Town of Eatonville

Comprehensive Water System Plan

Town of Eatonville

Agency Review
February 2013

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Town of Eatonville Comprehensive Water System Plan

February 2013

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Town of Eatonville
Comprehensive Water System Plan
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Executive Summary

PURPOSE OF THE PLAN

The Town of Eatonville's (Town) water system is a major infrastructure, much of which is invisible to the people who receive water from it. The water system requires qualified staff to operate and maintain it, and an ongoing capital improvement program to replace old components to meet the requirements mandated by federal and state laws. The primary purpose of the Town's 2013 Comprehensive Water System Plan (WSP) is to identify and schedule water system improvements that correct existing system deficiencies and ensure a safe and reliable supply of water to current and future customers. This WSP complies with Washington State Department of Health (DOH) regulations under WAC 246-290-100, which requires water purveyors to update their water system plans every 6 years.

CHANGES SINCE THE LAST COMPREHENSIVE WATER SYSTEM PLAN

The Town's last WSP was completed in 2005. The following changes have occurred since the last update that affect water system planning for the Town.

- The DOH Water Use Efficiency (WUE) Rule became effective on January 22, 2007, to ensure that water systems have a reliable supply of water and are using water more efficiently.
- The DOH *Water System Design Manual* was updated in December 2009. The revisions primarily address water demand requirements and water system physical capacity analysis, both of which affect the Town.
- Drinking water regulations are continually evolving to ensure that water purveyors are providing a safe and reliable water supply to their customers. Additional water quality monitoring requirements and revisions to existing regulations, such as the Groundwater Rule, and Stage 1 and 2 Disinfectants/Disinfection By-products Rule, have been implemented since the Town's last WSP was completed.

SUMMARY OF KEY ELEMENTS

The 2013 WSP presents a description of the existing water system and service area, a forecast of future water demands, policies and design criteria for water system operation and improvements, the operations and maintenance program, staffing requirements, a schedule of improvements, and a financial plan to accomplish the improvements. This WSP also includes several ancillary elements, which include a WUE plan, a water quality monitoring plan, a cross-connection control plan, and a watershed protection plan. A summary of the key issues related to these elements is provided in the following sections.

Water Service Area

The Town provides water service to approximately 1,036 customer accounts within its existing water service area boundary. The Town is responsible for providing public water service, utility management, and water system development within the retail water service area, which is larger than

the existing water service area, if the duty to serve requirements of the Municipal Water Law are satisfied. Although providing water service within the Town limits is the highest priority, water service can be extended outside of the Town limits and within the urban growth area if the duty to serve requirements are met and the project is in compliance with the Town's adopted land use plan, zoning, and development regulations. All water extensions shall be in compliance with the Town's water system standards.

