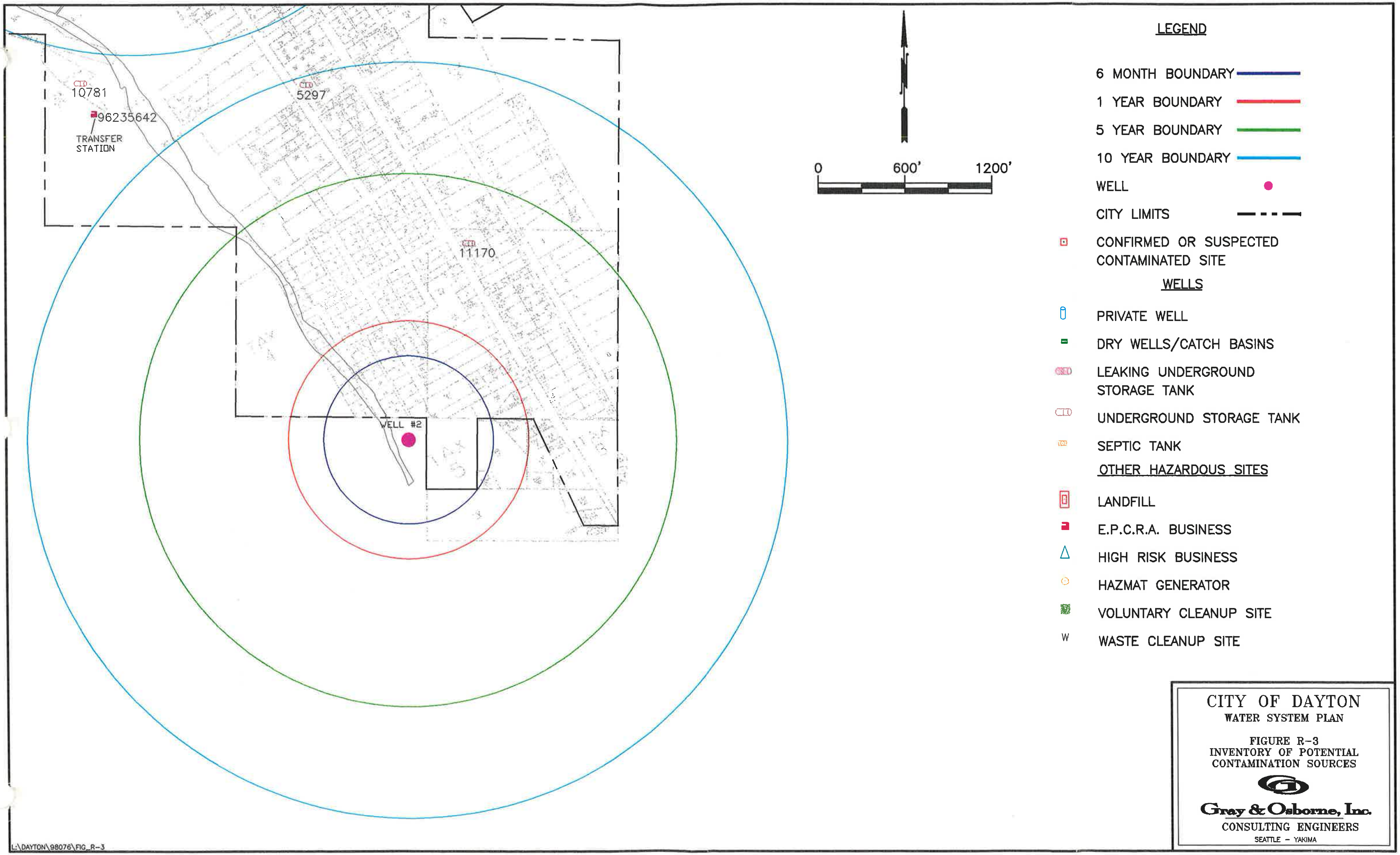
L:\DAYTON\90876\FIG_R-1



CITY OF DAYTON
WATER SYSTEM PLAN

FIGURE R-2
INVENTORY OF POTENTIAL
CONTAMINATION SOURCES

Gray & Osborne, Inc.
CONSULTING ENGINEERS
SEATTLE – YAKIMA



CITY OF DAYTON
WATER SYSTEM PLAN

FIGURE R-3
INVENTORY OF POTENTIAL
CONTAMINATION SOURCES

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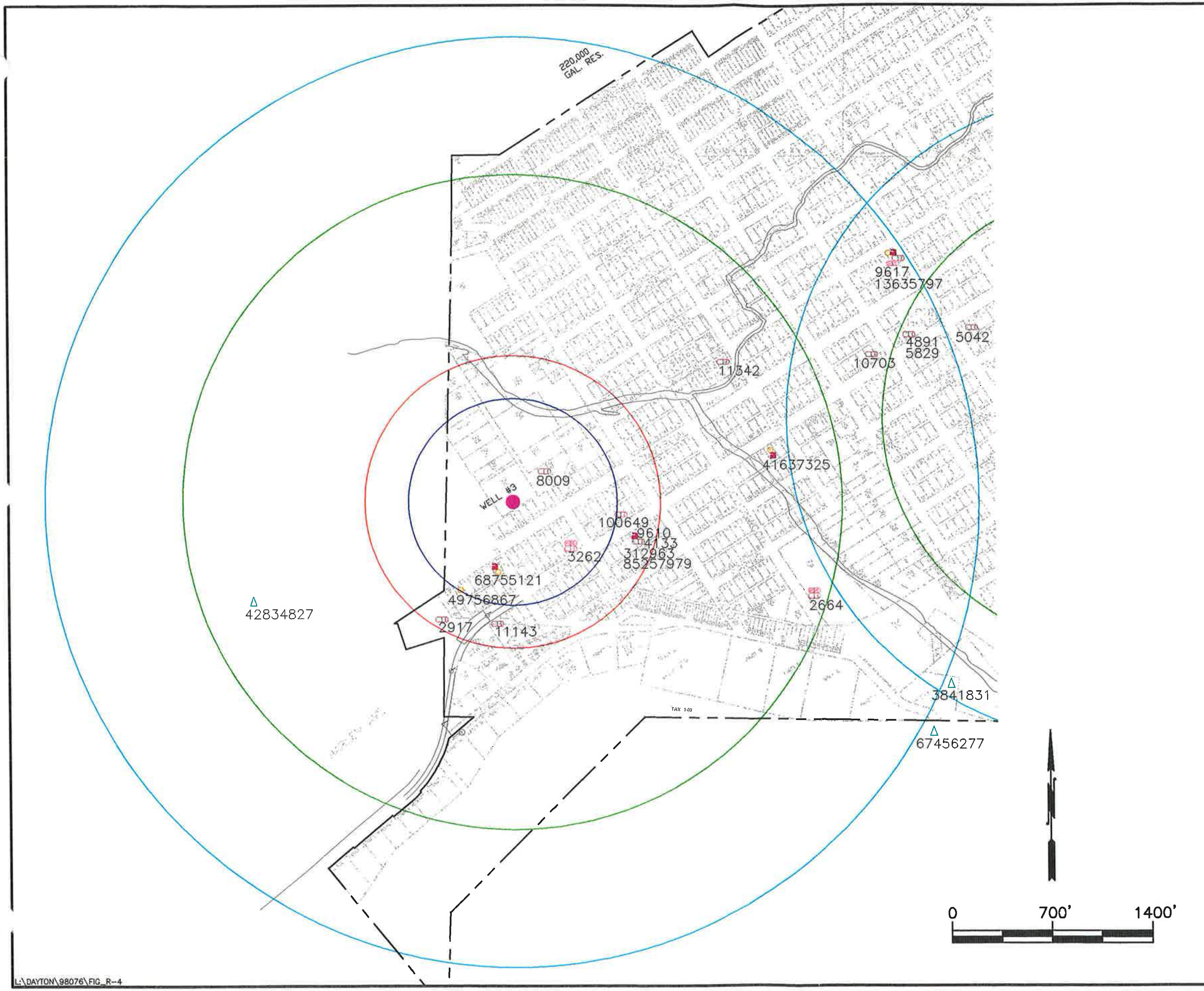
CONSULTING ENGINEERS
SEATTLE – YAKIMA



LEGEND

6 MONTH BOUNDARY ━
1 YEAR BOUNDARY ━
5 YEAR BOUNDARY ━
10 YEAR BOUNDARY ━
WELL ●
CITY LIMITS — · —
▣ CONFIRMED OR SUSPECTED CONTAMINATED SITE

WELLS

▯ PRIVATE WELL
▬ DRY WELLS/CATCH BASINS
▭ LEAKING UNDERGROUND STORAGE TANK
▭ UNDERGROUND STORAGE TANK
▭ SEPTIC TANK

OTHER HAZARDOUS SITES

▯ LANDFILL
■ E.P.C.R.A. BUSINESS
△ HIGH RISK BUSINESS
○ HAZMAT GENERATOR
▨ VOLUNTARY CLEANUP SITE
W WASTE CLEANUP SITE

CITY OF DAYTON
WATER SYSTEM PLAN

FIGURE R-4
INVENTORY OF POTENTIAL
CONTAMINATION SOURCES

Gray & Osborne, Inc.
CONSULTING ENGINEERS
SEATTLE – YAKIMA

L:\DAYTON\98076\FIG_R-4

One element of a contingency plan is an evaluation of the ability of a purveyor to meet future demand based on existing capacity and water rights, even with the loss of a well to contamination.

In order to minimize the effect of a release of contaminants into the environment, procedures must be in place to ensure that the decision making personnel can execute the proper mitigation measures. This contingency plan contains emergency response procedures to be implemented immediately following a release of contaminants into the environment. These procedures identify the appropriate personnel to contact at the local, state, and federal levels, the appropriate equipment needed, and a structured plan of action to respond quickly to effectively mitigate environmental damage resulting from such a release.

In the event that the City's source water becomes contaminated, additional sources of drinking water, or treatment of the contaminated water, will be necessary. Both short-term and long-term alternative drinking water supplies, and treatment methods for common contaminants, are identified in the following sections.

SOURCE ANALYSIS

A key element in contingency planning is the determination of the City's ability to meet existing and future demand with the largest well (either Well No. 2 or Well No. 3) out of service. Based on the demand projections in Chapter 2, the City can meet the existing demand with the available capacity from Well No. 2 or Well No. 3 and the use of Well No. 1 if these wells are run 24-hours per day on the maximum day. However, the City cannot meet the 20-year demand projections with the available capacity from either Well No. 2 or Well No. 3 and Well No. 1.

EMERGENCY MANAGEMENT

The first step in emergency management is the development of an emergency call-up list. This list has been prepared as part of the water system plan in Table 5-3. Emergency planning for several emergency situations has also been identified in Chapter 5.

SHORT-TERM CONTINGENCY PLANNING

As a matter of planning priority, it is important to identify appropriate emergency and short-term options. These include the steps required for immediate provision of water for a periods of days, weeks or months. The following is a list of short-term and emergency options that could be implemented at the City of Dayton following the short-term loss of a well.

Bottled Water

In an emergency situation which requires a well(s) to be shut off, bottled water is one alternative supply of drinking water. In many cases, sufficient supply is immediately available in either stores or a bottling facility. With Dayton being located geographically a short distance from neighboring communities, it is feasible that enough bottled water could be supplied for a short term using available sources from other communities.

Tank Trucks

Alternative supplies can be brought in by tank trucks. Dayton could use a contractor to transport hauled water. Careful attention must be given to disinfecting the tanks to avoid bacterial contamination. If the tanker truck(s) assigned to haul the water are known potable water hauling vehicles only, then the water need only be disinfected using a standard chlorine residual concentration. However, if the tanker truck(s) has been used to haul nonpotable water or the hauling status of the tanker truck(s) is not known, then the tank will be super-chlorinated with a concentration of a least 50 mg/L for a period of 24-hours. After the 24 hour period, the super-chlorinated water will be discarded and the tank filled with fresh chlorinated water and that water must be given a bacteriological test to determine if it is suitable for drinking. A copy of DOH guidelines for truck transportation of potable water supplies is presented at the end of this appendix. If this option is selected, a source of sanitary containers would be identified and supplied so that personnel are not required to use receptacles that could possibly be contaminated.

Water Conservation

The City of Dayton has developed a water conservation plan as part of this water system plan (Chapter 4). The conservation measures required for the City by the DOH include program promotion, source and service meter readings, and conservation pricing. In an emergency situation, more aggressive water conservation measures may be required than those outlined in Chapter 4. In an emergency situation requiring the complete or partial shutoff of the City's wells, non-essential water uses must be restricted. The City may be forced to implement aggressive water conservation measures, which may include water restrictions for activities such as landscape watering, laundry, vehicle washing, or bathing. Water conservation measures may also be used with other short-term supply options.

Groundwater Treatment

Treatment of contaminated can be accomplished through *in situ* or *ex situ* methods. *In situ*, or in place treatment involves remediation of an aquifer by introducing chemical, physical, or biological agents into the subsurface which reduce contamination levels. *Ex situ*, or pump and treat technologies involve the removal of contaminated groundwater from the subsurface and subsequent treatment at the source. Examples of *in* situ remediation include bioremediation and soil vapor extraction, while examples of *ex situ* treatment include reverse osmosis (RO), granular activated carbon (GAC), and air stripping. Both of these treatment methods can be extremely expensive. The capital investment for the treatment equipment along with cost of operating and chemical costs amount to a significant expenditure.

Surface Water Treatment

The only surface water within an acceptable distance from the City is the Touchet River. Treating water withdrawn from the Touchet River is probably not a viable short-term alternative. Since surface water is very susceptible to contamination and other water quality problems, it must pass through extensive treatment. Surface water treatment is likely to be difficult and expensive to implement and maintain on a short-term basis. In addition, water rights in the Touchet River may be a complex and time-consuming issue to resolve.

LONG-TERM CONTINGENCY PLANNING

Long-term water replacement options differ from emergency and short-term options in two ways. First, the amount of time available to evaluate the various alternatives is longer, permitting more extensive analysis of the considerations of future needs and other factors prior to decision making. Second, the range of alternatives which are viable is larger. The following sections provide a discussion of long-term options.

Drill New Wells

If investigations indicate that there is an untapped supply of groundwater in the form of a separated aquifer or a portion of the contaminated aquifer which is up-gradient and uncontaminated, it may be feasible for the City to drill new wells. This alternative can often be more economical and carry lower risk than treatment. Preliminary cost estimates for drilling of new wells are provided at the end of this appendix.

Groundwater Treatment

The same treatment technologies previously described are available as permanent solutions for contaminant removal. As discussed above, treatment of contaminated water should be viewed as a last resort and should be considered only after the other alternatives have been completely abandoned.

Interconnection

Interties with other water systems are sometimes a cost effective solution. However, the nearest City with a reliable water supply is the Town of Waitsburg, 10 miles away. The cost of this intertie could be substantial.

Water Conservation

While it is possible to use conservation strategies to reduce consumption over the long-term, the water savings from conservation are not likely to be large enough to replace the production of a contaminated well.

Dual Systems

The City already maintains a separate non-potable irrigation system that serves to reduce water demands on the potable water system.

Surface Water Treatment

As in the short-term surface water treatment discussion, the water quality, water right, and costs associated with surface water treatment make it a an unattractive alternative.

DAYTON WELLHEAD PROTECTION MANAGEMENT PLAN

Development of management strategies is essential for a successful wellhead protection program. Without proper management, potential contaminant sources are likely to become a reality. An informed public that understands the link between potential contamination sources and its drinking water is one of the most effective ways of protecting groundwater supplies. The City will send out information pertaining to wellhead protection on an annual basis as part of its consumer confidence report to provide continuous education of the public on the merits of wellhead protection.

08-06-14

To: Howard/Dave Anderson Perry

From: Jim City of Dayton

Subject: Well contaminate inventory

Please throw away the first inventory I sent and use this one. I took out Broughton Land Company.

Dayton Well Contaminate Inventory. Revised 08-06-14 Jim

1.	Columbia County Transfer Station 500 South Cottonwood	Garbage/chemicals
2.	Columbia County Fair Grounds/Gold Course 105 North Pine	Maintenance
3.	Tema 409 Cameron	Truck shop, maintenance
4.	Pik-A-Pop 535 West Main	Petroleum sales, car wash, RV dump
5.	Dept of Fisheries Acclimation Pond 401 South Cottonwood	Fish hatchery
6.	Columbia County Maintenance Shop 415 Gurnsey	Maintenance shop, county maintenance
7.	Walkers Auto Repair 326 West Main	Auto repair & maintenance
8.	Columbia County Fire Dept. 218 West Main	Emergency response, spill response
9.	McGills Shop 110 South Cottonwood	Repair shop, trucking business
10.	J-Har Logging 36713 Highway 12	Logging business, maintenance
11.	Dayton Wastewater Treatment 800 Stockton Lane	Treatment of wastewater, chemicals
12.	Dayton Chemical 106 Patit Road	Supplier of chemicals
13.	Dayton Chemical 608 Wagon Road	Fuel storage tanks
14.	Ag Link 108 North Pine	Agronomy/Retail

15. Ag link 207 North 3rd	Fuel sales, maintenance shop chemicals
16. Ag Link 601 Bulk Plant Road	Bulk fuel storage tanks
17. Dayton Tractor & Machine 36710 Highway 12	Repair shop
18. Shell Service Center 401 West Main	Fuel sales, maintenance shop
19 Skyline Fluid Power 109 North Front	Hydraulic repairs
20. Dayton Public Schools 609 South 2nd	Grounds maintenance, bus maintenance
21. Dayton City Shop 303 South Cottonwood	Grounds maintenance, parks, cemetery maintenance shop, chemicals
22. Coleman Oil West Main	Fuel sales, storage
23. Dayton General Hospital 1012 South 3rd	Ground maintenance, people repair
24. McGregor Company 120 South Cottonwood	Chemical sales, ground maintenance, repair shop
25. Carl Rowe Jr. 1109 South 4th	Heavy equipment contractor, maintenance shop
26. P.D.Q. Food Mart 403 East Main	Fuel sales
27. Wilbur Fletcher Inc. Rt. Box 238	Heavy equipment contractor maintenance shop
28. Kyle's Custom Toys 109 South Cottonwood	Impound yard, repair shop
29 Sabins Auto 317 West Main	Body & fender, painting

30. Seneca Foods 301 Seneca Way	Seed production, Chemicals
31. Dayton School 609 S. 2nd	Bus maintenance shop, grounds maintenance, building maintenance
32. General Store 426 West Main	Petroleum products
33. Walla Walla Co-op 509 West Cameron	Ag chemicals
34. Washington State DOT 531 West Main	Herbicides, weed control, road salt, Magnesium chloride, maintenance shop.
35. Jay's Garage 527 West Cameron	Automotive repair
36. City Lumber & Coal Yard 200 North 3rd	Paints, thinners, chemicals
37. Goff & Son 500 East Main	Automotive repair, towing.
38 Badger Mountain Construction 202 West Commercial	Contractor, construction

Wineries?

Updated: 06-18-14

Wellhead letters to:

Wilbur Fletcher 36717 Highway 12
Walkers Auto Repair 326 West Main
City of Dayton WWTP 800 Stockton Lane
Dayton City Shop 303 South Cottonwood
Coleman Fuel 601 Harlem Road
Columbia Rural Electric 115 East Main
WDOT 529 West Main
Columbia County Public Works Building P.O. Box 5
Pik A Pop 522 West Main
Desperado Bullets 2 Port Way
Goff and Sons Towing 500 East Main
Sabins Auto 317 West Main
Rock Hill Concrete 110 West Cameron
Skyline Fluid Power 109 North Front Street
PDQ 403 East Main
The General Store 426 West Main
Vestas 517 West Cameron
Walla Walla Co-Op 509 West Cameron
Columbia County Transportation 507 West Cameron
Gemmells Machine Shop 5 Port Way
McGregor Company 120 West Cameron
Dayton General Hospital 1012 South 3rd
Dayton Public School 614 South 3rd
Skyline Parts 102 West Main
Ag Link Dayton Hardware Store 207 North 3rd
Shell Service Center 401 West Man
Seneca 301 Seneca Way
TEMA 409 West Cameron
Kyle's Custom Toys 109 South Cottonwood
Coyote Engineering 531 West Cameron
Dayton Tractor 6 Port Way
Dayton Chemical Inc. 106 Patit Road
Columbia County Transfer Station P.O. Box 5
Columbia County Fire District 3 206 West Main Street
Dayton Pond Satellite Facility 410 South Cottonwood
Broughton Land Company 200 East Main
Chapman Heating and Air Conditioning 103 Patit Road
Double T Construction 1214 South 2nd
Cornaggias 1 Port Way
City Lumber and Coal Yard 200 North 3rd Street
Badger Construction 202 West Commercial
Carl Rowe Jr 1109 South 4th Street

Blue Mountain Railroad, 325 Mill Road, Lewiston. ID. 83501
Port of Columbia, 1 Port Way, Dayton, WA. 99328

Letters sent as of 06-17/18-14.
Jim

THE CITY OF
Dayton
WASHINGTON

City of Dayton 111 S. 1st Street, Dayton, WA 99328
Office 509.382.2361 Fax 509.382.2539
Web www.daytonwa.com

06-18-14

Joe Q. Citizen
325 Green Pickle Lane
Dayton, WA. 99328

Dear Business Owner,

The City of Dayton is developing a wellhead protection plan for our water system as required by the Washington State Department of Health. Wellhead protection involves protecting the land area surrounding our wells in order to prevent contamination of the drinking water supply. Part of the plan requires notification to all potential sources of contamination of the well locations. The City of Dayton has three (3) well sites. Well #2 is located at 504 East Tremont Street, Well #2 is located at 1540 South 2nd Street, Well #3 is located at 410 West Commercial Street. (See map included).