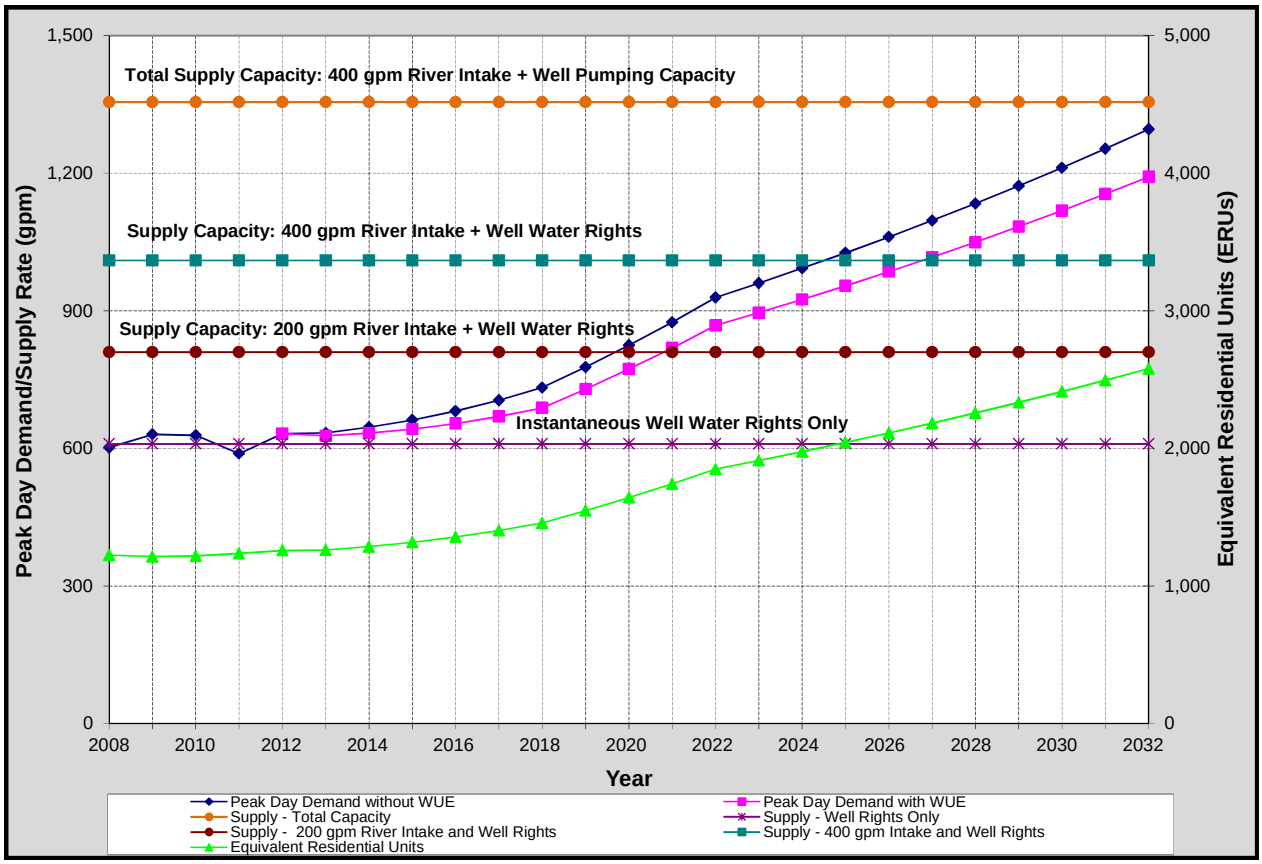
Past Water Usage and Water Use Efficiency

The Town experienced a trend of increasing water supply, or system-wide water demand, from 2004 through 2007 due to system-wide growth and the associated increase in water usage. A decline in water usage since 2007 is likely due to WUE practices. In addition, the Town has replaced old water main and repaired water main leaks to decrease annual water supply. The Town's per capita water demand, which was approximately 120 gallons per capita per day in 2011, is fairly standard for the Puget Sound area. The amount of distribution system leakage in the Town's system was 16 percent in 2011, which is in higher than the standard of 10 percent established by the WUE Rule. In addition to leakage in the distribution system, the Town has additional leakage at the water treatment plant site resulting in 31 percent total system leakage in 2011.