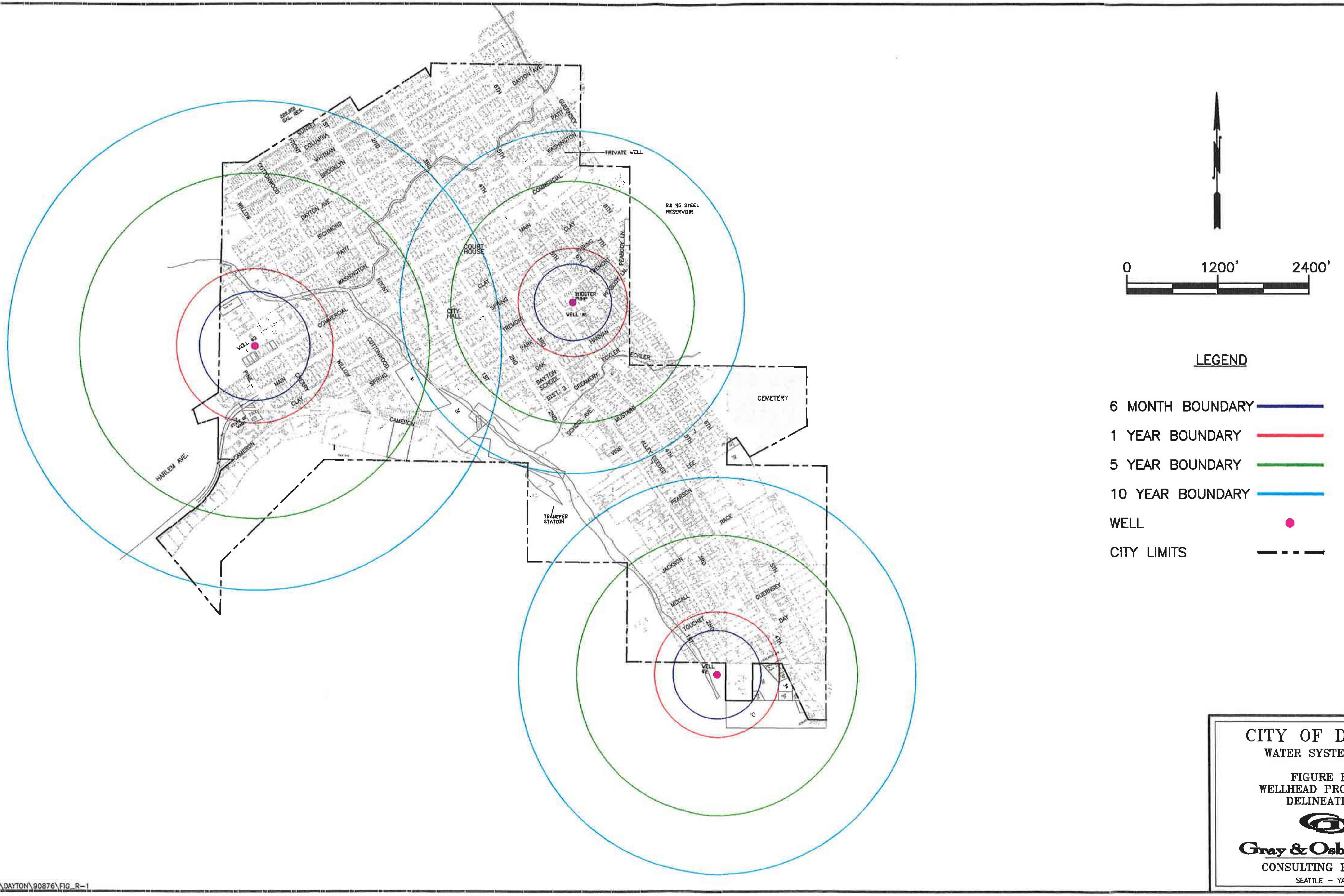
One of the goals of this plan is to raise public awareness about the vulnerability of the groundwater in our area to contamination. The purpose of this letter is to inform you of the proximity of your business/operation to our wellhead protection area and to serve as a reminder that any hazardous material spilled onto the ground, put into a septic system or an abandoned well, or traveling along a residential well's casing has the potential of contaminating our drinking water supply. Some potential contamination sources are:

- Dumping motor oil, gasoline, antifreeze or similar fluids onto the ground. These materials can be recycled.
- Leaking fuel storage tanks and distribution lines.
- Accidental spillage of fuel.
- Improper use of a septic system (dumping paint, cleaners, or solvents into a septic system).

We are very fortunate to have a good supply of high quality water. Please help us to keep it that way for our continued use, and for the ones that come along after us. Thank you for your attention in this matter. If you should have any questions please contact Jim Costello or Sal Benavides at (509)382-4571 or (509)382-2361.

Sincerely,

Jim Costello
City of Dayton
Public Works Dept.



CITY OF DAYTON
WATER SYSTEM PLAN

FIGURE R-1
WELLHEAD PROTECTION
DELINEATIONS

Gray & Osborne, Inc.
CONSULTING ENGINEERS
SEATTLE – YAKIMA

L:\DAYTON\90876\FIG_R-1

APPENDIX G

O&M Information

City of
Dayton
111 South First
Dayton, Washington 99328-1396
(509) 382-2361 • Fax: (509) 382-2539

(PROCEDURE FOR GENERATOR START UP)

BEFORE START UP

1.) CHECK OIL,WATER,& BATTERY LEVELS.

2.) START ENGINE BY PUTTING SWITCH TO THE "TEST POSITION" WRITE START UP TIME ON APROPIATE SHEET. LET IDLE FOR ABOUT FIVE (5) MINUTES, WHILE IN LOW IDLE, CHECK OIL ON THE IDLE SIDE.

3.) AFTER THE 5 MINUTES HAS ELAPSED YOU ARE NOW READY TO PUSH THE THROTTLE (YELLOW HANDLE) FORWARD. PUSH BUTTON DOWN AS YOU PUSH HANDLE FORWARD. MAKE VERY SURE THAT HANDLE IS ALL THE WAY FORWARD.

4.) THERE IS A HOUR GAUGE BY THE THROTTLE THAT YOU MUST RECORD.

5.) NOW GO TO FRONT PANEL PUSH BREAKER SWITCH UP.

6.) NOW GO INSIDE FLIP POWER HANDLE FROM P.P.L. TO GENERATOR.

7) YOU ARE NOW ON AUXILARY POWER.

8.) NOW RECORD THE LINE PRESSURE ON THE CHART.

9.) CALL THE SHOP AND HAVE SOMEONE PUT THE KNOB ON HAND POSITION.REMEMBER TO TELL THEM WHICH WELL YOU ARE AT

10.) ONCE THE WELL IS ON LINE YOU CAN RECORD THE GAUGES ON THE GENERATOR PANEL.

11) NOW RECORD STATIC LEVEL WHICH IS ON THE WALL, AFTER THAT OPEN THE KNOB ON THE COMPRESSOR TO LET AIR IN THE LINE, WHEN RED NEEDLE STOPS SHUT AIR OFF AGAIN AND RECORD WHERE THE RED NEEDLE IS. THIS IS YOUR PUMPING LEVEL.

12.) NOW GO OUTSIDE LOOK IN MANHOLE TO SEE HOW MANY GALLONS A MINUTE IT IS PUMPING. YOU ARE NOW RUNNING !!!.

13.) MAKE CONTACT WITH HIMMELBERGER OIL TO LET THEM KNOW THAT YOU WILL NEED DIESEL THAT AFTERNOON.

14) KEEP AN EYE ON THE RESERVOIR CHART, AND THE WELL SITE DURING THE RUNNING OF THE GENERATOR.

TURN OVER

City of
Dayton

111 South First
Dayton, Washington 99328-1396
(509) 382-2361 • Fax: (509) 382-2539

PROCEDURE FOR SHUTTING DOWN GENERATOR

1.) HAVE SHOP SHUT WELL OFF. (OR SHUT IT YOUR SELF BEFORE YOU GO TO WELL SITE.)

2.) ONCE THE PUMP HAS GONE THRU IT'S CYCLE AND COMPLETELY SHUT DOWN. YOU CAN FLIP BREAKER SWITCH DOWN ON THE GENERATOR.

3.) GO BACK INSIDE AND FLIP POWER LEVER FROM GENERATOR TO P.P.& L.POWER.

4.) NOW GO BACK OUTSIDE AND PULL THROTTLE (YELLOW HANDLE) BACK TO IDLE. LET IDLE FOR AT LEAST FIVE (5) MINUTES TO COOL DOWN.

5.) NOW YOU MAY SHUT IT DOWN, AT THIS TIME YOU SHOULD REFUEL

!!!!! ALWAYS FUEL IMMEDIATELY AFTER SHUTTING DOWN !!!!
!!!!! BECAUSE YOU MAY HAVE AN EMERGENCY THAT NIGHT !!!
!!!!!!! OR WORSE YET OVER THE WEEKEND.!!!!!!!!!!

6.) NOW MAKE SURE YOU PUT WELL BACK ON AUTOMATIC AT THE SHOP

7.) YOU ARE DONE, YOU DID A "GOOD JOB" ESPECIALLY IF YOU FOLLOWED THESE INSTRUCTIONS.

SAL BENAVIDES.
ASS'T.SUPERINTENDENT
01-17-97

Sal Benavides

FLUSHING AND DISINFECTION GUIDE

The general concepts of flushing and disinfection of water mains in the City of Dayton is discussed in this guide. The information in this guide was based on AWWA Standard C 651 – Disinfecting Water Mains. This standard should be referred to for more detailed information and procedures on flushing and disinfecting water mains.

I. DISCHARGE REQUIREMENTS

A. Discharges to environment

1. Discharges shall not cause or have the reasonable potential to cause or contribute to a violation of a water quality standard.

2. Employ Best Management Practices (BMPs) to prevent erosion from discharge of water during any construction activities including flushing and disinfection in accordance with an approved Storm Water Pollution Prevention Plan (SWPPP), if required.

3. Chlorinated water used for disinfection shall be dechlorinated with an approved dechlorination agent. Do not dose neutralizing chemical beyond the minimum required to neutralize the chlorine actually present in discharge. Allowable residual chlorine will vary depending on destination of the discharge (watercourse, flat land, or sanitary sewer system).

B. Notify the City Public Works Director immediately in the event of any accidental discharge.

II. FLUSHING OF WATER MAINS

A. Preliminary Flushing

1. Prior to flushing and disinfection, fill main with water to eliminate air pockets.

2. All new installations shall be flushed prior to placing in service (either before or after disinfection depending on the technique utilized).. If no fire hydrants or other convenient outlets for flushing are available, then approved flush connection shall be installed at approved locations. Operations requiring a system outage must be coordinated a minimum of one week in advance with the City's Public Works Director.

3. Flush new mains, thoroughly before connection is made to system piping in order to remove foreign materials that might have entered the main during the course of the installation or that might have been present in existing piping.

4. Flushing shall be of sufficient magnitude and duration to flush all foreign material out of the lines, valves, and hydrants. The flushing velocity shall be a minimum of 2.5 feet per second (ft/s).

5. All valves and hydrants shall be fully opened and closed under water pressure to ensure proper operations during flushing and to dislodge foreign material. During flushing operations, all valves or connections to existing systems shall be closed and backflow preventors or other approved equipment installed at the source to prevent contamination of existing systems.

6. Existing site features and improvements shall be protected during flushing operation.

B. Final Flushing - Clearing the main of heavily chlorinated water:

1. Arrangements for water quality testing of chlorine concentrations and bacteriological quality shall be made at minimum of 24 hours in advance of the final flushing.

2. After residual free chlorine concentration test has been completed, flush the piping system with potable water until total chlorine concentration in main is less than 1 milligram per liter (mg/L) or 1 ppm.

3. If the water quality tests do not show compliance with the applicable requirements of the Safe Drinking Water Act, the main shall be flushed, re-chlorinated, and retested until test results demonstrate compliance.

III. DISINFECTION OF WATER MAINS

A. Disinfecting solutions containing chlorine shall not exceed 12% active chlorine; greater concentrations can chemically attack and degrade polyethylene.

B. Water shall be supplied from a temporary backflow protected connection to the existing distribution system at locations approved by the City Public Works Director or from another approved source.

C. Tablet Method with HTH Granules

1. HTH (solid calcium hypochlorite) granules shall not to be used on solvent weld pipe or on screwed –joint steel pipe.

2. Granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-ft intervals. The granular quantity of calcium hypochlorite can be calculated as shown below:

Calcium Hypochlorite Quantities per 500 linear feet.		
Pipe Diameter		**Granules**
In.	oz	g
4	1.7	57
6	3.8	113
8	6.7	200
10	10.5	300
12	15.1	430

3. When the installation has been completed, the main shall be filled with water at a rate to insure that the water within the main will flow at a velocity no greater than 1 ft/s. Precautions shall be taken to eliminate air pockets with in the main.

4. The water shall remain in the pipe for a minimum of 24 hours. If the water temperature is less than 41°F (5°C) it shall remain in the pipe for a minimum of 48 hours. Detectable chlorine residual should be found at each sampling point after the 24 hour or 48 hour period. Contact the City Public Works Director to arrange for residual chlorine testing.

D. Continuous Feed Method

1. Place HTH granules as described in the Tablet Method.

2. Preliminary Flushing as discussed above.

3. Inject chlorinated water with a free chlorine concentration no less than 25 mg/L, into the water main no more than 10 feet from the beginning of the new main. The amount of chlorine required for each 100 feet of pipe of various diameters is provided in Table 4 of AWWA C651. Provisions shall be taken to eliminate air pockets.

4. Chlorinated water shall remain in the pipe for a minimum of 24 hours. If the water temperature is less than 41°F (5°C) it shall remain in the pipe for a minimum of 48 hours. After the 24 hour or 48 hour period, the treated water in all portions of the main shall have a residual not less than 10 mg/l of free chlorine. Contact the City Public Works Direct to arrange for residual chlorine testing a minimum of 24 hours in advance.

3. After the residual chlorine testing had been accomplished, Final Flushing will be performed

E. Slug Method

1. Install HTH granules as described in the Tablet Method.

2. Preliminary Flushing as discussed above.

3. Inject chlorinated water with a free chlorine concentration no less than 100 mg/l into the water main no more than 10 feet from the beginning of the new main. Provisions shall be made to eliminate air pockets.

4. Chlorine concentration shall be measured at regular intervals. Chlorine shall be supplied continuously so that a slug of chlorine solution moves through the main and expose all interior surfaces to a concentration of 100 mg/l for a minimum of three hours.

5. The free chlorine residual shall be measured as the slug moves through the main; if the concentration drops below 50 mg/l, then the flow shall be stopped; equipment relocated at head of slug and flow resumed.

6. As the slug moves through the system, operate fittings, valves, hydrants and other appurtenances so as to disinfect these portions of the water main.

7. Perform Final Flushing as described above.

F. If final total chlorine concentrations and bacteriological quality tests do not show compliance with water quality requirements repeat disinfection process until test results demonstrate compliance.

IV. DISINFECTION FOR REPAIRS

A. Before Repair:

1. Where practical, isolate a section of affected line and shut off all service connections.

2. Swab or spray the inside of new pipe and fittings with a minimum of 1 percent (10,000 ppm) hypochlorite solution before they are installed. Disinfect tools to be used in same manner.

B. After Repair:

1. Prior to disinfection, flush affected line to remove any debris that may have been introduced during repairs. If possible, flush from both directions. Flush until discolored water is eliminated and water flows clear. If line segment cannot be isolated, thoroughly flush the segment to a tank or through a fire hydrant.

2. Apply chlorinated water to the interior surfaces of affected water line segment at the chlorine concentration and contact times as follows; verify total chlorine concentration by performing an initial total chlorine concentration test.

Chlorine Concentration (mg/L)	**Minimum Contact Time**
300	15 minutes
250	1 hour
200	1.5 hours
150	2 hours
100	3 hours

3. Flush affected line with potable water until total chlorine concentration in main is less than 1 mg/L (1 ppm) or the prevailing chlorine concentration in the water system is achieved. Follow the discharge requirements described above.

4. After flushing, arrange for final total chlorine concentration and bacteriological quality tests.

5. If final total chlorine concentrations and bacteriological quality tests do not show compliance with water quality requirements repeat disinfection process until test results demonstrate compliance.

6. Alternatively the Slug Method as described above may be followed.

Washington State Department of
Health
Environmental Public Health
Office of Drinking Water

Water Quality Monitoring Schedule

System: DAYTON WATER DEPARTMENT
Contact: JAMES S COSTELLO

PWS ID: 18250 3
Group: A - Comm

Region: EASTERN
County: COLUMBIA

NOTE: To receive credit for compliance samples, you must fill out laboratory and sample paperwork completely, send your samples to a laboratory accredited by Washington State to conduct the analyses, AND ensure the results are submitted to DOH Office of Drinking Water. There is often a lag time between when you collect your sample, when we credit your system with meeting the monitoring requirement, and when we generate the new monitoring requirement.

Coliform Monitoring Requirements

	Jul 2014	Aug 2014	Sep 2014	Oct 2014	Nov 2014	Dec 2014	Jan 2015	Feb 2015	Mar 2015	Apr 2015	May 2015	Jun 2015
Coliform Monitoring Population	2740	2740	2740	2740	2740	2740	2740	2740	2740	2751	2751	2751
Number of Routine Samples Required	3	3	3	3	3	3	3	3	3	3	3	3

- Collect samples from representative points throughout the distribution system.
- Collect required repeat samples following an unsatisfactory sample. In addition, collect a sample from each operating groundwater source.
- Collect no less than 5 routine samples in the month following one or more unsatisfactory samples, in accordance with your system's Coliform Monitoring Plan.
- For systems that chlorinate, record chlorine residual (measured when the coliform sample is collected) on the coliform lab slip.

Chemical Monitoring Requirements

Distribution Monitoring

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Lead and Copper	10	Jan 2013 - Dec 2015	standard - 3 year	07/31/2012	Jul 2015
Asbestos	1	Jan 2011 - Dec 2019	standard - 9 year	11/23/2009	Nov 2018
Asbestos	1	Jan 2011 - Dec 2019	standard - 9 year	11/23/2009	Sep 2018
Total Trihalomethane (THM)	1	Jan 2014 - Dec 2014	Initial - Annually	08/22/2012	***Aug 2014***
Halo-Acetic Acids (HAA5)	1	Jan 2014 - Dec 2014	Initial - Annually	08/22/2012	***Aug 2014***

Notes on Distribution System Chemical Monitoring

For *Lead and Copper*:
- Collect samples from indoor faucets after the water has sat unused in the pipes for at least 6 hours, but no more than 12 hours.
- Flush sample faucets with cold water the evening prior to collecting the sample.
- If your sampling frequency is annual or once every 3 years, collect samples between June 1 and September 30.

For *Asbestos:* Collect the sample from one of your routine coliform sampling sites in an area of your distribution system that has asbestos concrete pipe.
Asbestos:

For *Disinfection Byproducts (HAA5 and THM):* Collect the samples at the locations identified in your Disinfection Byproducts (DBP) monitoring plan.

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels or analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- If "R&C" is listed in a monitoring requirement's frequency, the requirements are based on detections which are reliably and consistently below the health standard.