Future Water Demands and Water Supply

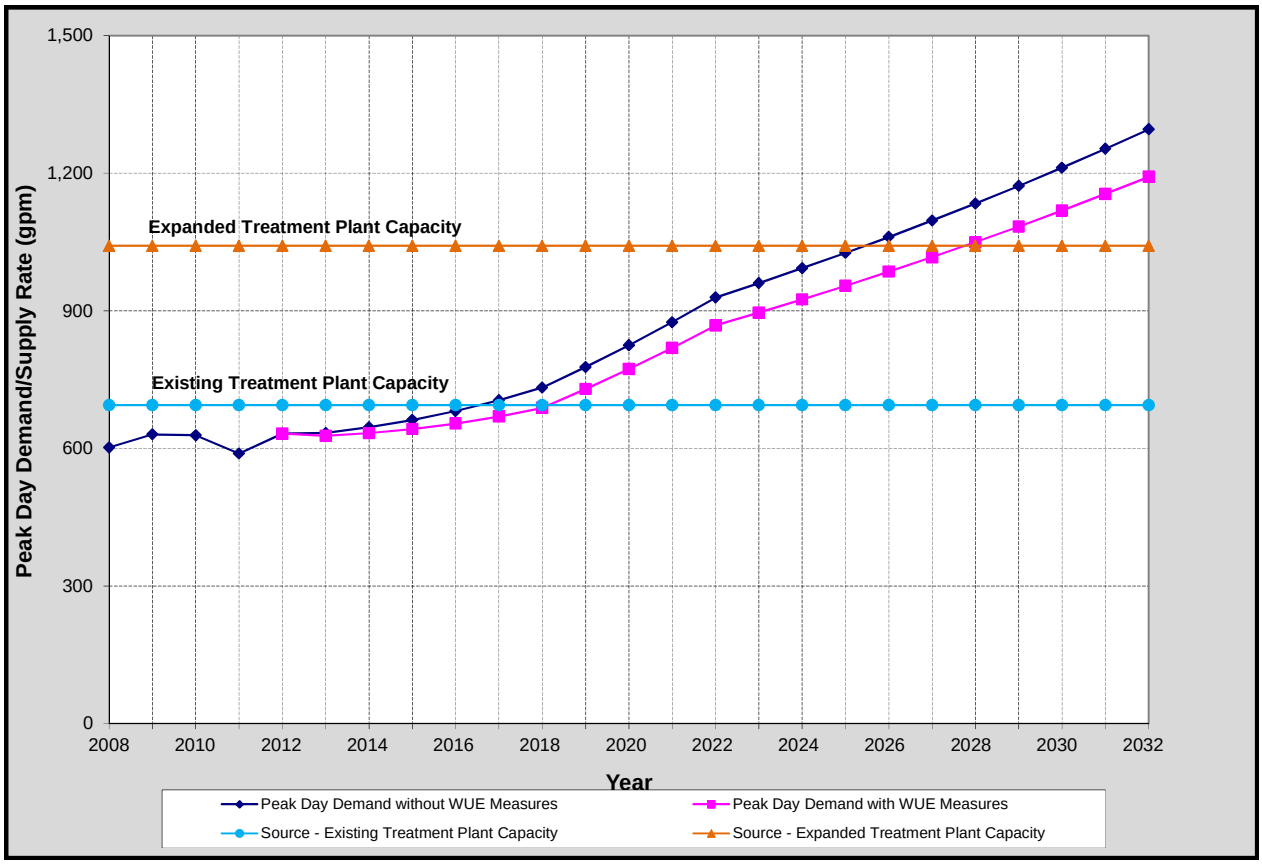
Overall water demand within the Town's system is projected to increase by approximately 25 percent within the next 6 years and double within the next 20 years based on growth projections. The Town's well sources alone scarcely had sufficient instantaneous water rights to meet the demand requirements of the system in 2011, as shown in **Chart ES-1**. The Town relies on the Mashel River source to meet the demands beyond the water right capacity of the well sources. The maximum diversion capacity of the Mashel River source is approximately 400 gallons per minute (gpm). At that diversion rate plus the well instantaneous water rights, the Town has sufficient supply to meet the peak demand requirements of the system until approximately 2025, as shown in **Chart ES-1**. Beyond 2025, the Town will need additional supply sources. The Town is considering improving the river intake or transferring instantaneous water rights from the river to the wells, but obtaining additional water rights to meet the projected demands will likely be necessary.

Chart ES-1
Future Water Supply and Demand Projections



The Town's existing water treatment plant has sufficient capacity to meet the peak day demand requirements of the system until approximately 2017, as shown in the **Chart ES-2**. The Town's water treatment plant has an existing capacity of 1.0 million gallons per day (MGD) and the capability for an expanded capacity of 1.5 MGD. The expanded water treatment plant would have sufficient capacity to meet the peak day demand requirements of the system until approximately 2026. Beyond 2026, further water treatment plant expansion will be necessary to meet the projected demands. The improvements at the water treatment plant can be delayed by several years if the leakage issue at the water treatment plant is resolved and the Town reduces its overall supply requirement.

Chart ES-2
Future Water Treatment and Demand Projections



Water Source and Quality

The Town's drinking water is supplied a surface water diversion and four groundwater under the influence of surface water wells. The Town's water treatment plant currently filters the water from the Mashel River and the wells. All supply is disinfected and has pH adjustment for corrosion control.

The quality of the Town's water supply has been satisfactory and has met or exceeded all drinking water standards. The drinking water regulations are constantly changing and will require additional monitoring and reporting in the future in an effort to ensure safe drinking water for the public. Therefore, it is imperative that the Town stay abreast of the regulations to maintain compliance.