Source S01 Well #2 - AEN297 Well Use - Permanent Susceptility - Moderate

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2014 - Dec 2014	standard - 1 year	06/09/2014	
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	05/07/2007	May 2016
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	08/04/2010	Aug 2016
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	06/19/2012	Jun 2021
Pesticides	0	Jan 2014 - Dec 2016	waiver - 3 year	07/12/2000	
Soil Fumigants	0	Jan 2014 - Dec 2016	waiver - 3 year		
Gross alpha	1	Jan 2014 - Dec 2019	standard - 6 year	06/15/2010	Jun 2016
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	06/15/2010	Jun 2016

Source S02 Well #3 - AEN296 Well Use - Permanent Susceptility - High

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2014 - Dec 2014	standard - 1 year	06/09/2014	
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	05/07/2007	May 2016
Volatile Organics (VOC)	1	Jan 2014 - Dec 2016	standard - 3 year	04/17/2012	Apr 2016
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	04/17/2012	Apr 2021
Pesticides	0	Jan 2014 - Dec 2016	waiver - 3 year	07/12/2000	

Source S02 Well #3 - AEN296 Well Use - Permanent Susceptility - High

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Soil Fumigants	0	Jan 2014 - Dec 2016	waiver - 3 year	08/18/1998	
Gross alpha	1	Jan 2014 - Dec 2019	standard - 6 year	11/23/2009	Nov 2015
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	11/23/2009	Nov 2015

Source S03 Well #1 Well Use - Permanent Susceptility - Moderate

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2014 - Dec 2014	standard - 1 year	06/09/2014	
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	09/02/2010	Sep 2019
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	04/17/2012	Apr 2018
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	04/17/2012	Apr 2021
Pesticides	0	Jan 2014 - Dec 2016	waiver - 3 year	09/17/2002	
Soil Fumigants	0	Jan 2014 - Dec 2016	waiver - 3 year		
Gross alpha	1	Jan 2014 - Dec 2019	standard - 6 year	11/23/2009	Nov 2015
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	06/19/2012	Nov 2015

Other Information

Other Reporting Schedules	***Due Date***
Measure chlorine residuals and submit monthly reports if your system uses continuous chlorination:	monthly
Submit Consumer Confidence Report (CCR) to customers and ODW (Community systems only):	07/01/2014
Submit CCR certification form to ODW (Community systems only):	10/01/2014
Submit Water Use Efficiency report online to ODW (Community and other municipal water systems only):	07/01/2014
Send notices of lead and copper sample results to the customers sampled:	30 days after you receive the laboratory results
Submit Certification of customer notification of lead and copper results to ODW:	90 days after end of monitoring period

Special Notes

None

Eastern Regional Water Quality Monitoring Contacts

For questions regarding chemical monitoring:	Steve Hulsman: (253) 395-6777 or Sophia Petro: (360) 236-3046: or Steve.Hulsman@doh.wa.gov or sophia.petro@doh.wa.gov
For questions regarding DBPs:	Russell Mau: (509) 329-2116 or russell.mau@doh.wa.gov
For questions regarding coliform bacteria and microbial issues:	Mark Steward: (509) 329-2134 or Mark.Steward@doh.wa.gov

Additional Notes

The information on this monitoring schedule is valid as of the date in the upper left corner on the first page. However, the information may change with subsequent updates in our water quality monitoring database as we receive new data or revise monitoring schedules. There is often a lag time between when you collect your sample and when we credit your system with meeting the monitoring requirement.

We have not designed this monitoring schedule to display all compliance requirements. The purpose of this schedule is to assist water systems with planning for most water quality monitoring, and to allow systems to compare their records with DOH ODW records. Please be aware that this monitoring schedule does not include constituents that require a special monitoring frequency, such as monitoring affiliated with treatment.

Any inaccuracies on this schedule will not relieve the water system owner and operator of the requirement to comply with applicable regulations.

If you have any questions about your monitoring requirements, please contact the regional office staff listed above.

CITY OF DAYTON COLIFORM MONITORING PLAN

City of Dayton.
Columbia County
Washington State

System ID Number. 182S0-3
Plan Preparers, Sal Benavides Assistant Public Works Director
Jim Costello, Public Works Director

SOURCES OF WATER
SO1. Well #2
1,425 feet deep
1,100 gallons per minute

SO2. Well #3
1,180 feet deep
1,100 gallons per minute

SO3. Well #1
1,302 feet deep
700 gallons per minute

STORAGE:
2 million gallon reservoir – located on east end of town
220 thousand gallon standpipe – located on north end of town

TREATMENT: The only treatment provided to the city's water system is disinfection. Each well site has its own chlorinator. The chlorine is calcium hypochlorite tablets which dissolves in the water and pumped into the water system for disinfection.
SO1 Well #2 sodium hypochlorite tablets. Accu-tab PowerPro Model #3075
SO2 Well #3 sodium hypochlorite tablets. Accu-tab PowerPro Model #3075
SO3 Well #1 sodium hypochlorite tablets. Accu-tab PowerPro Model #3012

PRESSURE ZONES: ONE

POPULATION: 2,720

LABORATORY: Walla Walla Regional Water Testing Services
714 South College Place, College Place, WA. 99324
PHONE NUMBER: 509-526-9287 AFTER HOURS: 509-540-8461
HOURS OF OPERATION: Monday thru Thursday 8:00AM to 12:00PM – 1:00PM to 5:00PM
Friday 8:00AM to 12:00PM
CONTACT NAME: Joan Skifstad

EMERGENCY LABORATORY: Benton County Health Department
7102 West Okanogan Place
Kennewick, WA. 99336
PHONE NUMBER: 509-460-4200 AFTER HOURS: 509-546-9909
HOURS OF OPERATION: Monday thru Friday 8:00AM to 5:00PM

ROUTINE COLIFORM SAMPLES

The Total Coliform Rule requires coliform samples be collected from representative points (areas) in the distribution system at regular time intervals. They must never be collected from a source. A properly developed and implemented CMP will ensure that you monitor each area of the distribution system adequately on a regular basis.

Coliform bacteria tend to cluster and do not evenly disperse within a distribution system. It is possible for two samples taken a few minutes apart from the same tap to have different results, one indicating the presence and the other indicating the absence of coliform. This happens because a cluster of bacteria can break up, mix up, and move to other parts of the distribution system.

The minimum number of required samples depends on the population the water system serves each month. The minimum number of samples the rules require will likely ensure water quality monitoring thoughout the distribution system of a "simple" water system. A "simple" system usually has one or two sources and a single pressure zone.

It is best to collect the routine sample at the beginning of the week. Many labs do not accept samples at the end of the week or on weekends. Even if your lab does accept samples, it is often hard for a water system to respond properly to sample results on a Friday afternoon or weekend day.

Avoid collecting routine coliform samples during weeks that contain holidays and vacations unless you know trained staff and lab capacity are available to respond to unsatisfactory sample results.

REPEAT COLIFORM SAMPLES AND TRIGGERED SOURCE SAMPLES

The Total Coliform Rule requires the collection of repeat samples within 24 when routine distribution system sample is unsatisfactory.

The Groundwater Rule requires you to collect source samples from every source that was in use when you collected the routine sample.

SYSTEMS COLLECTING TWO OR MORE ROUTINE SAMPLES EACH MONTH MUST TAKE A TOTAL OF THREE REPEAT SAMPLES FROM THE FOLLOWING LOCATIONS:

1. The same tap as the original unsatisfactory routine sample.
2. An active service within five active connections upstream from the original unsatisfactory sample location
3. An active service within five active connections downstream from the original unsatisfactory sample location.

In addition to the requirements above, you must collect a triggered source sample from each groundwater source in use when you collected the unsatisfactory routine sample. You must collect source samples prior to any treatment. You should mark these samples as "raw water" on the coliform sample form. It is important to add the DOH source number so you can get credit for the raw source sample.

COLIFORM SAMPLE SITE SELECTION

You must select routine sample sites that represent the varying conditions that exist throughout the distribution system. With properly located sites, you can identify changes in water quality and possible causes for the changes. Sample sites should reflect the complexity of the system and focus on areas of concern, such as low-pressure zones, cross-connection hazards, dead end lines, deteriorating water mains, areas susceptible to stagnation due to low water use, or other questionable conditions.

It is recommended that most systems whether "simple" or "complex," have more routine sample sites than needed each month. For example a system that is required to have three sample sites may have four sample sites. These routine sample sites should be rotated throughout the year. Example, sample one site in January, a different one in February, a different one in April, ect.

It is recommended collecting samples from the source and the storage reservoir on a regular basis. Mark these samples as "investigative." They don't count as compliance samples.

Be careful when selecting sample taps. You can use both customer service connections and dedicated sampling stations. When selecting sites, it is important to remember that samples from a customer's tap may be affected by conditions that don't accurately reflect conditions in the distribution system.

During routine and repeat sampling, you may determine a site no longer represents the conditions within the distribution system. You should remove this sampling site from the Coliform Monitoring Plan and replace it with a site that better represents the conditions within the distribution system.

WHEN SELECTING SAMPLE TAPS AVOID:

- Swivel Faucets
- Hot/cold "mixing faucets" such as faucets with a single lever.
- Drinking fountains
- Janitorial sinks
- Frost-free hose bibs
- Leaking or spraying faucets
- Faucets below ground or near ground level
- Faucets served by home filters or other home treatment systems
- Hydrants

NOTE TO SAMPLE COLLECTOR

Assess the representative status of each sample site each time a sample is collected. Use your best judgment to sample or not. The sample collector may choose not to take a sample from a scheduled site if the assessment reveals current or recent off-normal events at the sample site. Off-normal events include construction at the facility where the sample site is located, modification to the plumbing at the sample site, or an activity at the sample site that may have compromised the sanitary integrity of the sample faucet. The sample collector should have the knowledge and authority to choose a different site when circumstances make the scheduled site unsuitable to give a sample that represents the distribution water quality.

Chlorinated systems should also remind sample collectors to measure the free chlorine residual when they collect the sample. Collectors should note the measurement on the sample form they will submit to the lab with the sample.

When a routine distribution sample is total coliform present, all groundwater sources that were in use when the routine sample was collected must be sampled for E. coli.

Routine sample sites should be rotated on a weekly basis. The sample collector should rotate through each sample site about three to four times each year.

Routine, Repeat, and Triggered Source Sample Locations

Address for Routine Sample	Location for Repeat Sample Site	Sources for Triggered Sample Sites (1)
X1 510 East Gurnsey	1-1 510 East Gurnsey	SO1 Well #2
	1-2 1402 South 5th	SO2 Well #3
	1-3 1403 South 4th	SO3 Well #1
X2 111 South First Street	2-1 111 South First Street	SO1 Well #2
	2-2 209 East Clay	SO2 Well #3
	2-3 203 South First	SO1 Well #1
X3 224 West Richmond	3-1 224 W. Richmond	SO1 Well #2
	3-2 220 W. Richmond	SO2 Well #3
	3-3 417 N. Willow	SO3 Well #1
X4 800 Stockton Lane	4-1 800 Stockton Lane	SO1 Well #2
	4-2 731 Stockton Lane	SO2 Well #3
	4-3 722 Stockton Lane	SO3 Well #1

(1) Triggered – Samples taken only from those wells in service when unsatisfactory sample was taken.

SAMPLE SITE ROTATION

January 510 East Gurnsey , 111 South 1st , 224 W. Richmond
February 111 South First Street, 800 Stockton Lane, 510 E. Gurnsey
March 224 West Richmond, 800 Stockton Lane, 510 E. Gurnsey
April 800 Stockton Lane, 111 S. 1st , 224 West Richmond.

May 510 East Gurnsey, 111 S. 1st , 224 W. Richmond
June 111 South First Street, 800 Stockton Lane, 510 E. Gurnsey
July 224 West Richmond, 800 Stockton Lane, 510 E. Gurnesy
August 800 Stockton Lane, 111 S. 1st, 224 W. Richmond

September 510 East Gurnsey, 111 S. 1st , 224 W. Richmond
October 111 South First Street, 800 Stockton Lane, 510 E. Gurnsey
November 224 West Richmond, 800 Stockton Lane, 510 E. Gurnsey
December 800 Stockton Lane, 111 S. 1st , 224 W. Richmond.

FIVE ROUTINE SAMPLE LOCATIONS – MONTH AFTER AN UNSATISFACTORY SAMPLE

Location for routine sample sites Unsatisfactory previous month	Location for the five routine sample sites (1)
X1 510 East Gurnsey	X3 224 West Richmond X2 111 South First Street X4 800 Stockton Lane X1 510 East Gurnsey X2 111 South First Street
X2 224 West Richmond	X2 111 South First Street X4 800 Stockton Lane X1 510 East Gurnsey X3 224 West Richmond X4 800 Stockton Lane
X3 111 South First Street	X3 224 West Richmond X4 800 Stockton Lane X1 510 East Gurnsey X2 111 South First Street X3 224 West Richmond
X4 800 Stockton Lane	X1 510 East Gurnsey X4 800 Stockton Lane X3 224 West Richmond X2 111 South First Street X1 510 East Gurnsey

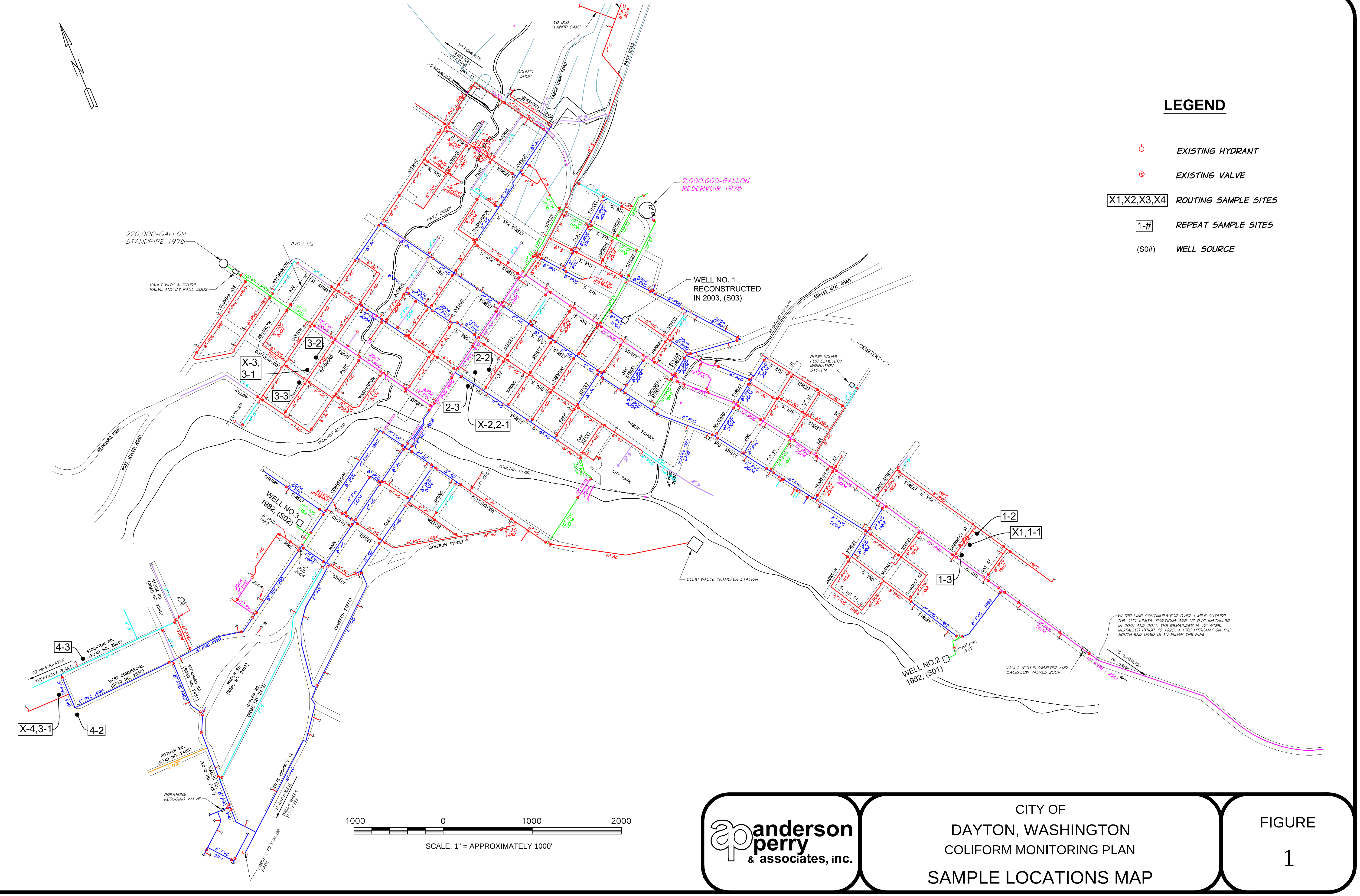
1 NOTE TO SAMPLE COLLECTOR:

You should not take a sample from the location of the UNSATISFACTORY sample site from the previous month the same day as the sample from one of the five the following month samples. Just as long as it is taken in the same month. Example: Say the BAD sample was at 224 West Richmond, the next month you would take a sample from 224 West Richmond. As you can see above 224 West Richmond is on the list of the 5 routine sample sites, just don't take the sample from the same site the same day, just take it in the same month.

COLIFORM (COAL-i-form)

A group of bacteria found in the intestines of warm-blooded animals (including humans) and also in plants, soil, air and water. Fecal coliforms are a specific class of bacteria which only inhabit the intestines of warm-blooded animals. The presence of coliform bacteria is an indication that the water is polluted and may contain pathogenic organisms.

R:\Clients\Dayton\918-120 Water System Update\020 Plan Update\Water System Figure 1.dwg, 3/17/2015 10:19:41 AM



LEGEND

-○-	EXISTING HYDRANT
⊗	EXISTING VALVE
X1,X2,X3,X4	ROUTING SAMPLE SITES
1-#	REPEAT SAMPLE SITES
(S0#)	WELL SOURCE

anderson perry & associates, inc.

CITY OF
DAYTON, WASHINGTON
COLIFORM MONITORING PLAN

SAMPLE LOCATIONS MAP

FIGURE
1

EMERGENCY RESPONSE CITY OF DAYTON 2015

System I.D. 18250 3

City of Dayton Water System
303 South Cottonwood
Dayton, WA. 99328

East Route 12, come into Dayton turn right on Cottonwood Street approximately 2 blocks South on the left hand side is the City Shop.

West Route 12, come into Dayton turn left on Cottonwood Street approximately 2 blocks South on the left hand side is the City Shop.

The City of Dayton has 3 deep wells.
Well #1 is located on 500East Tremont Street. It has the capacity to pump 700 gallons per minute by a 175 HP Crown 8 submersible motor. The well is 1,303 feet deep and has a cement surface seal.

Well #2 is located at 1540 South 2nd Street. It pumps 1,100 gallons per minute by a 300 HP Byron Jackson submersible motor. With a booster pump it could pump 1,700 gallons per minute. The well is 1,425 feet deep and has a cement surface seal.

Well #3 is located at 410 West Commercial Street. It pumps 1,100 gallons per minute by a 300 HP Byron Jackson submersible motor. With a booster pump it could pump 1,700 per minute. The well is 1,180 feet deep and has a cement surface seal.

Wells #2 & #3 are set up to be operated by a mobile trailer mounted caterpillar 3409 generator, 450 HP during a power outage. The wells cannot be ran together, only one well can be operated at a time. Well #1 is not set up for the generator.

Wells #1, #2 and #3 each have their own separate chlorinator. The chlorine used is hypochlorite tablets 65% available chlorine.

The City has two water storage tanks. One is a 2 million gallon reservoir located on the East end of town and a 220 thousand gallon standpipe located on the North end of town. The 2 million gallon reservoir has two inlet/outlet valves, the 220 thousand gallon standpipe has one inlet/outlet valve.

The levels of the reservoir and the standpipe are monitored by the telemetry system. The pumps are monitored by the telemetry system. Set levels are programmed into the telemetry and the pumps come on or off according to the set levels, there are also high/low level alarms, power outage alarms, Cl2 alarms. When there is a power outage the auto dialer starts dialing phone numbers of the City Crew members and also the Sheriffs office. A list of the City of Dayton crew members by call number, name and telephone numbers:

The City of Dayton has approximately 24 miles of distribution lines ranging from 2" to 12". The residential services normally are either 5/8 x ¾" and 1". The number of service connections is 1,477. The latest population number is 2,720 for the City of Dayton.

System owner: City of Dayton
City Superintendent: Jim Costello, Water Distribution Manager 3, Water Pollution Control Plant Operator 3, Wastewater Collection Specialist 3, Phone #509-382-2361 or Cell #509-386-0875

City Assistant Superintendent: Sal Benavides, Water Distribution Manager 2, Cross Connection Control Specialist. Phone #509-382-2361 or Cell #509-386-8613

When an emergency happens the crew will meet at the site of the problem or at the City Shop. The service van, backhoe, water truck, trash pumps, plumbing equipment, parts, barricades, caution tape, radios and other items are located.

Chain of command:
Jim Costello, City Superintendent
Handle in coming phone calls and administrative support, provide information to the public and media, contact customers, asses the systems facilities and operations in the field, organize and carry out repairs. Direct employees.
Sal Benavides, City Assistant Superintendent, Contact customers, organize and carry out repairs, asses the systems facilities and operations in the field. Direct employees.
Dave Elkins, Leadman. Organize and carry out repairs, put employees where needed on the repairs as he sees needed.

In the absence of the City Superintendent the Assistant Superintendent is in charge and the Leadman is next in line.

FLOODING: The main street bridge has a watermain on both sides of the bridge, there are isolation valves on the east and west sides of the bridge in case of the waterlines being broken during at high water event. South of the main street bridge is a foot bridge with a waterline on the north side of the bridge with isolation valves on both sides of the bridge. There is no water storage on the west side of the Touchet River, so if the waterlines on both bridges are no longer able to operate, well #3 could supply water to the west side being regulated by fire hydrants.

HIGH WINDS: The City of Dayton has experienced high winds in the past and power has been disrupted.

EARTHQUAKE: Low probability of risk.

ICE STORM: Low probability of risk.

DROUGHT: Low probability of risk.

TERROISM: Low probability of risk.

CONSTRUCTION ACCIDENT: Low probability of risk.

CHEMICAL SPILL: Low probability of risk.

Emergencies usually have a wide range of severity. Defining categories of severity can significantly aid in determining appropriate response actions. Knowing the severity of the emergency and being able to communicate it to others will help system personnel keep their response balanced and effective.

LEVEL I EMERGENCY, NORMAL ROUTINE EMERGENCY

Service line breaks and or problems
Main line breaks or leaks.
Minor problems at well sites
Minor problems with telemetry
Other minor problems which it is not likely that public health will be jeopardized.

LEVEL II EMERGENCY, MINOR EMERGENCY (ALERT STATUS)

Disruption in water supply such as transmission main line break, pump failure, loss of pressure, potential backflow.

LEVEL III EMERGENCY, SIGNIFICANT EMERGENCY

A verified acute confirmed coliform MCL or E. coli/fecal positive sample requiring immediate consideration of a health advisory notice to customers.

A confirmed sample of another primary contaminant requiring immediate consideration or a health advisory notice to customers.

A loss or complete malfunction of the water system, including chlorination.

A major line break or other system failure resulting in a water shortage or requiring system shutdown.

An act of vandalism or terrorist threat such as intrusion or damage to a primary facility.

An immediate threat to public health of the customers and an advisory is required.

Severe drought significantly affecting well yield.

LEVEL LV EMERGENCY, CATASTROPHIC DISASTER/MAJOR EMERGENCY

Earthquake that shuts down the system or impacts sources, lines, ect

Act of terrorism possibly contaminating the water system with biological or chemical agents.

Chemical spill within 2000 feet of the sytems sources

Storm that significantly damages power grid and system facilities.

Mudslide or other earth shift that causes failure of transmission or loss of water in well.

WATER SHORTAGE

Verify problem, consult with staff for best plan to solve problem.
If needed to inform public make up a form with appropriate information and distribute.

Outside water use, depends on emergency.
No outside use at all.
Watering lawns only from 6:00 am to 12:00 noon then again from 6:00 pm to 10:00 pm and by house numbers, odd and even to go with odd and even days.

Inside use of water, depends on emergency. Consumption of water may be a boil order, bottled water only. Use of sink and toilets permitted.

After the emergency is over, fixed, resolved the public would be notified to go back to full use of water or there may be stipulations before full use can be put back into place.

WATER QUALITY SAMPLING

Coliform Bacteria testing, Walla Walla Regional Water Testing Services. Daytime 509-526-9287
After hours/emergencies 509-540-8461
Hours of operation: Monday thru Thursday 8:00AM to 12:00PM – 1:00PM to 5:00Pm
Friday 8:00AM to 12:00PM
Contact Name: Joan Skifstad

Emergency Lab: Benton County Health Department
7102 West Okanogan Place
Kennewick WA. 99336
Phone: 509-460-4200 After Hours 509-546-9909
Hours of Operation: Monday thru Friday 8:00AM to 5:00PM

Chlorine testing is done daily by city staff.
All other testing is done by Anatek Labs, 1282 Alturas Drive, Moscow. ID
Phone #208-883-2839 Fax #208-882-9246

EFFECTIVE COMMUNICATION

Example notification.

The City of Dayton Water Department is experiencing problems in the water system, and are doing everything we can to solve the problem. Our primary concern is to protect the public health. An important part is to keep the system operational for emergencies such as fire protection or any other damage from occurring.
What we know now is that we have positive bacterial test.
We will keep you informed as soon as we learn more.
We have contacted the State and local officials to help us respond effectively.
If you think you are ill or need medical advice, contact a physician.
We are sampling the water and doing tests to determine whether there is contamination in the water system.
If you choose to use the city water boil it or use bottled water until further notice.
Thank you for your cooperation.

VULNERABILITY ASSESMENT

Assessing the facilities.

Well #1. Well #1 is a deep well 1.303 feet deep. This well site was made new in 2004 and is in excellent condition. 2012 new pump motor, pump rebuilt. The well head and pump house are fenced and has outside lighting. The door and gates are always locked.

Well #2. Well #2 is a deep well 1,425 feet deep. The pump and motor were rebuilt August 2001 the transformer was replaced. In 2003 the inside of the electrical control panel several components and wires were replaced. In 1996 pump and motor replaced.
In 1999 the motor replaced. 03-2013 pump and motor replaced.
The well house was painted in 2002 and in excellent condition. The well head and pump house are fenced and has outside lighting. The gates and door are always locked.

Well #3. Well #3 is a deep well 1,180 feet deep. The pump and motor were replaced in the spring of 2007. Pump house was painted in 2002 and is in excellent condition. The well head and pump house are fenced. There is outside lighting. The door and gates are always locked.

The vault for the altitude valve was installed in 2002 and is located at the bottom of the standpipe. It is ground level and is always locked.

The 220,000 gallon standpipe is located north of town and is fenced in. It was repainted on the outside and recoated on the inside in 2003 and is in excellent condition. The standpipe was built in 1978.

The 2 million gallon reservoir is located east of town and is fenced in. It was repainted on the outside and recoated on the inside in 2003 and is in excellent condition. The reservoir was built 1978.

The computer for the telemetry system is located at the city shop. It was installed in 2003. Other componets of the telemetry system are located at wells #1, #2, #3 and at the standpipe and the reservoir.

POWER OUTAGE.

For the most part there are not that many power outages here. The city has a backup generator for wells #2 and #3. When power does go out the wells cannot be ran together, just one at a time. Well #1 does not have the ability to be connected to the generator.
When the power goes out the alarms go off and the auto dialer starts calling phone numbers including the Sheriffs office and the Sheriffs office also starts calling city employees to respond to the power outage.
The first thing is to try and determine if the whole city is out of power, sometimes it is just part of the town and one or two of the pumps are not effected if that's the case then if needed switch the lead pumps. If the whole city is without power then determine what the water level is and decide weather to start the generator or not. If water levels are getting low or if in a high water

demand part of the year, start the generator. If it is decided to start the generator, (see instructions sheets included) check fuel level, check oil level, check coolant level and if the block heater is working. After the generator is started observer operation of the pump, observe the gauges on the generator for proper fuctions. Phone call to the power company to let them know we have no power and how long the power will be out if possible. Once the power is restored the generator is put through a cool down cycle and shut off. Recheck oil, coolant, fuel levels. Call fuel company to refill fuel tank. Call the power company let them know we have power and thank them for getting power back on. Observe pumps and telemetry for proper operations before leaving.
Colman Oil supplies the fuel, 509-382-4191
Pacific Power, local service man 509-520-8552

ALTERNATE WATER SOURCES

Bottled water is an alternate. The are several stores in town that carry bottled water.
The Pepsi company in Walla Walla handles bottled water.

The are contractors in town that have water trucks, also the fire department has tankers. The City of Waitsburg is 9 miles away and they may or may not be out of power at the same time as the City of Dayton and we have an agreement if we need to haul water from them or if they need to haul water from us it can be done. The City of Dayton has a water 1,100 gallon water truck.

CURTAILING WATER USE

The City of Dayton has had to put on water restriction in the past due to the loss of a well pump. The city put out information door to door, in the newspapers and on the local television. The restrictions were on outside water use. Outside watering hours were from 6:00AM to 12:00 noon, then from 6:00PM to 10:00PM. It worked out fine. The next step was to go to odd even days matching odd even addresses. The curtailment information is continued until the emergency was corrected.

RETURNING TO NORMAL OPERATION.

All three water sources are equipped with chlorination. Chlorination is continuous. If needed to bump up the chlorine it can at the well sites. Chlorine can be manually dumped into the standpipe and reservoir if needed. To manually add chlorine to the standpipe and reservoir you have to climb to the top and open the hatch to dump the chlorine in. Flushing of the systems can be accomplished by opening fire hydrants and purging the water. Bacterial samples will be taken and passed before lifting the water restrictions or what ever test need to be taken before lifting the water restrictions.
The Department of Health will be contacted and informed of any and all changes made to correct the problems. City of Dayton customers will be informed of the condition of the water system and that the water restrictions are no longer in effect.

COLUMBIA COUNTY EMERGENCY MANAGEMENT DEPARTMENT

Contact Lisa Caldwell, 509-382-2518. The Columbia Emergency Management Department is available for assistance if and when the emergency is too big, catastrophic and other outside help, advise, assistance, equipment, what have you is needed.

Dayton City Crew Phone Numbers

P-4 Jim Costello home 509-382-3063 Cell 509-386-0875
P-5 Rod Smith home 509-382-4316
P-8 Rob John home 509-382-3124 cell 509-240-3258
P-9 Sal Benavides home 509-240-2994 cell 509-386-8613
P-10 Lloyd Fletcher home 509-382-3066 cell 509-540-5700
P-11 Don Moton home 509-382-1680
P-13 Dave Sweetwood home 509-382-3059 cell 509-386-4452
P-16 Dave Elkins home 509-382-4165 cell 509-780-1389
007 Mike Bowhay home 509-382-4675 cell 509-386-5633
City Shop 509-382-4571

EMERGENCY NOTIFICATION NUMBERS

Sheriff's Office 509-382-2518 or 509-382-1100
Wastewater Treatment Plant 509-382-2937
Hospital 509-382-2531
Emergency 911
Utility Locate 811 or 800-424-5555
City Hall, Trina Cole, City Clerk 509-382-2361
Fire Department 509-382-4281
Mayor Craig George 509-382-2361
Columbia Emergency Management. Lisa Caldwell 509-382-2518
Department of Ecology Emergency Spill 509-329-3400
Department of Ecology Main Line 509-329-3400
Department of Health Main Line 509-456-3115
Columbia Cnty Health Dept. 509-382-2181
Touchet valley Television 509-382-2132
Dayton Chronicle 509-382-2221
Waitsburg Times 509-337-6631

OTHER IMPORTANT PHONE NUMBERS

Dayton Electric 509-991-6011 or 509-382-3081
Correct Equipment, chlorine supplier 425-869-1233
Anderson Perry 509-529-9260
Anatek Labs, water testing 208-883-2839
Roger Trump Columbia Cnty Road Superintendent 509-520-4459
Total Energy, Ryan Harris, Telemetry 509-946-4500 or 509-727-8699
Pacific Power & Light, local lineman 509-520-8522
Pacific Power & Light, Bill Clemons 509-520-7788
Gemmells Machine Shop, 509-382-4159
Jim Korsberg, Local Contractor 509-382-4648
Bob Yoast, local contractor 509-382-4904
Wilbur Flectcher, local contractor 509-382-4461 or 509-991-9551
Bruce Larkin, local contractor 509-990-5587
Dayton Mercantile, local grocery store, bottled water, 509-382-2563
Pik-A-Pop, local mini mart, bottled water 509-382-9952
General Store, local mini mart, bottled water 509-382-1042

Hugh's Supple, supplier of water & sewer pipe, ect 509-456-0531
Department of Health 509-456-3115
Department of Ecology 509-329-3400
Health Department, local office 509-382-2181
Department of Transportation 509-527-4548
City Lumber, parts and tools 509-382-4211
Skyline Parts, automotive supplies 509-382-2573
Ferguson Supply, water & sewer supplier, Dick Coyle 800-795-6642 or cell 509-780-9785
H.D. Fowler, water & sewer supplier, Mark Brain 509-545-0255 or cell 509-727-7076
Columbia County Engineer 509-382-2534
Columbia County Shop 509-382-2652
Pepsi Cola Bottling Co. Bottled water 509-525-7200

ORDINANCE NO. 1510

AN ORDINANCE to provide for
Cross Connection Control

WHEREAS, it is the desire of the City Council of the City of Dayton to include provisions for Cross Connection Control as outlined in WAC 248.54.285.

THEREFORE, be it hereby ordained by the City Council of Dayton as follows:

"Cross Connection Control" The purpose of this ordinance is to protect the water supply of the City of Dayton from contamination or pollution from potential cross connections; promote the elimination or control of existing or potential cross connections; and assure that approved backflow devices are tested annually. The installation or maintaining of any actual or potential cross connection which would endanger the purveyor's public drinking water system is prohibited. Any such cross connection now existing is hereby declared unlawful and shall be removed immediately or face penalty. Water service to any premise shall be contingent upon the customer providing cross connection control in a manner approved by the purveyor. The control or elimination of cross connections shall be in accordance with the State of Washington Administrative Code (WAC 248-54-285), or any superseding WAC. The policies, procedures and criteria for determining appropriate levels of protection shall be in accordance with the, Accepted Procedure and Practice in Cross Connection Control Manual - Pacific Northwest Section-American Waterworks Association, Fourth Edition, or any superceding editions, however, the authoritative body (as the City Superintendent) of the purveyor may establish requirements for cross connection control more stringent than the state requlation if it is determined that conditions so dictate. It shall be the responsibility of the City of Dayton to protect the public drinking water system from contamination due to cross connection. Backflow devices required to be installed shall be a model approved by the State Department of Health. Authorized employees of the City of Dayton with proper identification shall have free access at reasonable hours of the day, to all parts of a premises or within buildings to which water is supplied."

"Definitions:

(a) Backflow - The flow other than the intended direction of flow, of any foreign liquids, gases or substances into the distribution system of the public drinking water system.

(b) Contamination - The entry into, or the presence in, the public drinking water system of any substance or matter when present in drinking water above an acceptable level may adversely affect the health of the consumer and/or the aesthetic qualities of the water consumed.

(c) Cross Connection - Any physical arrangement connecting a public drinking water system, directly or indirectly, with anything other than another public drinking water system , capable of contaminating the public drinking water system as a result of backflow.

(d) Department - The Washington State Department of Social & Health Services.

(e) Public Drinking Water System - Any water system or supply intended or used for human consumption or other domestic uses; including source, treatment, storage, transmission and distribution facilities where water is furnished to any community, collection or number of individuals; however excluding a system serving one single family residence.

(f) Purveyor - (The City of Dayton), or its authorized agent.

(g) Service - A physical connection between the public drinking water system and customer's system.

(h) Customer - Any person, firm or corporation that is furnished drinking water through a legal service connection to the drinking water system.

(i) Illegal User - Any person, firm or corporation that is not authorized by the purveyor to use a customer's service."

"Penalty. Service to any premise receiving its water from the purveyor's public drinking water system shall be contigent upon compliance with all rules and regulations of the department and the purveyor. Service shall be discontinued to any premise for failure to comply with the rules and regulations of the department and this purveyor." A minimum penalty of $100, and a maximum, of the total cost of clean up of the cross connection including any liability of health directly related to such cross connection.

Section 3. This ordinance will be added to the City Code section 4 - . Service to New Facilities--Inspection.

Section 4. This ordinance shall become effective from and after its passage by the Council, approval by the Mayor and publication as required by law.

PASSED BY THE CITY COUNCIL this 12 day of MARCH ,1991.

APPROVED;

Bette Lou Crothus

Greg Lewis, Mayor Pro-Tem

ATTEST:

Don Avery

Don Avery, City Clerk

APPROVED AS TO FORM:

Greg L. Lutcher, City Attorney

CITY OF DATYON

WATER SYSTEM PLAN

CROSS-CONNECTION DATABASE

Owner	Address	Make	Size	Type	Serial #	Date Tested	Date Due	Tester		Comments
Russell Fletcher	224 N. Touchet	???	3/4"	DC	77877	4/28/2011	**4/10/2012**	Herres B -5569		Out of Service
Bryan Buroker	240 N. Touchet	Febco	3/4"	DC	831225	7/28/2011	**7/28/2012**	Herres B - 5569		Out of Service
Tomlinson / Black	254 E. Main	Watts	1"	RP	58985		**9/23/2012**	Herres B - 5569		Out of Srvice
City of Dayton	111 S. 1st	Watts	1/2"	RP	56780	12/29/2011	**12/29/2012**	Herres B - 5569		
Seth Horwitz	109 W. Patit	Conbraco	3/4"	DC	MV105	7/16/2012	**4/15/2013**	Herres B - 5569		
City of Dayton	Pool	Watts	1/2"	RP	57882		**4/15/2013**	Herres B - 5569	F	
Walt Sinkbeil	515 N. Front	Wilkins	3/4"	DC	1439075	!!?????	**5/1/2013**	Herres B -5569		Out of Service
GrainHouse Grill	232 E. Main	Watts	1/2"	RP	386496	6/7/2012	**5/8/2013**	Herres B - 5569		Closed
????	517 S. 4th	Wilkins	1"	DC	2007431	5/10/2012	**5/10/2013**	Knowles B - 5316		Empty
Cody Smith	113 W. Dayton	Febco	3/4"	DC	AK4139	5/10/2012	**5/10/2013**	Knowels B - 5316		Out of Service
City of Dayton	Pool	Watts	3/4"	RP	100824		**5/15/2013**	Herres B - 5569		Out of Service
David Price	815 S. 3rd	Wilkins	1"	DC	2234687	6/9/2012	**5/15/2013**	Herres B - 5569		
Bill Peters	518 N. 1st	Wilkins	1"	DC	2467892	7/16/2012	**7/16/2013**	Herres B - 5569		House Empty
Dan Andrews	1316 S. 5th	Wilkins	3/4"	DC	2448105	10/1/2012	**9/23/2013**	Herres B -5569		Out of Service
Bear Paw	250 E. Main	Watts	1"	RP	174872		**9/23/2013**	Herres B - 2339		Out of Service
Dayton Post Office	202 S. 2nd	???	3/4"	RP	108233	3/29/2013	**3/31/2014**	Knowles B - 5316		
PDQ	403 E. Main	Watts	1/2"	RP	256893	11/6/2014	**4/1/2015**	Herres B -5569	F	
Columbia REA	115 E. Main	Watts	1/2"	RP	A53220	6/11/2013	**4/10/2014**	Knowles B - 5316	F	
Doug Johnson	506 S. 1st	Watts	1/2"	RP	57533	10/23/2013	**4/15/2014**	Herres B-2339		
City of Dayton	Park	Watts	4"	DC	174496	8/15/2013	**4/15/2014**	Herres B - 5569		
Don Hodgson	214 S. 6th	Watts	1/2"	RP	129135	8/15/2013	**4/15/2014**	Herres B -5569	F	
Col. Co. Fairgrounds	PO Box 5	Wilkins	2"	RP	509977	6/6/2013	**4/15/2014**	Herres B - 5569		
City of Dayton	Pool	Wilkins	3/4"	RP	3156987	6/6/2013	**4/15/2014**	Herres B - 5569		
Best Western	5th / Main	Wilkins	3"	DC	J41002	4/16/2013	**4/16/2014**	Stafford B - 4247		
Best Western	5th / Main	Watts	1-1/4"	RP	OO6842	11-06014	**4/16/2015**	Herres B - 5569		
Best Western	5th / Main	Watts	1-1/4"	RP	O1463	11/6/2014	**4/16/2015**	Herres B -5569		
Best Western	5th / Main	Watts		RP	391872	11/6/2014	**4/16/2015**	Herres B -5569		
Patit Creek Home	423 W. Main	Ames	3/4"	DC	16278	6/12/2013	**5/5/2014**	O'Brien B - 5934		
Ryan Jones	818 E. Spring	Wilkins	1-1/4"	DC	868589	11/22/2013	**5/13/2014**	Herres B - 5569		
Patit Creek Home	423 W. Main	Ames	3"	DC-d	110301	6/12/2012	**5/15/2014**	O'Brien B - 5934		
Dayton School Dist.	609 S. 2nd	Wilkins	3"	DC	J22612	6/6/2013	**5/31/2014**	Herres B - 5569		
Blue Mt. Station	Port of Columbia	Wilkins	1-1/2"	DC	a098085	8/15/2013	**6/1/2014**	Herres B - 5569		
Rosie Archer	105 Maple Lane	Wlikins	1-1/4"	DC	A247743	6/13/2013	**6/13/2014**	Knowles B - 5316		
Seth Murdock	400 E. Clay	Wilkins	1"	DC	?	5/24/2014	**6/21/2015**	Herres B - 5569		
Rufus Craighead	203 E. Patit	Wilikins	1"	DC	2356859	8/15/2013	**7/1/2014**	Herres B - 2339		
Ellen Johnson	301 N. Cottonw.	Wilkins	3/4"	DC	3304490	6/24/2013	**7/1/2014**	Herres B - 5569		
D.O.T.	529 W. Main	Wilkins	1-1/2"	DC	2154381	6/4/2013	**7/3/2014**	Adams B - 3727	F	
Karen Williams	308 S. 2nd	Wilkins	1"	DC	A2100093	7/16/2013	**7/16/2014**	Sickles B - 5827		
Weinhard Café	258 E. Main	Wilkins	1"	RP	W101571	11/6/2014	**9/23/2015**	Herres B- 5569		
Blue Mt. Council	221 E. Wash.	Watts	1/2"	RP	60004	11/4/2014	**10/1/2015**	Herres B - 5569	F	
Karen Thronson	302 S. 2nd	Watts	1/2"	RP	108348	11/11/2013	**11/12/2014**	Herres B - 2339	F	
Passmore Dental of	202 E. Main	Wilkins	3/4"	RP	3492613	1/3/2014	**11/15/2014**	Herres B 2339		
Elk Drug	176 E. Main	Watts	1/2"	RP	59353	11/4/2014	**11/24/2015**	Herres B - 5569	F	
Anna Thomas	317 E. Patit	Wilkins	1/2"	RP	W055236	1/3/2014	**12/10/2014**	Herres B -5569		
City of Dayton	111 S. 1st	Watts	1"	RP	78116	1/3/2014	**12/28/2014**	Herres B - 2339		
City of Dayton / WW	111 S. 1st	Watts	2"	RP	144725	11/4/2014	**12/28/2015**	Herres B - 5569		
Chief Sprins Pizza	134 E. Main	Watts	1/2"	RP	59976	1/22/2014	**12/29/2014**	Reese B - 5855		
City of Dayton	111 S 1st	Watts	3/4"	RP	95329	1/3/2014	**12/29/2014**	Herres B - 2339		
Dayton School Dist.	609 S. 2nd	Febco	4"	DC	C1229	1/3/2014	**12/29/2014**	Herres B - 2339		
Dayton School Dist.	609 S. 2nd	Watts	1"	RP	45295	1/3/2014	**12/29/2014**	Herres B - 2339		
Dayton School Dist.	609 S.2nd	Watts	1/2"	RP	56774	1/3/2014	**12/29/2014**	Herres B - 2339		
Dayton School Dist.	609 S.2nd	Watts	3/4"	RP	94533	1/3/2014	**12/29/2014**	Herres B - 2339		
Dayton School Dist.	609 S.2nd	Watts	1/2"	RP	56776	1/3/2014	**12/29/2014**	Herres B - 2339		
Dayton School Dist.	609 S.2nd	Watts	3/4"	RP	90332	1/3/2014	**12/29/2014**	Herres B - 2339		
Dayton School Dist.	609 S. 2nd	Watts	3/4"	RP	146958	1/3/2014	**12/29/2014**	Herres B - 2339		
Dayton School Dist.	609 S. 2nd	Watts	1/2"	RP	57538	1/3/2014	**12/29/2014**	Herres B - 2339		
Chuck Reeves	105 W. Clay					1/3/2014	**1/3/2015**	Herres B 2339	F	

CITY OF DATYON
WATER SYSTEM PLAN
CROSS-CONNECTION DATABASE

Owner	Address	Make	Size	Type	Serial #	Date Tested	Date Due	Tester		Comments
Liberty Theater	344 E. Main	Watts	3/4"	RP	4370	1/3/2014	**1/4/2015**	Herres B - 2339		
Fish & Wildlife	401 S. Cottonw.	Watts	3.4"	RP	172777	1/3/2014	**1/12/2015**	Herres B - 2339		
Port of Columbia	700 Artisan Way	Watts	2"	RP	306286	1/13/2014	**1/13/2015**	Herres B - 5569	N	
Col. Co. Firestation	206 W. Main	Wilkins	3/4"	RP	W197669	2/4/2014	**1/23/2015**	Herres B - 5569		
Fiesta En Jalisco	404 W. Main	Watts	1/2"	RP	A47091	2/4/2014	**1/27/2015**	Herres B - 5569		
Fiesta En Jalisco	404 W. Main	Watts	1/2"	RP	A52951	2/4/2014	**1/27/2015**	Herres B - 5569		
Ray's Drive In	221 W. Main	Conbraco	3/8"	RP	Z6860	2/4/2014	**2/21/2015**	Herres B - 5569		
Tucannon Meats	406 E. Main	Watts	3/4"	RP	46030	2/4/2014	**2/21/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Watts	1"	RP	37189	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Watts	2"	RP	88288	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Wilkins	1-1/2"	RP	1454648	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Ames	2-1/2"	DC	1200426020	2/11/2014	**2/25/2015**	Herres B - 5569	F	
Dayton Gen. Hosp.	1012 S. 3rd	Ames	3/4"	DC	26068	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Wilkins	3/4"	RP	W144038	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Watts	3/4"	RP	95334	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Febco	3/4"	RP	R5621	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Wilkins	1"	RP	1585800	2/4/2014	**2/25/2015**	Herres - B 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Wilkins	6"	DC	W84767	2/11/2014	**2/25/2015**	Herres B - 2339		
Dayton Gen. Hosp.	1012 S. 3rd	Watts	1/2"	RP	228100	2/4/2014	**2/25/2015**	Herres B - 5569	F	
Dayton Gen. Hosp.	1012 S. 3rd	Watts	1/2"	RP	122241	2/11/2014	**2/25/2015**	Herres B - 2339	F	
Dayton Gen. Hosp.	1012 S. 3rd	Watts	3/4''	SVP	45828	2/4/2014	**2/25/2015**	Herres B - 5569		
Shell Service Center	401 W. Main	Wilkins	1/2"	RP	455519	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Wilkins	1"	RP	3542596	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Febco	3"	DC	N1205071134	2/14/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Wilkins	1"	RP	3542595	2/4/2014	**2/25/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Watts	2"	RP	94527	2/4/2014	**2/25/2015**	Herres B - 5569	F	
Dayton Gen. Hosp.	1012 S. 3rd	Wilkins	3/4"	DC	W85098	2/4/2014	**2/25/2015**	Herres B - 5569		
Col. Co. Grain Gro.	210 E. Main	Wilkins	3/4"	RP	W037150	5/19/2014	**3/1/2015**	Herres B - 5569	F	
Steves Grocery	724 S. 4th	Watts	1/2"	RP	57535	3/28/2014	**3/24/2015**	Herres B - 5569		
Sterling Bank	257 E. Main	Watts	3/4"	DC	79929	3/28/2014	**3/24/2015**	Herres B - 5569		
City of Dayton	Well #3 N.Pine	Febco	1"	RP	H14492	3/28/2014	**3/24/2015**	Herres B - 5569		
City of Dayton	Well #2 S.2nd	Febco	1"	RP	H14517	3/28/2014	**3/24/2015**	Herres B - 5569		
Eagle Manor/ Don K.	520 E. Tremont	Watts	1-1/2"	DC	69204	3/28/2014	**3/30/2015**	Herres B - 5569		
Seneca	711 E. Main	Watts	6"	DC	244966	3/24/2014	**3/31/2015**	Sickles B - 5827		
Seneca	711 E. Main	Watts	1"	RP	339515	3/24/2014	**3/31/2015**	Sickles B - 5827		
Seneca	711 E. Main	Ames	3"	DC	JF0714	3/24/2014	**3/31/2015**	Sickles B - 5827		
Seneca	711 E. Main	Watts	8"	DC	321643	3/24/2014	**3/31/2015**	Sickles B - 5827		
Seneca	711 E. Main	Febco	2"	DC	N4036	3/24/2014	**3/31/2015**	Sickles B - 5827		
Seneca	711 E. Main	Conbraco	1"	DC	ER648	3/24/2014	**3/31/2015**	Sickles B - 5827	F	
Seneca	711 E. Main	Ames	8"	DC	JG0672	3/24/2014	**3/31/2015**	Sickles B - 5827		
Seneca	711 E. Main	Hersey	3/4"	DC	115550	3/24/2014	**3/31/2015**	Sickles B - 5827		
Dayton Chemical	Rt #2 PO Box 67	Wilkins	2"	RP	405534	5/22/2014	**4/1/2015**	Herres B 2339		
General Store	426 W. Main	Watts	1/2"	RP	55403	4/16/2014	**4/1/2015**	Herres B - 2339		
Ag Link	108 N. Pine	Febco	2"	DC	H05280	5/16/2014	**4/1/2015**	Herres B - 5569	F	
Rockhill Concrete	P.O. Box 123	Watts	2"	RP	91054	4/28/2014	**4/1/2015**	Herres B - 5569		
Gary Kitterman	307 E. Jackson	Wilkins	1"	DC	23025015	4/16/2014	**4/1/2015**	Herres B -5569		
MF Kurth	408 E. Creamery	Wilkins	1"	DC	1200926	4/16/2014	**4/1/2015**	Herres B - 5569		
John Eaton	101 Maple Lane	Wilkins	1"	DC	3329028	5/22/2014	**4/1/2015**	Herre B - 5569		
Gerald Pulliam	301 W. Comm.	Febco	1"	DC	A243535	5/1/2014	**4/2/2015**	Herres B - 5569		
Columbia REA	115 E. Main	Wilkins	3/4"	DC	1045240	5/20/2014	**4/10/2015**	Knowles B - 5316		
Dayton Mercantile	516 W. Main	Watts	1/2"	RP	61633	4/16/2014	**4/14/2015**	Herres B - 5569	F	
Ameristar	533 W. Main	Wilkins	3/4"	RP	881657	4/16/2014	**4/14/2015**	Herres B - 5569		
Ameristar	533 W. Main	Febco	3/4'	RP	H18233	4/16/2014	**4/14/2015**	Herres B - 5569		
Ameristar	533 W. Main	Wilkins	1/2'	RP	913129	4/16/2014	**4/14/2015**	Herres B - 5569		
Col. Court	P.O. Box 241	Febco	2"	PVB	H006484	6/19/2014	**4/15/2015**	Herres B - 5569		
Col. Co. Fairgrounds	PO Box 5	Febco	1"	DC	H62212	6/19/2014	**4/15/2015**	Herres B -2339		
Terry Nealy	227 N. Cherry	Wilkins	1"	DC	2936087	4/16/2014	**4/15/2015**	Herres B - 5569		

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Col. Co. Golf Course	PO Box 5	Wilkins	3/4"	DC	2528066	5/1/2014	**4/15/2015**	Herres B - 5569		
Debbie Bruegman	1111 S. 3rd	Watts	1"	DC	343460	5/1/2014	**4/15/2015**	Herres B -5569		
Brad McMasters	117 W. Dayton	Wilkins	1"	DC	3061597	5/1/2014	**4/15/2015**	Herres B - 5569		
Nancy Payne	705 E. Richmond	Wilkins	1"	DC	473228	8/5/2014	**4/15/2015**	Herres B - 5569		
Cody Steinhoff	132 W. Brooklyn	Wilkins	1"	DC	2114009	5/1/2014	**4/15/2015**	Herres B - 5569		
Unit. Meth. Church	110 S. 3rd	Wilkins	1/2"	RP	W310886	6/19/2014	**4/15/2015**	Herres B - 5569		
Mark Sschuck	411 S. 1st	Watts	1-1/2"	DC	A03162	7/16/2014	**4/15/2015**	Harri B - 6069		
Zelma Hargrave	1024 S. 4th	Wilkins	1"	DC	2880153	5/20/2014	**4/15/2015**	Harri B - 6069		
Kim Lyonnais	744 S. 5th	Wilkins	1"	DC	2014140	4/28/2014	**4/15/2015**	Herres B - 5569		
Gene Crothers	505 S. 6th	Wilkins	1"	DC	1215482	4/28/2014	**4/15/2015**	Herres B - 5569		
Shane Robins	1018 S. 4th	Wilkins	1"	DC	974447	4/16/2014	**4/15/2015**	Herres B - 5569		
Leonard Niclo	1201 S. 4th	Wilkins	3/4"	RP	1378113	4/16/2014	**4/15/2015**	Herres B - 5569		
Bobbie Klingenstein	803 E. Spring	Wilkins	1"	DC	2302036	4/28/2014	**4/15/2015**	Herres B - 5569		
Banner Bank	126 E. Main	Wilkins	1"	PVB	305892	5/1/2014	**4/15/2015**	Herres B - 5569		
Col. Co. Fairgrounds	PO Box 5	Watts	2"	DC	114707	6/19/2014	**4/15/2015**	Herres B - 5569		
Col. Co. Golf Course	PO Box 5	Wilkins	3/4"	DC	616697	5/1/2014	**4/15/2015**	Herres B - 5569		
Loretta Melanson	810 E. Spring	Wilkins	1-1/4"	DC	A075418	6/19/2014	**4/15/2015**	Herres B - 5569		
Col.Co. Courthouse	341 E. Main	Watts	3"	DC	125213	4/16/2014	**4/15/2015**	Herres B - 5569		
Dave Schreck	309 S.3rd	Watts	1"	DC	301720	5/1/2014	**4/15/2015**	Herres B - 5569		
Unit. Meth. Church	110 S. 3rd	Wilkins	1"	DC		5/1/2014	**4/15/2015**	Herres B - 5569		
Steven Gregg	1306 S. 3rd	Wilkins	3/4"	DC	3457476	5/1/2014	**4/15/2015**	Herres B - 5569		
City of Dayton	Cemetary	Wilkins	2"	DC	286738	4/16/2014	**4/15/2015**	Herres B - 5569		
City of Dayton	L.L. Complex	Watts	2"	DC	A17051	4/16/2014	**4/15/2015**	Herres B - 5569		
Mike McGhan	206 E. Tremont	Wilkins	1"	DC	3283706	5/1/2014	**4/15/2015**	Herres B - 5569		
City of Dayton	Front of DOT	Wilkins	1"	DC	W123201	6/19/2014	**4/15/2015**	Herres B - 5569		
Bob Benzel	404 W. Clay	Wilkins	1"	DC	2400391	6/19/2014	**4/15/2015**	Herres B - 5569		
Banner Bank	126 E. Main	Wilkins	1"	DC	O98982	4/16/2014	**4/15/2015**	Herres B - 5569		
Michael Luce	611 S. 3rd	Watts	1"	DC	88042	4/16/2014	**4/15/2015**	Herres B - 5569		
Dewayne Ramsey	302 E. Tremont	Wilkins	1"	DC	3280243	8/11/2014	**4/15/2015**	Herres B - 5569		
Col.Co. Courthouse	341 E. Main	Watts	3/4"	RP	100779	4/16/2014	**4/15/2015**	Herres B - 5569		
Col. Co. Courthouse	341 E. Main	Wilkins	1-1/2"	DC	1872869	4/16/2014	**4/15/2015**	Herres B - 5569		
Craig George	314 S. 2nd	Wilkins	1"	DC	2805479	4/28/2014	**4/15/2015**	Herres B - 5569		
Port / WWFC-OP	509 W. Cameron	Ames	6"	DC	KG0258	4/16/2014	**4/15/2015**	Herres B - 5569		
Port / WWFC-OP	509 W. Cameron	Ames	3/4"	DC	19332	4/16/2014	**4/15/2015**	Herres B - 5569		
Port / WWFC-OP	509 W. Cameron	Wilkins	2"	RP	2934649	4/16/2014	**4/15/2015**	Herres B - 5569		
Maura Trainer	702 S. 2nd	Wilkins	1"	DC	3274859	4/28/2014	**4/15/2015**	Herres B - 5569		
Port Distr. Court	535 W. Cameron	Wilkins	1"	DC	797332	4/16/2014	**4/15/2015**	Herres B - 5569		
McGregor	120 W. Cameron	Febco	2"	RP	AA6404	0416-14	**4/15/2015**	Herres B- 5569		
Port Of Columbia	507 Cameron	Wilkins	1"	DC	3136618	4/16/2014	**4/15/2015**	Herres B - 5569		
Drew Wood	311 E. Jackson	Wilkins	1"	DC	2302165	4/16/2014	**4/15/2015**	Herres B - 5569		
Eagles Club	220 E. Main	Watts	1/2"	RP	56773	4/16/2014	**4/15/2015**	Herres B - 5569		
City of Dayton	WWTP	Watts	3/4"	RP	13617	8/11/2014	**4/15/2015**	Herres B - 5569	F	
1st Congr. Church	208 S. 3rd	Wilkins	1"	DC	1673477	4/28/2014	**4/15/2015**	Herres B -5569		
Col.Co. Planning	114 S. 2nd	Watts	1"	DC	85727	4/16/2014	**4/15/2015**	Herres B - 5569		
Tom Hargrave	201 S. Cherry	Wilkins	1"	DC	2978590	4/16/2014	**4/15/2015**	Herres B - 5569		
Dayton Gen. Hosp.	1012 S. 3rd	Wilkins	1-1/4''	DC	A302256	5/22/2014	**4/15/2015**	Herres B - 5569	N	
Americn West Bank	427 E. Main	Wilkins	1"	DC	1937493	5/22/2014	**4/26/2015**	Herres B - 5569		
Brad McMasters	317 W. Dayton	Wilkins	1"	DC	A288319	4/30/2014	**4/30/2015**	Herres B - 5569	N	
Dayton School Dist.	609 S. 2nd	Wilkins	3"	DC	J22612	5/22/2014	**5/1/2015**	Herres B - 5569		
Katy Wamble	315 S. 2nd	Wilkins	1	DC	2381381	8/11/2014	**5/1/2015**	Herres B - 5569		
Community Bible Ch	203 S. 2nd	Wilkins	1"	DC	265857	8/11/2014	**5/1/2015**	Herres B - 5569		
No. Touchet Bypass	1500 Block S. 4th	Wilkins	3"	DC	J31427	6/19/2014	**5/1/2015**	Herres B - 5569		
Greg Bye	803 E. Clay	Watts	1"	DC	353646	6/19/2014	**5/1/2015**	Herres B -5569		
Merle Jackson	402 S. 1st	Wilkins	1"	DC	2581040	5/22/2014	**5/1/2015**	Herres B - 5569		
Fred Gritman	301 E. Touchet	Wilkins	1"	DC	2005226	5/1/2014	**5/1/2015**	Herres B - 5569		
LDS Church	1114 S. 3rd	Wilkins	1"	DC	1965363	5/20/2014	**5/1/2015**	Harri B - 6069		
Larry Eidt	503 N. 1st	Wilkins	1"	DC	395463	5/22/2014	**5/1/2015**	Herres B 5569		

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Peggy Lowe	717 S. 3rd	Wilkins	1"	DC	2745295	5/20/2014	**5/1/2015**	Knowles B - 5316		
Todd Powell	112 S. 6th	Wilkins	3/4"	RP	791918	4/28/2014	**5/1/2015**	Herres B - 5569	F	
City of Dayton	Caboose	Watts	3/4"	DC	88431	5/22/2014	**5/1/2015**	Herres B - 5569		
Russ Whipple	111W. Main	Febco	1"	DC	A157174	5/22/2014	**5/1/2015**	Herres B - 5569	F	
Col. Co. Road Dept.	P.O. Box 5	Wilkins	2"	RP	405525	5/22/2014	**5/1/2015**	Herres B - 5569		
Col. Co. Road Dept.	P.O. Box 5	Watts	1"	DC	A84139	5/22/2014	**5/1/2015**	Herres B - 5569		
Col. Co. Road Dept.	P.O. Box 5	Wilkins	4"	DC	U15053	5/22/2014	**5/1/2015**	Herres B - 5569		
Warren Talbott	625 N. Willow	Wilkins	1-1/4"	DC	2106305	4/28/2014	**5/1/2015**	Herres B - 5569		
Col.Co. Road Dept.	Trans. Sta. PO Box5	Wilkins	2"	DC	509115	5/22/2014	**5/1/2015**	Herres B - 5569		
Broughton House	303 E. Wash.	Wilkins	1"	DC	781189	5/1/2014	**5/1/2015**	Herres B -5569		
City of Dayton	WWTP	Febco	2"	RP	E2707	4/16/2014	**5/1/2015**	Herres B - 5569		
Washington Federal	306 E. Main	Watts	3/4"	DC	56190	3/28/2014	**5/1/2015**	Herres B - 5569		
Bill Carney	508 E. Hannan	Watts	1"	DC	190962	4/28/2014	**5/1/2015**	Herres B - 5569		
Janice Davis	123 W. Dayton	Watts	1"	DC	285314	5/1/2014	**5/1/2015**	Herres B - 5569		
Cameron Court	522 Cameron	Watts	2"	DC	43834	5/22/2014	**5/1/2015**	Herres B - 5569		
Jay Takemura	215 S. 8th	Watts	1"	DC	331147	5/15/2001	**5/1/2015**	Herres B - 5569		
Jennie Dickenson	306 S.3rd	Wilkins	3/4"	DC	A191624	5/1/2014	**5/1/2015**	Herres B -5569		
John Leonard	603 N. Cotton.	Wilkins	1"	DC	3790333	5/22/2014	**5/1/2015**	Herres B 5569	N	
Matt Talbott	220 E. Dayton	Wilkins	1"	DC	A019575	5/1/2014	**5/10/2015**	Herres B -5569		
Knoblock Apts.	700 S. 5th	Febco	2"	DC	A06239	5/24/2014	**5/10/2015**	Harri B - 6069		
Blue Col. Eye Care	215 E. Clay	Wilkins	1"	DC	A018179	7/16/2014	**5/10/2015**	Harri B - 6069		
Judy Brooks	632 Harlem	Wilkins	1"	DC	2772270	5/20/2014	**5/10/2015**	Knowles B - 5316		
Gary Goudy	1512 S. 5th	Wilkins	1"	DC	1406087	5/20/2014	**5/10/2015**	Harri B - 6069		
Rich Trump	608 E. Hanan	Wilkins	1"	DC	3039877	5/20/2014	**5/10/2015**	Harri B - 6069		
Quest	116 S. 1st	Wilkins	1"	PVB	CB127419	8/11/2014	**5/10/2015**	Herres B - 5569		
Craig Moisio	710 E. Clay	Wilkins	1"	DC	2936014	4/28/2014	**5/13/2015**	Herres B - 5569		
Blue Willow RV Park	201 S. Willow	Wilkins	1"	DC	501855	5/1/2014	**5/15/2015**	Herre B - 5569		
Wendy Frame	722 Stockton Rd	Wilkins	1"	DC	2980747	5/22/2014	**5/15/2015**	Herres B - 5569		
Conv. Care Center	112 N. 2nd	Wilkins	1/2"	RP	492949	6/19/2014	**5/15/2015**	Herres B - 5569		
David Hemphill	300 E. McCall	Wilkins	1"	DC	2975463	5/1/2014	**5/15/2015**	Herres B - 5569		
Randy Barton	209 N. 1st	Wilkins	1"	DC	A113667	5/1/2014	**5/15/2015**	Herres B - 5569		
Chad Broughton	714 E. Park	Wilkins	1"	DC	1060082	5/22/2014	**5/15/2015**	Herres B - 5569		
Mike Rowley	210 W. Patit	Wilkins	1"	DC	2975312	5/1/2014	**5/15/2015**	Herres B -5569		
Blue Willow RV Park	201 S. Willow	Wilkins	1"	DC	501788	5/1/2014	**5/15/2015**	Herres B - 5569		
Jeff Jenkins	221 S. 4th	Wilkins	1"	DC	1775247	5/1/2014	**5/15/2015**	Herres B -5569		
Chistine Broughton	115 S. 5th	Wilkins	1"	DC	2060172	5/1/2014	**5/15/2015**	Herres B - 5569		
Boldman House	410 N. 1st	Watts	1"	DC	333611	4/28/2014	**5/15/2015**	Herres B - 5569		
Grace Epis Parsonage	307 S. 3rd	Watts	1"	DC	2583255	6/19/2014	**6/1/2015**	Herres B - 5569		
Debbie Behler	317 E. Wash.	Wilkins	1"	DC	2343667	8/5/2014	**6/1/2015**	Herres B - 5569		
Doug Hinds	808 E. Tremont	Wilkins	1"	DC	2515784	8/11/2014	**6/1/2015**	Herres B - 5569		
Chuck James	202 S. 3rd	Wilkins	3/4"	DC	A040577	8/11/2014	**6/1/2015**	Herres B -5569		
Hubbard Rogg	111 S. 2nd	Wilkins	3/4"	RP	453147	6/19/2014	**6/1/2015**	Herres B - 5569		
Samantha Devor	406 Creamery	Wilkins	1"	DC	2302154	5/22/2014	**6/1/2015**	Herres B - 5569		
Michael Haight	403 S. 1st	Febco	1"	DC	HA18481	8/11/2014	**6/1/2015**	Herres B - 5569		
Judy Geisen	315 S. 4th	Wilkins	1"	DC	2691409	5/1/2014	**6/1/2015**	Herres B - 5569		
Country Vill. Tr. Park	RT 1	Wilkins	3/4"	DC	A102564	6/19/2014	**6/1/2015**	Herres B - 5569		
McNary	312 W. Clay	Wilkins	3/4"	DC	580121	5/1/2014	**6/1/2015**	Herres B -5569		
Grace Epis. Church	301 S. 3rd	Febco	1"	DC	HA18493	5/1/2014	**6/1/2015**	Herres B - 5569		
Country Vill. Tr. Park	RT 1	Wilkins	3/4"	DC	A109747	6/19/2014	**6/1/2015**	Herres B - 5569		
Country Vill. Tr. Park	RT 1	Wilkins	1"	DC	A111202	6/19/2014	**6/1/2015**	Herres B - 5569		
Country Vill. Tr. Park	RT 1	Febco	1"	DC	A104367	6/19/2014	**6/1/2015**	Herres B - 5569		
Jamie Pounds	208 W. Rich.	Wilkins	3/4"	DC	975704	5/22/2015	**6/1/2015**	Herres B - 5569		
Mitch Payne	1302 S. 5th	Wilkins	1"	DC	1060065	5/1/2014	**6/1/2015**	Herres B - 5569		
Dave Riggs	414 W. Clay	Wilkins	1"	DC	729724	5/22/2014	**6/7/2015**	Herres B - 5569		
Dave Riggs	414 W. Clay	Febco	1"	DC	A120640	5/22/2014	**6/7/2015**	Herres B - 5569		
Dayton Depot	222 E. Comm	Wlikins	1"	DC	3036004	5/22/2014	**6/15/2015**	Herres B - 5569		
Dick Juris	201 N. Cherry	Wilkins	1"	DC	8081124	5/22/2014	**6/21/2015**	.		

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Owner	Address	Make	Size	Type	Serial #	Date Tested	Date Due	Tester		Comments
Wayne Meicher	312 S. 1st	Wilkins	1"	DC	A088874	5/1/2014	**6/21/2015**	Herres B -5569		
Valley View Tr. Park	PO Box 152	Watts	4"	DC	172272	8/11/2014	**7/1/2015**	Herres B - 2339		
Rowes Tr. Park	114 N. Touchet Rd	Febco	1"	DC	A102538	6/20/2014	**7/1/2015**	Herres B - 5569	F	
Sabins Auto	317 W. Main	Watts	1/2"	RP	155734	5/22/2014	**7/1/2015**	Herres B - 2339		
Sabins Auto	317 W. Main	Conbraco	1"	DC	K7802	5/22/2014	**7/1/2015**	Herres B - 5569		
Lois Koshmeder	1213 S. 2nd	Wilkins	1"	DC	1589843	5/1/2014	**7/1/2015**	Herres B - 5569		
Kathy Juris	214 S. 8th	Wilkins	3/4"	DC	1580123	5/1/2014	**7/1/2015**	Herres B - 5569		
Rowes Tr. Park	715 E. Rich.	Febco	1"	DC	A105896	5/22/2014	**7/16/2015**	Herres B - 5569		
Kathy Olson	126 W. Brooklyn	Wilkins	1"	DC	2061017	8/11/2014	**9/23/2015**	Herres B -5569		

BACKGROUND INFORMATION ON BACKFLOW INCIDENTS AND INCIDENT RESPONSES

BACKFLOW INCIDENTS

Water systems are designed for water to flow from the distribution system to customers; however, unusual conditions can cause the water to flow backwards, from a customer's plumbing system into the City's water system. Backflow can occur at any potential physical "cross-connection" between the City's water system and the customer's water system and can result in the contamination of the City's potable water supply.

Conditions that Cause Backflow

- **Backsiphonage:** When pressure in the City's water system drops below a customer's plumbing system pressure.
- **Backpressure:** When pressure in a customer's plumbing system rises above the City's water supply pressure.

Backflow incidents can pose a serious threat to public health. Microbial, chemical, or physical contaminants that enter the distribution system through unprotected cross-connections, or through openings in the underground piping system, may cause widespread illness, injury, or worse.

If a backflow incident occurs, customers may call to express concerns about degraded water quality or loss of pressure. Customer complaints and direct observations may be clues that a backflow event occurred. Pay attention to the following signs, respond quickly, and investigate all potential backflow incidents.

- **Discolored or Unusual Looking Water** – Listen for words such as discolored, cloudy, soapy, foamy, or oily.

  Note: Discolored water can also be caused by increased flows in pipes, or changes in normal pipe flows that disturb sediments in the distribution system. Investigate all reports of colored water.
- **Taste and Odor Problems** – The human nose and taste buds are extremely sensitive and detect some water contaminants at extremely low concentrations. Detectable differences in taste and odor could indicate that a backflow incident occurred. Listen for words such as fuel, chemical, medicinal, or salty, especially after a low-pressure event.
- **Low or No Chlorine Residual in the Distribution System** – Measure and record free chlorine residual at locations around a pressure-loss event or water quality complaint. Lower residuals may mean that chlorine is reacting with substances that entered the water system.

DEVELOP A CONTINGENCY PLAN FOR ALTERNATE WATER SUPPLIES

During a backflow incident, the City may need to issue a "do not use water" or "boil water" public health notice to its customers. If the contamination is microbacteriological in nature, a "boil water" notice could provide adequate public health protection. However, if the contamination is chemical in nature, a "boil water" notice may not provide adequate protection of public health and a "do not use water" notice will be required. If the City has any question as to which notice to use, issue a "do not use water" notice until otherwise notified by the Washington State Department of Health (DOH).

If a "do not use water" or "boil water" notice is in effect, bottled water may need to be secured. Local bottled-water retailers and DOH-approved water haulers may be needed to distribute sufficient water to the affected customers.

To maintain critical facilities that depend on water to function, such as hospitals and fire departments, alternate water sources must be secured. Secure enough alternate water to account for extraordinary water demands during a backflow incident, such as firefighting. If necessary, make arrangements with neighboring fire departments capable of sending tanker trucks to secure an adequate water supply for firefighting. Alternate sanitation supplies such as portable toilets may also be necessary when contaminated water is not to be sent to the wastewater stream (see the City's Emergency Response Plan for additional information).

MAINTAIN DETAILED INFORMATION ABOUT THE WATER SYSTEM

Maintain up-to-date information regarding the direction of water flow through the distribution system; the locations of shutoff valves, access points, roads, buildings, and health hazards; and the capacity of the potable-water reservoir. Maintain up-to-date maps showing the distribution system and the locations of all isolation valves and keep these maps at the Public Works Shop and City Hall. This information will help determine where and how quickly the contaminated water might spread and how to isolate the affected area. Updated water system information will also hasten the shift to any possible alternate water source in a backflow incident.

DEVELOP A UNIDIRECTIONAL FLUSHING (UDF) PLAN

UDF is a type of line flushing that isolates pipe sections or loops in an organized, sequential manner, typically from source to periphery. Hydrants should be operated to pull the freshest water into the area being flushed. Flushing programs usually start at the source of contamination and move out through the system.

UDF consists of closing specific valves to create one-way flow, then opening hydrants consecutively. This increases the speed of the water flow in the pipes to a velocity high enough for removing the contaminated water. Since conventional line flushing draws water in from all directions and does not increase the speed of water flow through the pipes enough to dislodge deposits, UDF allows for a better response to localized water-quality complaints.

Structuring a successful UDF program requires determining the size and makeup of discrete flush zones, collecting data, organizing manpower, determining the flushing flow rate, and creating zone maps showing the locations of valves, the source of pressure, and the sizes of the lines. Since a UDF program targets distribution pipes less than 12 inches in diameter, transmission piping is typically not included. Distribution pipes smaller than 12 inches in diameter are divided into zones. This type of flushing is optimized via hydraulic modeling and geographic information systems to pinpoint the best hydrant and valve locations and the velocities that make up a zone. This information can then be used to determine the sequence in which each pipe within the zone should be flushed.

Discharges of flushed water could harm the public health and the environment, and disinfectant residuals in the water may be toxic to aquatic life. Consequently, the City must consider the proper disposal of flushed water and handle flushed water in accordance with all federal and state regulations.

WATER TESTING

To facilitate baseline water quality monitoring and respond quickly to reported or discovered backflow incidents, the water utility may wish to assemble an in-house sampling team capable of collecting samples and forwarding them to the appropriate analytical laboratory. Sampling teams responding to potential contamination should be trained and equipped to characterize the site, perform on-site hazard screening using available field-test kits, collect samples, and prepare samples for transport.

The water utility should be familiar with the testing capabilities of nearby laboratories. No laboratory can test for all possible contaminants, and most labs specialize in testing certain types of contaminants (e.g., chemical or biological). See the City's Emergency Response Plan for laboratories typically used by the City.

Water must be tested throughout all phases of incident response to determine whether the remediation strategy is sufficient. To lift any public health notices issued regarding the water system, test results must be reported to DOH.

If there is evidence of, or information suggesting, contamination at sufficient levels to pose a threat to the life of City personnel, the City should request a trained hazmat emergency-response team. In most situations, calling 911 will contact the hazmat team.

REVIEW BASELINE WATER QUALITY MONITORING DATA

To identify the contaminant that has entered the water system in a backflow incident, City staff must know what chemicals and organisms are normally present in the water system. Review baseline water quality monitoring data by referring to either the City's Water System Plan or DOH's Office of Drinking Water's Sentry Internet Database at https://fortress.wa.gov/doh/eh/portal/odw/si/intro.aspx.

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Cross-Connection Control Program
BACKFLOW INCIDENT REPORT FORM

***Note:** use this form to comply with WAC 246-290-490(8)(g).*

Part 1: Public Water System (PWS) Information

PWS ID:	PWS Name:	County:

Part 2: Backflow Incident Information

A. Incident Identification

Incident date:	Time of incident:	Incident ID (DOH use):

B. Information on Premises where Backflow Originated

Name of premises:
Premises physical address:
City: ,WA Zip:
Premises type: non-residential ☐ residential ☐
Premises category/description (Table 9 category*, if applicable):
Most recent hazard evaluation prior to incident (mm/dd/yyyy): None ☐
PWS's assessed hazard level:
Type of backflow preventer required by PWS:
Premises isolation required by PWS? Yes ☐ No ☐
PWS relies on *in-premises protection*? Yes ☐ No ☐
Other hazard evaluation information:

*See WAC 246-290-490(4)(b)(i).

C. Method of Discovery of Backflow

How the backflow was discovered (check all that apply):	Direct observation .... ☐ Meter running backwards .... ☐ Water use decrease .... ☐ Disinfectant residual monitoring ... ☐ Water quality monitoring .... ☐	Water quality complaint .... ☐ Illness/injury complaint .... ☐ Result of Investigation .... ☐ Other (Describe): ☐
Incident reported to the public water system by:	PWS Personnel ☐ Premises Owner/Occupant ☐ Other PWS Customer ☐ Backflow Assembly Tester ☐ Other (Specify):	

D. Contaminant Information

Contaminant type (check all that apply):	Microbiological ☐ Chemical ☐ Physical ☐
Describe contaminant (for example, the organism name, chemical, etc.). Please attach lab analysis or MSDS, if available.	

E. Extent and Effects of Contamination

Estimated extent of contamination:	Contained within premises ☐ Entered PWS distribution system ☐
Estimated number of connections affected:	Residential Non-residential
Estimated population affected or at risk:	Residential Non-residential
Number water quality complaints:	Describe water quality complaints:
Number illnesses reported:	Describe illnesses/irritation (specific illnesses, if known):
Number physical injuries(e.g. burns) or irritation(e.g. rashes) cases reported:	

Part 3: Cross-Connection Control Information at Backflow Site

A. Source of Contaminant

Source of contaminant or fixture type (check all that apply):	Air conditioner/heat exchanger …….. ☐ Auxiliary water supply ……………... ☐ Beverage machine ……………..…… ☐ Boiler, hot water system …….…….. ☐ Chemical injector/aspirator ………... ☐ Fire protection system ……………... ☐ Irrigation system (PWS supplied) ….. ☐	Industrial/commercial process water/fluid……………………… ☐ Medical/dental fixture ………..…… ☐ Reclaimed water system………..….. ☐ Swimming pools, spa ………….…… ☐ Wastewater (sewage) system ….…... ☐ Other (specify): ……………… ☐ ………………………………

B. Distribution System Pressure Conditions in the Vicinity of the Backflow Incident

Type of backflow:	Backsiphonage ☐ Backpressure ☐	**Typical distribution system pressure in vicinity of incident** (if range, enter lower end of range): psi
Main/pressure status at time of incident (check all that apply):	Normal ……………………………... ☐ Main break …………………….......... ☐ Fire fighting ………………………… ☐ Other high usage …………………… ☐ Power outage ……………………….. ☐	Source/plant outage ………………… ☐ Scheduled water shutoff by PWS …... ☐ Unscheduled/emergency shutoff …… ☐ Unknown ………………………........ ☐ Other (specify) ☐

Describe causes and circumstances leading to backflow:

C. Backflow Preventer Information/Installation/Approval Status at Site of Backflow

Complete the tables in C and D for the ***premises isolation*** preventer for either of the following situations:

- If a premises isolation backflow preventer is installed ***and*** the contaminant entered the PWS distribution system.
- If the premises isolation assembly is the only backflow preventer at the site.

In all other cases, complete tables in C and D for the ***in-premises*** backflow preventer installed at the fixture. If more than one backflow preventer was involved in the backflow incident, copy tables C and D and complete them for the additional preventer(s).

If no backflow preventer was installed at the time the incident occurred, check this box ☐ and go directly to Part 4. Don't fill out the tables below (in C and D).

Backflow preventer information:	Type installed: Make: Serial number:	Installed for: Model: Size: Date installed:
Installation status (check all that apply):	Properly installed/plumbed ☐ Improperly installed/plumbed ☐	Improperly protected bypass present ☐ If so, explain:
Commensurate with assessed degree of hazard?	Yes ☐ No ☐	If not, explain:
DOH/USC-approved at time of backflow incident?	Yes ☐ No ☐	If not, approved when installed? Yes ☐ No ☐

D. Backflow Preventer Inspection/Testing Information at Site of Backflow

Most recent inspection/test information *prior* to backflow incident. Attach test report(s), if available.	No test report on record .... ☐ Date tested/inspected: Passed test/inspection *without* repairs .... ☐ Failed initial test/inspection, passed *after* repair .... ☐ Failed test/inspection, no repairs made .... ☐	
Inspection/test information *after* backflow incident [per WAC 246-290-490(7)(b)]. Attach test report.	Not tested/inspected .... ☐ Date tested/inspected: Passed test/inspection *without* repairs .... ☐ Failed initial test/inspection, passed *after* repair......... ☐ Failed test/inspection, no repairs made.................... ☐	
Preventer failure information , if applicable (check all that apply):	Fouled check .... ☐ Debris .... ☐ Weather-related damage ..... ☐	Damaged seat .... ☐ Other: ☐
If preventer failed inspection/test, did failure allow backflow?	Yes ☐ No ☐	If yes, explain:

Part 4: Corrective Action/Notifications

Action *taken* by PWS to restore water quality (check all that apply):	None .... ☐ Flushed/cleaned mains ...... ☐ Flushed/cleaned plumbing... ☐ Disinfected mains .... ☐ Disinfected plumbing .... ☐	Other treatment (describe): ☐ Replaced mains .... ☐ Replaced plumbing .... ☐ Other: ☐
Action *ordered* by PWS to correct cross-connection (check all that apply):	None .... ☐ Eliminate cross-connection... ☐ Remove by-pass .... ☐ Install **new** preventer ... ☐ For *premises isolation* ☐ For *fixture protection* ☐	Change **existing** preventer ☐ Repair/replumb .... ☐ Reinstall correctly .... ☐ Replace with same type ☐ Upgrade type .... ☐ Other: ☐
Action ordered accomplished?	Yes ☐ Date: No ☐	If no, explain:
Agency notifications per WAC 246-290-490(8)(f) (check all that apply):	DOH ☐ Local Health Agency ☐ Issued by end of next business day:	Local Adm. Authority ☐
Notifications of consumers in area of incident (check all that apply):	Population at risk ☐ Boil Water Advisory ☐	Public notification (PN per DOH regs.) ☐ Other (describe):
Other enforcement/corrective actions (describe):		

Part 5: Cost of Backflow Incident (optional)

Item	PWS Personnel Hours Expended	Cost to PWS ($)	Cost to Premises Owner ($)
Investigation			
Restoration of water quality			
Correction of cross-connection situation			
Litigation and/or settlement			
Other not included in above			

Part 6: Further Information/Documentation

Additional information about this incident such as pictures, sketches, newspaper/journal articles, water quality analyses, epidemiological reports, etc. would be helpful. Information may be in electronic form or hard copy.

Part 7: Form Completion Information

Note: *Form should be completed by a person currently certified as a Cross-Connection Control Specialist.*

I certify that the information provided in this Backflow Incident Report is complete and accurate to the best of my knowledge.		
CCC Program Mgr. Name (print):		Title:
Signature:	CCS Cert. Number:	Date:
Phone:	E-mail:	
I have reviewed this report and certify that the information is complete and accurate to the best of my knowledge.		
PWS Mgr./Representative Name (Print):		Title:
Signature:	Op. Cert. Number:	Date:

Please send completed backflow incident form:

By mail to:

Washington State Department of Health
Office of Drinking Water – CCC Program Manager
P O Box 47822
Olympia, WA 98504-7822

By email to: terri.notestine@doh.wa.gov or cccprogram@doh.wa.gov

Please send questions, comments, or suggestions about this form to us at the address above or e-mail them to cccprogram@doh.wa.gov

If you need this publication in an alternate format, call (800) 525-0127. For TTY/TDD, call (800) 833-6388.

CITY OF DAYTON
BACKFLOW INCIDENT RESPONSE PLAN

STEP 1 - FIND THE CAUSE OF BACKFLOW AND ASSESS THE RISK

Investigate the cross-connection to identify the potential contamination and the "Degree of Hazard." The conditions that identify the "Degree of Hazard" are classified as either a contamination hazard or a pollution hazard. The types of hazards are further defined as follows:

- **Health Hazard** – An actual or potential threat of contamination of a biological, chemical, physical, or radiological nature to the public potable water system that will or could cause a danger to public health.
- **System Hazard** – An actual or potential threat of severe danger to the physical properties of the public water system, or a pollution or contamination that would have a prolonged effect on the quality of the system's potable water.
- **Pollution Hazard** – An actual or potential threat to the physical properties of the water system or the potability of the water supply system that does not constitute a health or system hazard.
- **Plumbing Hazard** – An internal or plumbing type cross-connection in a potable water system that may be either a contamination hazard or a pollution hazard. This type of hazard could include, but is not limited to: eyewash stations, lavatories, lawn sprinkler systems, slop sinks, toilets, washing machines, and water fountains.

Note: As the first responder, ***you*** *are responsible for determining the severity of the situation. In a case of actual harm to human life, immediately call Emergency Medical Responders. If human life is not threatened, use the Chain of Command (see Table 1 below). Also, remember that your safety must come first. If your health or safety is at risk, you cannot help anyone else.*

STEP 2 - IDENTIFY THE AFFECTED AREA AND WORK TO LIMIT THE SPREAD OF CONTAMINATION

- Assess the affected area to determine its potential impact on the system.
- If a known contaminate has been introduced into the water system, isolate the impacted area.
- Implement activities to repair and correct the cross-connection or backflow event and limit the spread of contamination.

STEP 3 - REPORT

- Immediately report the incident using the Chain of Command.
- Contact the Washington State Department of Health (DOH) Office of Drinking Water Eastern Regional Office at (509) 329-2100 during office hours, or call the After-Hours Emergency Hotline at (877) 481-4901. DOH staff will help you determine which customers to contact and whether or not a health advisory notice needs to be issued.
- Document the date, time, location, and activities associated with the incident in the cross-connection log.

TABLE 1
Chain of Command

Name and Title	Responsibilities During an Emergency	Contact Numbers
Jim Costello, Public Works Director (PWD)	• Responsible for overall management and operations of the water system. • Managing lead during an emergency. • Provides information to regulatory agencies, the public, and news media. • Approves all communications to external parties. • Responsible for inspections, maintenance, sampling, assessing facilities, and providing recommendations to the Mayor.	(509) 386-0875 – cell (509) 382-4571 – shop (509) 382-3063 – home
Craig George, Mayor	• Responsible for administrative functions, approval of management, operation practices, and approval of funds and recommendations for the water system. • Responsible for managing the emergency and emergency plan if PWD is unavailable.	(509) 382-2361 – City Hall
Sal Benavides, Assistant Public Works Director	• Assists in all responsibilities listed for the PWD.	(509) 386-8613 – cell (509) 382-4571 – shop (509) 240-2994 – home
Trina Cole, Clerk/Treasurer	• Responsible for administrative functions in the office including keeping a log of events and receiving phone calls. • Provides a standard, carefully pre-scripted message to callers with general questions. Additional information is released through the PWD or Mayor.	(509) 382-2361 – City Hall
Sal Benavides, Cross-Connection Control Specialist	• Responsible for maintaining the integrity of the cross-connection control program and ensuring that DOH procedures are followed.	(509) 386-8613 – cell (509) 382-4571 – shop (509) 240-2994 – home

STEP 4 - NOTIFICATION

- Notify all affected homes and business about the incident. Inform customers on how to protect their health and what water system operators are doing to correct the situation.
- Issue a health advisory notice depending on the "Degree of Hazard." If you are certain the risk is limited to microbial contamination, issue a Boil Water Advisory notice (see attached) stating to use tap water only if the water is boiled first. If the risk is not limited to microbial contamination, issue the attached *Drinking Water Warning: Backflow Incident* public notice and flyer.
- Contact the City's water system customers using the following procedures:
    - Execute Code Red Emergency Notification.
    - (If necessary) directly contact homes, private and non-private businesses, and all other consumers.
    - If unable to execute Code Red Emergency Notification or have direct contact, use door tags.
    - Notify local authorities (i.e., fire, police, health, and building/plumbing inspectors).
    - Notify the news media.

STEP 5 - CONTAMINANT REMOVAL

- **Flush** the affected parts of the distribution system to remove any contaminants. The flushing plan should effectively move any known contaminants to the nearest discharge point without unnecessarily spreading contamination through the distribution system.
- **Disinfect** the affected parts of the system to reduce the risk of waterborne disease. If you do not typically disinfect the system, notify customers before adding a disinfectant.
- **Collect** water quality samples after restoring normal operating pressure. Include coliform and possibly certain chemical samples to confirm the system meets drinking water quality standards.

STEP 6 - RESCIND NOTIFICATION

Notify all affected customers that the drinking water restrictions have been lifted using the Code Red Emergency Notification system, the attached news release, by directly contacting customers, or by using door tags.

STEP 7 - DOCUMENTATION

Complete and submit the Backflow Incident Report form (attached) to DOH's Office of Drinking Water Cross-Connection Control Program Manager.

Your logo or
company name here.

News Release

For Immediate Release: <DATE>
Contact: Water purveyor/system contact name and telephone number

<Water System> announces boil water advisory for all customers in <area>

CITY NAME — The <SYSTEM NAME> is advising all water customers to boil their drinking water after recent samples showed the presence of <fecal coliform, E. coli, total coliform>. The Washington State Department of Health (DOH) has been notified and <SYSTEM NAME> is working closely with the Office of Drinking Water to find the source of contamination and fix the problem, which may include disinfecting the system. The boil water advisory will remain in effect until further notice.

<System spokesperson quote> (e.g. "We are doing all we can to eliminate the bacteria from the water system. Safe and reliable drinking water is critical to good health and responding to this kind of emergency is our highest priority," said system spokesperson.)

<NUMBER or NO> illnesses related to the community's drinking water have been reported. To correct the problem <WHAT IS BEING DONE> (e.g. Chlorine was applied to the entire system on DATE.)

The boil water advisory includes several precautionary steps that customers should take. These include using purchased treated bottled water or boiled water for any water that might be consumed: drinking, brushing teeth, dishwashing, preparing food and making ice. Water should come to a rolling boil for one minute, then allowed to cool before using.

The advisory will remain in effect until <SYSTEM NAME> and DOH are confident there is no longer a threat of illness to their customers. Once satisfactory results are reported, customers will be notified that the advisory has been lifted.

If you have any questions, please call us at <TELEPHONE NUMBER>.

###

06-22-11

Drinking Water Warning: Backflow Incident

Public Notification

The ____________________ Water System, ID______, located in ___________County may be contaminated because of a backflow incident in which _____________________ (describe the substance) flowed back into the drinking water system. You are located in the service area potentially affected by this backflow incident.

Do Not Use Tap Water for Drinking, Laundry, or Bathing Until Further Notice. Use only purchased bottled water for drinking, making ice, brushing teeth, washing dishes, food preparation, and hand washing.

When backflow occurs, microbial or chemical contamination can be drawn into the water system. These contaminants can cause severe injury or illness.

What caused the backflow incident?

What is the affected area?

What are we doing to correct the problem?

Where can customers get bottled water?

What should you do before you begin using your tap water?

We will notify you when the water is safe to use.

For more information, please call _______________ at (   ) ___-_____ or email ___________________.

Please share this notice with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments and businesses). You can post it in a public place, share copies by hand, or mail it.

The ___________________ Water System sent this notice to you on ___/___/____

For Water Utility Use Only:

Backflow Incident Public Notice Certification Form
Within 10 days of notifying your customers, please complete this certification form and send a copy of each type of notice you distributed (hand-delivered notices, new releases, email, phone transcript, etc.) to our regional office. Call 1-800-521-0323 for the regional office address.

Distribution was completed on ___/___/___. Were the water users notified within 24 hours? ☐ Yes ☐ No	Check all that apply: ☐ Hand delivery, ☐ News release (TV, radio, newspaper, etc.), ☐ Posting at ________________________ ☐ Other ________+____________________

Signature of owner or operator	Position	Date

DOH Form (331-495) 6/14

For people with disabilities, this form is available on request in other formats. To submit a request, please call 800-525-0127 (TDD/TTY 711).

DO NOT DRINK

- Contaminated Water-

- Do not use for drinking.
- Do not use to mix/dilute baby formula.

For more information, ______________________

____

No beba el agua.

No use el agua para preparar la fórmula para bebés (biberón).

Your logo or
company name here

News Release

For Immediate Release: <DATE>

Contact: Water purveyor/system contact name and telephone number

<Water System Name> Boil Water Advisory Rescinded

CITY NAME – The <SYSTEM NAME> is advising all its water customers that it is no longer necessary to boil their drinking water. Recent test samples show the absence of <fecal coliform, E. coli, total coliform> bacteria.

<SYSTEM SPOKESPERSON QUOTE> (e.g. “Working with the Washington State Department of Health over the last <NUMBER OF > days, we have completed inspections, water quality sampling, disinfection, and flushing to resolve the contamination problem,” stated <NAME OF WATER SYSTEM MANAGER>. “We’re pleased to be able to lift the boil water advisory.”

The inspection of the water system indicated <DESCRIPTION OF SOURCE OF CONTAMINATION, if known, and what will be done to maintain good water quality>

If you have shut off or not used fixtures, water fountains, ice machines, soda machines, and/or other equipment over the past several days, flush the fixture or equipment until there is a change in water temperature before putting it back into service.

The <SYSTEM NAME> encourages customers with questions to call <TELEPHONE NUMBER>.

###

9-15-06

APPENDIX H

Financial Data

No.	Project	Project Cost	Grant Funding	Date	Comments
1	Municipal Water System Improvements	$ 1,291,270.43	$ 346,891.40	Dec-82	Grant from DSHS; Contractor: Mid-Columbia Construction
2	McCall's Addition	$ 65,300.51		Dec-82	w/ Muni. Water Sys. Improv; Contractor: Mid-Columbia Const.
3	Day's Railroad Addition	$ 66,432.48		Oct-84	Contractor: Central Washington Asphalt, Inc.
4	Tremont St. Reservoir Drain Line			Sep-89	
	Construction	$ 48,458.20			Contractor: Humbert Excavating.
	Engineering	$ 10,998.91			
	Subtotal	$ 59,457.11			
5	4th Street Resurfacing Project			Jul-94	Project included Waterline replacement
	Engineering	$ 8,748.27			
	Construction	$ 15,773.50			Contractor: Transtate Asphalt Co.
	Subtotal	$ 24,521.77			
6	Front Street Waterline Improvement Project	$ 192,503.75		May-02	Contractor: A.F. Cannone & Son Excavation & Paving
7	Water System Improvements - Phase I				
	Well No. 1 Pump Test & Repair	$ 30,390.25		Nov-02	Contractor: Picatti Bros.
	Water System Improvements - Well No. 1	$ 239,396.70		Nov-04	Contractor: Apollo
	Telemetry	$ 105,269.37			Contractor: Total Energy Management
	Engineering	$ 105,568.82			
	Legal, Admin, & Environmental	$ 35,831.66			
	Subtotal	$ 516,456.80			
8	Water System Improvements - Phase II				
	Construction - Apollo	$ 1,906,360.86		Feb-05	Contractor: Apollo
	Painting Steel Water Storage Tanks	$ 204,535.95		Dec-04	Contractor: Wilbur Fletcher
	Engineering	$ 439,979.90			Includes design, observation, & management
	Legal, Admin. & Environmental	$ 194,037.68			
	Subtotal	$ 2,744,914.39	$ 950,000.00		RD Grant & Loan, PWTF Loan 115
9	Patit Creek - First Street Bridge	$ 6,240.00		May-05	
10	S. 4th Street Flowmeter & Backflow Preventer	$ 45,789.64		Jun-09	
11	Shutters Properties Water Line Relocation	$ 41,144.51		Jul-11	
	Total	**$ 5,054,031.39**	**$ 1,296,891.40**		

TABLE H-1
Summary of Water Infrastructure Funding Assistance Programs

Eligible Projects	Eligible Applicants	Funding Available
CDBG-GP - Community Development Block Grant – General Purpose Grant Program (GRANT)		
Final design and construction of domestic wastewater, side sewer connections, drinking water, stormwater, roads, streets, and bridge projects	Projects must principally benefit low- to moderate-income people in non-entitlement cities and counties Cities or towns < 50,000 people	Up to $1 million No match required, but local contribution and gap funding preferred
CDBG-GP - Community Development Block Grant – Community Investment Fund (GRANT)		
Top priority projects from County list of prioritized projects	Projects must principally benefit low- to moderate-income people in non-entitlement cities and counties Cities or towns < 50,000 people	Up to $1 million Grant need must be clearly identified Project must be ready to go Must be a local priority project
Community Economic Revitalization Board (CERB) – Construction Program (LOAN and GRANT)		
Projects must support industrial sector business growth and job creation or retention in the state Eligible projects include infrastructure, utilities, general purpose industrial buildings, and port facilities	Counties, cities, towns, port districts, special districts, federally-recognized tribes, municipal and quasi-municipal corporations with economic development purposes Must demonstrate gap in public project funding and need for CERB assistance	Grants in unique cases $1 million maximum per project Interest rates vary, 20-year maximum term Requires 25 percent minimum match CERB authority for funding approvals
Drinking Water State Revolving Fund (LOAN)		
Design and construction projects associated with community and non-community water systems	Privately- and publicly-owned, for-profit and non-profit systems, but not federal- or state-owned systems	Loan, 1.0 to 1.5 percent, 20-year term Principle forgiveness for communities with high affordability index
PWTF – Public Works Trust Fund – Construction Program (LOAN)		
New construction, replacement, and repair of infrastructure including domestic water, sewer, road, and bridge projects	Counties, cities, and special purpose districts that meet certain requirements No school or port districts	$1 to $7 million 5 to 15 percent local match 0.5 to 2.0 percent interest, varies with local match 5- to 20-year term maximum
Rural Community Assistance Corporation – Environmental Infrastructure Loan Program (LOAN)		
Water, wastewater, solid waste, and stormwater facilities that primarily serve low-income, rural communities	Non-profit organizations, public agencies, and tribal governments; projects must be located in rural areas with populations of 50,000 or less in 13 western states	Up to $1.0 million 5.0 to 8.0 percent interest, 1.0 percent loan fee 1- to 20-year term maximum
Rural Development /Rural Utilities Service Water and Waste Disposal Direct Loans and Grants (GRANT and LOAN)		
Preconstruction and construction associated with building, repairing, or improving drinking water, solid waste facilities, and wastewater facilities	Counties, special purpose districts, non-profit corporations, or tribes unable to obtain funding from other sources at reasonable rates and terms Cities or towns < 10,000 people	Grants vary Interest rates vary 30- to 40-year loan terms No pre-payment penalty

TABLE H-2
Local Funding Sources

Assessments	Bonds	Impact Fees	Private Loans	Property Taxes	Fees
Description					
Assessment of benefited properties and owners within a defined area (e.g., Local Improvement Districts). Final assessment based on actual cost for constructed improvements. Common basis for charge; per connection, square lot footage	Authorization of debt service for system construction costs. General Obligation (GO) based on property value and/or user fees. Revenue based on user fees. Length and term of bond determined by lender and owner.	Proportionate cost share of existing and future infrastructure needed to serve new development. Existing – Net cost of existing system to users. Future – Projected cost of improvements needed for new users. Common Basis: Meter size, connection, number of fixtures.	Temporary provision of a specific amount of funds upfront for an expenditure that must be repaid in a set amount of time. Private loans may be loans from a commercial bank or other financial institutions.	Ad valorem taxes charged to property owners as a percentage of the current assessed value of property. Typically, GO bonds levied for the system construction.	User Fees – Charges assessed system users for capital and O&M costs for providing utility service. Monthly fee typically based on a base and usage rates. Connection Fees – Charges assessed to property owners at the time of connection to the utility system.
Advantages					
Direct cost/benefit relationship, provides stable revenue base. Other funding sources such as grants, loans, bonds can be utilized as part of the funding.	Accepted means for project financing. GO – Stable revenue base. Revenue – Beneficiaries of services pay.	Beneficiaries pay specifically for required infrastructure. Provides means of recovering cost for installed extra capacity.	Application process is typically much faster. Less obligations (e.g., environmental reports, ADA requirements) than with government finance.	Administrative system in place for assessing taxes. Property tax typically has large, stable revenue base.	User Fee – Cost/benefit relationship is clear with rational rate setting. Connection Fee – Covers utility cost for connection.
Limitations					
Typically requires beneficiary and utility approval for specifically defined and benefited area. More difficult to administer than other funding sources.	GO requires voter approval; revenue typically does not. Revenue typically has higher rates and reserve requirements than GO. Requires bond counsel for execution.	Fees do not provide capital in much advance of development. Requires basis for charge. Hard for some localities to ascertain capital needs and future size.	Generally, private loans have higher interest rates and less favorable payback terms.	Government and voter approval needed. Some municipalities and states have statutory limits on property tax levels.	User Fee – Reliance for O&M as well as capital financing may be unaffordable in some communities. Connection Fee – Only covers utility's cost of connection.

Water

Debt	Source	Maturity Date	Principal	Interest Rate	Outstanding Debt*
Water and Sewer Refunding Bonds, Series 2010 (43.5% Water)	Bank of New York	2023	$ 1,505,000.00	5.60%	$ 1,285,000.00
2001 Water Loan, PW-01-691-022	PWTF	2021	$ 494,000.00	0.50%	$ 182,506.00
2004 Water Revenue Bonds, USDA Phase I	Rural Development	2034	$ 260,000.00	4.25%	$ 230,950.00
2004A Water Revenue Bonds, USDA Phase II	Rural Development	2034	$ 1,500,000.00	4.50%	$ 1,327,658.00
2004 Water Loan PW-02-691-PRE-115	PWTF	2022	$ 208,443.91	2.00%	$ 87,766.00
Total			**$ 3,967,443.91**		**$ 3,113,880.00**

* Principal Balance as of 12/31/2014

Water

No.	Project	Project Cost	Grant Funding	Date	Interest Rate	Years	Allocable Interest
1	Municipal Water System Improvements	$ 1,291,270.43	$ 346,891.40	Dec-82	9.96%	10	$ (940,601.51)
2	McCall's Addition	$ 65,300.51		Dec-82	9.96%	10	$ (65,039.31)
3	Day's Railroad Addition	$ 66,432.48		Oct-84	10.00%	10	$ (66,432.48)
4	Tremont St. Reservoir Drain Line	$ 59,457.11		Sep-89	7.26%	10	$ (43,165.86)
5	4th Street Resurfacing Project	$ 24,521.77		Jul-94	6.22%	10	$ (15,252.54)
6	Front Street Waterline Improvement Project	$ 192,503.75		May-02	4.25%	6	$ (49,088.46)
7	Water System Improvements - Phase I	$ 516,456.80		Nov-04	4.25%	10	$ (219,494.14)
8	Water System Improvements - Phase II	$ 2,744,914.39	$ 950,000.00	Dec-04	2.0-4.5%	9.9	$ (709,521.89)
9	Patit Creek - First Street Bridge	$ 6,240.00		May-05	4.30%	9.5	$ (2,549.04)
10	S. 4th Street Flowmeter & Backflow Preventer	$ 45,789.64		Jun-09	4.86%	5	$ (11,126.88)
11	Shutters Properties Water Line Relocation	$ 41,144.51		Jul-11	4.46%	3	$ (5,505.14)
	Total	**$ 5,054,031.39**	**$ 1,296,891.40**				**$ (2,127,777.25)**

Water CFC with Grant Funding

Item	Parameter		Value, $
1	Cost of Existing Infrastructure	$	5,054,031.39
2	Outstanding Debt	$	(3,113,880.00)
3	Contributions In-Kind	$	-
4	Allocated Interest	$	2,127,777.25
5	Net Cost Basis	$	4,067,928.64
6	No. of ERUs		1,922
7	**Total Water System CFC per ERU**	**$**	**2,116.51**

Water CFC without Grant Funding

Item	Parameter		Value, $
1	Cost of Existing Infrastructure	$	5,054,031.39
2	Outstanding Debt	$	(3,113,880.00)
3	Contributions In-Kind	$	(1,296,891.40)
4	Allocated Interest	$	2,127,777.25
5	Net Cost Basis	$	2,771,037.24
6	No. of ERUs		1,922
7	**Total Water System CFC per ERU**	**$**	**1,441.75**

Water with Grant Funding

Meter Size	Weighing Factor	CFC
3/4-inch / 1-inch	1.0	$ 2,120
1-1/2 - inch	3.3	6,996
2-inch	5.3	11,236
3-inch	10.0	21,200
4-inch	16.7	35,404
6-inch	33.3	70,596
8-inch	53.3	112,996
10-inch	76.7	162,604

Water without Grant Funding

Meter Size	Weighing Factor	CFC
3/4-inch / 1-inch	1.0	$ 1,440
1-1/2 - inch	3.3	4,752
2-inch	5.3	7,632
3-inch	10.0	14,400
4-inch	16.7	24,048
6-inch	33.3	47,952
8-inch	53.3	76,752
10-inch	76.7	110,448

APPENDIX I

Environmental Information

SEPA ENVIRONMENTAL CHECKLIST

UPDATED 2014

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

***Instructions for applicants*: [help]**

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use “not applicable” or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

***Use of checklist for nonproject proposals:* [help]**

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. background [help]

1. Name of proposed project, if applicable: [help]
   City of Dayton Water System Plan

2. Name of applicant: [help]
   City of Dayton

3. Address and phone number of applicant and contact person: [help]

Karen Scharer, AICP, Planning Director
City of Dayton
111 South First Street
Dayton, WA 99328
509-382-2361

4. Date checklist prepared: [help]

February 5, 2015

5. Agency requesting checklist: [help]

Washington State Department of Health

6. Proposed timing or schedule (including phasing, if applicable): [help]

Approval of Water System Plan - Spring/Summer 2015, implementation of improvement projects identified in plan over 6-year and 20-year planning periods.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. [help]

The Water System Plan identifies improvements to the City of Dayton's water system that need to take place over the next 6 and 20 years to meet Dayton's projected water needs and be able to supply a safe and reliable amount of water to its residents.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. [help]

Gray & Osborne, Inc., completed a Wellhead Protection Plan as part of the City's April 2001 Water System Plan. That plan is incorporated into this Water System Plan. The existing Wellhead Protection Plan identifies the susceptibility and vulnerability of Dayton's groundwater wells through delineations, analysis, and identification of existing and potential contamination sites.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. [help]

No.

10. List any government approvals or permits that will be needed for your proposal, if known. [help]

The Water System Plan needs to be approved by the Washington State Department of Health, Office of Drinking Water. The Department of Ecology will review and may comment on the Water System Plan, but this is not required.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.) [help]

The Water System Plan is a document covering all aspects of the City's water system. The plan includes projected water demands for the next 20 years (2014-2034) and identifies capital improvement projects that are needed over the next 20 years to meet the needs of Dayton. The plan covers physical facilities (wells, reservoirs, waterlines), operational plans, source

water protection, financial status of the water system, and projected costs of the improvements. The area covered under this plan is the City's existing, retail, future, and water rights place of use water service areas.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist. [help]

The location of the proposal encompasses the City's existing, retail, future, and water rights place of use water service areas. The above water service areas include the City limits, the majority of the Urban Growth Area (UGA), and existing services outside the UGA. Portions of the UGA were excluded from the City's water service areas due to existing topography and water features.

B. ENVIRONMENTAL ELEMENTS [help]

1. Earth

a. General description of the site [help]
(circle one): Flat, rolling, hilly, steep slopes, mountainous,
other _____________

The City of Dayton lies in the Touchet River valley at the confluence of the Touchet River and Patit Creek.

The valley floor is relatively flat (slopes are less than 1 percent) with the minimum elevation of 1,557 feet above sea level and a maximum elevation of 2,085 feet within the city limits. The valley is bordered by moderate to steep sloping hillsides (slopes of 30 to 40 percent) to the north and east respectively and steep hillsides (slopes of 50 to 90 percent) in the southern portion of the community at Rock Hill bluff.

b. What is the steepest slope on the site (approximate percent slope)? [help]
~30 to 40 percent

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils. [help]
The major soil's association in the study area is the Patit Creek Hermiston Association and the Athena-Palouse Association. The Patit Creek-Hermiston-Onyx Association is characterized as having nearly level, well drained, medium textured soils that formed in alluvium. Some of these soils are gravely or cobbly. The Athena-Palouse Association can be described as being dominantly strongly sloped, to moderately steep, well drained, medium textured soils that formed in wind-laid silts. Farmland exists outside the UGA, but no land within the UGA is zoned farmland.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. [help]

Steep slopes surrounding the Touchet River valley.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill. [help]

No filling or grading is identified or proposed in this Water System Plan. However, capital improvement projects outlined in the plan, such as new waterlines, typically require filling or grading as part of the project. Quantities needed will not be known until project designs are completed.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. [help]

With the exception of the Front Street Drain Line Project, erosion is not anticipated for any of the capital improvement projects described in the Water System Plan. Erosion could potentially occur in the steep portions of the pipe alignment for the Front Street Drain Line Project. Erosion and sediment best management practices (BMPs) and controls would be specified in the construction contract documents for this project. Contractor would be required to comply with contract document provisions.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)? [help]

New waterlines do not create impervious surfaces although they are usually placed under streets that are impervious. A new pump station building would create an impervious area. The extent of these areas are not known in this Water System Plan and will not be known unless Dayton proceeds with a project and completes design of the project.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: [help]

Any potential erosion as a result of these projects should be minimal. Any necessary measures to reduce or control erosion will be determined during project design and incorporated into an Erosion Control Plan.

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known. [help]

No air emissions are projected from the completion of this Water System Plan. Construction of capital improvement projects described in the plan would create automobile and industrial equipment emissions as part of construction, but no emissions following completion of the projects.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe. [help]

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any: [help]

Not applicable.

3. **Water**

a. Surface Water: [help]

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type
and provide names. If appropriate, state what stream or river it flows into. [help]
Touchet River, Patit Creek, and Mustard Hollow. Several wetlands have been mapped and included in the U.S. Fish and Wildlife Service's National Wetlands Inventory Database. These wetlands are hydrologically connected to the Touchet River and occur within the City's UGA.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans. [help]
Some waterline projects may be within 200 feet of a stream. The Water System Plan does not identify any particular stream on the capital improvement project list. This information will be determined during the design of the project.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material. [help]
The amount and location of fill and dredge material to be placed in or removed from surface water or wetlands is not identified in the plan. This information will be determined during the design of the project.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known. [help]
No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan. [help]
According to FEMA's Flood Insurance Rate Maps (FIRM's), portions of the area lie within a 100-year floodplain. Much of the City of Dayton is protected from flooding due to levees constructed along the Touchet River.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge. [help]
No.

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known. [help]
The City currently withdraws groundwater for potable water use.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. [help]
None.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe. [help]
None.

2) Could waste materials enter ground or surface waters? If so, generally describe. [help]
Some pollutants associated with general construction could potentially enter ground or surface waters.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.
No.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:
Any necessary measures to reduce or control erosion will be determined during project design and incorporated into an Erosion Control Plan.

4. **Plants** [help]

a. Check the types of vegetation found on the site: [help]

__X__deciduous tree: alder, maple, aspen, other
__X__evergreen tree: fir, cedar, pine, other
__X__shrubs
__X__grass
_____pasture
_____crop or grain
_____Orchards, vineyards or other permanent crops.
_____wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
_____water plants: water lily, eelgrass, milfoil, other
_____other types of vegetation

b. What kind and amount of vegetation will be removed or altered? [help]
Some incidental vegetation may be removed or altered as a result of the completion of this Water System Plan. Specific kind and amount of vegetation would be determined during project design.

c. List threatened and endangered species known to be on or near the site. [help]
Listed plant species occur within Columbia County, but none are known to be within the City of Dayton's UGA.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: [help]
Completion of all capital improvement projects, described in this Water System Plan, will include landscaping which will enhance vegetation on project sites. This includes planting of native trees and shrubs and removal of invasive noxious weeds.

e. List all noxious weeds and invasive species known to be on or near the site.
Yellow starthistle, Mediterranean sage, Japanese/Bohemian knotweed, Leafy spurge, cheatgrass, and rattle grass.

5. **Animals**

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. Examples include: [help]

birds: **HAWK**, **HERON**, eagle, **SONGBIRDS**, other:
mammals: **DEER**, bear, elk, **BEAVER**, other: **WILD TURKEY, PHEASANT, QUAIL, DUCKS, AND GEESE**
fish: bass, **SALMON**, **TROUT**, herring, shellfish, other: **STEELHEAD**

b. List any threatened and endangered species known to be on or near the site. [help]
The Touchet River, a major tributary of the Walla Walla River, supports populations of ESA listed Mid-Columbia Basin steelhead and bull trout.

c. Is the site part of a migration route? If so, explain. [help]
The Touchet River is a migration route for various species of fish including ESA listed juvenile and adult steelhead and adult bull trout. The reach of the Touchet River, which flows through Dayton, has been identified as a "Priority Area" for fish recovery in both the Walla Walla Subbasin Plan and the Snake River Salmon Recovery Plan.

d. Proposed measures to preserve or enhance wildlife, if any: [help]
The Water System Plan does not degrade wildlife or wildlife habitat.

e. List any invasive animal species known to be on or near the site.
None.

6. **Energy and natural resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc. [help]
The Water System Plan does not require any energy following completion. Electricity would be used to run pumps, valves, and telemetry during project construction.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe. [help]
No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any: [help]
The Water System Plan includes a conservation plan to reduce water usage by Dayton customers. A reduction in water usage would reduce electrical usage by the City to pump water and conserve energy.

7. **Environmental health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe. [help]
No.

1) Describe any known or possible contamination at the site from present or past uses.
None known.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.
None.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.
Calcium hypochlorite used for disinfection of potable water.

4) Describe special emergency services that might be required.
An emergency response plan is part of the Water System Plan. No special emergency services will be required from completion of the Water System Plan.

5) Proposed measures to reduce or control environmental health hazards, if any:
Follow Material Safety Data Sheet instructions and recommendations for handling and using calcium hypochlorite.

b. **Noise**

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? [help]
No noise currently exists which might affect the Water System Plan.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site. [help]
Construction noise would be created during the construction of any capital improvement project described in the Water System Plan. No noise would be created after completion of a project.

Short-term: All noise created by the projects would be intermittent and temporary in nature and confined to project sites during daylight hours (6:00 a.m. to 6:00 p.m.) for the duration of the project. Construction noise may be audible to residents in surrounding neighborhoods. Commuters and pedestrians traveling in the vicinity of the project may notice temporary noise. Any noise generated in these areas will dissipate quickly as

commuters and pedestrians distance themselves from the source. Since the proposed work is transitory, the impact to surrounding areas is temporal and not anticipated to result in continuous exposure at harmful levels.

Long-term: None.

3) Proposed measures to reduce or control noise impacts, if any: [help]
Not applicable.

8. **Land and shoreline use**

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe. [help]
The Water System Plan covers the City of Dayton's water service area within the UGA. Current uses within the City are varied.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use? [help]
As the City of Dayton has grown, land that once was used for agriculture has been turned into residential, commercial, and industrial areas. Only limited portions of land within the UGA are currently being used for agriculture.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:
None anticipated.

c. Describe any structures on the site. [help]
Structures that may be constructed as part of capital improvement projects for the water system include pump buildings.

d. Will any structures be demolished? If so, what? [help]
It is unknown at this time if any structures will require demolition as a result of the construction of several of the capital improvement projects.

e. What is the current zoning classification of the site? [help]
The City of Dayton has over seven different zoning classifications within the City UGA. The Water System Plan describes projects that would serve all of those classifications.

f. What is the current comprehensive plan designation of the site? [help]
Primarily residential.

g. If applicable, what is the current shoreline master program designation of the site? [help]
Not applicable.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify. [help]
Not applicable.

i. Approximately how many people would reside or work in the completed project? [help]
The projected population of the City of Dayton at the end of the Water System Plan time period (2026) is 3,139.

j. Approximately how many people would the completed project displace? [help]
The Water System Plan and its capital improvement projects would not displace any people.

k. Proposed measures to avoid or reduce displacement impacts, if any: [help]
Not applicable.

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: [help]
The Water System Plan will be incorporated into the City's comprehensive plan, which determines specific water, sewer, transportation, parks, schools, fire and police, and other City services to ensure it is compatible with existing and projected land uses.

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:
Conformance with City and Columbia County existing and projected land uses and plans.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. [help]
The Water System Plan does not provide any housing units, but does provide plans to serve the expected growth in housing. A number of housing units will be provided as a result of the City's growth over the planning period of the Water System Plan.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. [help]
No housing would be eliminated or completion of any of the planned projects suspended as a result of the Water System Plan.

c. Proposed measures to reduce or control housing impacts, if any: [help]
Not applicable.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed? [help]
The Water System Plan proposes the construction of new pump station buildings. The new pump stations would be made of concrete masonry units (CMU) approximately 12 feet high. The final height depends on size and final design of the pump station buildings.

b. What views in the immediate vicinity would be altered or obstructed? [help]
No views would be altered or obstructed as a result of the completion of the Water System Plan or any of the proposed projects.

c. Proposed measures to reduce or control aesthetic impacts, if any: [help]
None.

11. **Light and glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur? [help]
The Water System Plan and its associated projects will not produce any light or glare.

b. Could light or glare from the finished project be a safety hazard or interfere with views? [help]
Not applicable.

c. What existing off-site sources of light or glare may affect your proposal? [help]
Not applicable.

d. Proposed measures to reduce or control light and glare impacts, if any: [help]
Not applicable.

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity? [help]
The City has various parks and recreational areas within the UGA that the Water System Plan covers.

b. Would the proposed project displace any existing recreational uses? If so, describe. [help]
No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: [help]
Not applicable.

13. **Historic and cultural preservation**

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe. [help]
The City of Dayton has three historical districts listed on the National Register of Historic Places - two residential and one commercial. These are the Southside National Historic District, Washington Street National Historic District, and Downtown Dayton National Historic District. There are also several individual residences listed outside the districts. In addition, there is one district listed on the Dayton Register of Historic Places - the Downtown Dayton Historic District. There are also several individual listings of houses on the Dayton Historic Register. In both the national and Dayton Historic Districts, buildings are designated as primary/contributing or non-contributing. Included among these is the oldest existing railroad station in Washington (1881) and the Columbia County Courthouse, the oldest Washington State Courthouse still in use. The areas in which these landmarks are located are shown in the historic overlay map shown in the City of Dayton Comprehensive Plan.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources. [help]
The City of Dayton Environmental Report for Water System Improvements, Phase I (Anderson Perry & Associates, Inc. - 2003), which included a review of cultural resources within the City.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc. [help]

The City of Dayton Environmental Report for Water System Improvements, Phase I (Anderson Perry & Associates, Inc., 2003), which included a review of cultural resources within the City.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

An Unanticipated Discovery Plan for cultural resources was required for the City's 2004 Water System Improvements Project. The City adopted the Confederated Tribes of the Umatilla Indian Reservation "Policy and Procedure Manual for the Repatriation of Ancestral Human Remains and Funerary Objects". That plan or similar plan would be utilized for future construction projects. Previously, the Tribes and other organizations were contacted in 2003 as part of the preparation for an environmental report for waterline replacements throughout the City, including 100 percent of the proposed project areas.

14. Transportation

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any. [help]

Capital Improvement projects outlined in the Water System Plan would be accessed by various streets with the UGA of the City of Dayton.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop? [help]

Columbia County Public Transportation (CCPT) is available to all residents of Columbia County as well as to residents of Waitsburg and Dixie located in adjacent Walla Walla County. The majority of trips are to Walla Walla. The nearest transit stop is Waitsburg, which is 10 miles away from Dayton.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate? [help]

Not applicable.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private). [help]

No new roads or streets will be required as a result of the completion of this Water System Plan.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. [help]

Some work may be in the vicinity of existing railroad tracks, but should not affect rail traffic.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates? [help]

Not applicable.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

Proposed construction of water system improvements will temporarily affect traffic in the City.

h. Proposed measures to reduce or control transportation impacts, if any: [help]

Utilize traffic control plans for safety and to minimize transportation impacts.

15. **Public services**

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe. [help]

The Water System Plan would not create an increased need for public services. The Water System Plan is a planning tool to provide a public service to meet growth within the City of Dayton.

b. Proposed measures to reduce or control direct impacts on public services, if any. [help]

Not applicable.

16. **Utilities**

a. Circle utilities currently available at the site: [help]

[✓ electricity], natural gas, [✓ water], [✓ refuse service], [✓ telephone], [✓ sanitary sewer], [✓ septic system (outside City)], other:

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed. [help]

The Water System Plan would not require any utilities to be completed. Capital improvement projects in the plan completed would require electricity and water service.

C. Signature [HELP]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: David Jepsen PE

Name of signee DAVID JEPSEN PE

Position and Agency/Organization PROJECT ENGINEER, ANDERSON PERRY + ASSOCIATES, INC.

Date Submitted: 3/12/15

D. supplemental sheet for nonproject actions [help]

(**IT IS NOT NECESSARY** to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?
No increase of these elements is anticipated since the futre water demand is projected to be less than in 2014.

Proposed measures to avoid or reduce such increases are:
The City has adopted water use efficiency goals and a plan to meet these goals.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?
Proposed construction of water system improvements are within existing public rights-of-way and easements and should not affect these elements.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:
None.

3. How would the proposal be likely to deplete energy or natural resources?
No. Water demand is anticipated to decrease in the future.

Proposed measures to protect or conserve energy and natural resources are:
Implement City's water use efficiency plan.

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?
Proposed construction of water system improvements listed in the Water System Plan may impact historic or cultural resources.

Proposed measures to protect such resources or to avoid or reduce impacts are:
For internally funded projects, the City will have an Inadvertent or Unanticipated Discovery Plan in place to handle discovery of historic or cultural items.

For projects funded with state or federal monies, a Historical Cultural Survey will be performed prior to starting construction.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?
   The City's Water System plan should not affect land and shoreline use. The City and Columbia County wil review and certify that the Water System Plan is consistent with adopted comprehensive plans, development regulations, and other policies.

   Proposed measures to avoid or reduce shoreline and land use impacts are:
   Follow City's comprehensive plan and development regulations.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?
   No. Water demand is anticipated to decrease.

   Proposed measures to reduce or respond to such demand(s) are:
   None.

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.
   None identified.

Historic Districts
City of Dayton