Operations and Maintenance

The Town's operations and maintenance organization is staffed by well-qualified, technically trained personnel. Town staff regularly participates in safety and training programs to keep abreast of the latest changes in the water industry and to ensure a smooth and safe operation of the water system. The current staff of supervisory personnel and field crew, many of whom are responsible for the water system and other utilities, have effectively operated the water system in the past. However, general maintenance of the water system has not been kept up to the level desired due to limited staff availability. In order to properly maintain the system and handle water system expansion in the future, additional staff will be required. The Town plans to add staff to meet the increased requirements from system expansion, as the budget allows.

Water System Evaluation

The existing water system was evaluated to determine its ability to meet the policies and design criteria of the Town and those mandated by the DOH. The results of the evaluation are summarized as follows.

- The Town has sufficient water supply to meet the demands of existing water customers. However, additional water supply will be needed prior to 2025, assuming 400 gpm can be diverted from the Mashel River and the maximum instantaneous well water rights are utilized, to meet the projected demands of the system based on the forecasted population growth. The Town will also need additional annual water rights by 2020 to meet projected average day demands.
- Leakage at the water treatment plant requires evaluation and resolution with an initial focus on potential clearwell leakage.
- The Town's water treatment facility will need a third treatment skid prior to 2017 to meet projected demands. The project can be delayed if the leakage issue at the water treatment plant can be satisfactorily resolved.
- The 1050 Pressure Zone has an existing storage deficiency that will increase as further growth occurs.
- A new pressure zone is needed near the Hilltop Reservoir for growth at the higher elevations.
- A portion of the 996 Zone in the vicinity of the 996 Zone Reservoir has low pressures and does not have adequate fire flow available. Converting this area to the 1077 Zone is required to adequately service this neighborhood.
- The existing Hilltop Booster Pump Station and Center Street Booster Pump Station need improvements for reliability and redundancy.
- One pressure reducing station has reached its design life and needs replacement.

- Several areas of the system require replacement of existing water main to resolve deficiencies related to low fire flows, aging water main, and undesirable pipe materials.
- The telemetry system has limited capabilities and all of the facilities are not currently connected to the master telemetry unit at the water treatment plant.

Proposed Water System Improvements and Financing Plan

Improvements to the water system are necessary, primarily to resolve existing system deficiencies, but also to accommodate the increase in water demands from future growth. Improvements identified for the first 6 years of the capital improvement program (2013 through 2018) are estimated to cost approximately $2,429,000, which results in an average expenditure of approximately $405,000 per year. Improvements in the following 6 years (2019 through 2024) are estimated to cost approximately $5,914,000. If the leakage issue at the water treatment plant can be fixed, the cost of improvements in the first 6 years of the capital improvement program can be reduced to approximately $1,228,000, or approximately $204,000 per year, by delaying the water treatment plant expansion until necessary.

The financial analysis is intended to illustrate the feasibility of funding the operation and maintenance and capital improvements recommended for the water system for the next 6 years. The first 6 years of capital improvements are projected to be funded by accumulated capital cash reserves, annual revenue collections from connection charges, annual transfers of rate-funded capital or excess cash (above minimum balance targets) from operating accounts, interest earnings on capital fund balances and other miscellaneous capital resources, and revenue bond financing. The cost of operating and maintaining the water system and funding the capital improvements over the upcoming 6 years will require an increase in rates and connection charges, which will be coordinated with the Town Council based on the general recommendations within this WSP.

Introduction

1

WATER SYSTEM OWNERSHIP AND MANAGEMENT

The Town of Eatonville (Town) is a municipal corporation that owns and operates a public water system within its water service area. The water system data on file at the Washington State Department of Health (DOH) for the Town's system is shown in **Table 1-1**.

Table 1-1
Water System Ownership Information

Information Type	Description
System Type	Group A - Community - Public Water System
System Names	Eatonville Water Department
County	Pierce
DOH System ID Number	22300K
Owner Number	1666
Address	201 Center Street West, PO Box 309, Eatonville, WA 98328
Contact	Mr. Mike Tiller, Water Superintendent
Contact Phone Number	(360) 832-6110

OVERVIEW OF EXISTING SYSTEM

At the end of 2011, the Town provided service to approximately 1,036 total customer connections, or 1,237 equivalent residential units (ERUs), within the Town's retail water service area, which extends beyond the Town limits. The Town limits comprise an area of approximately 1.8 square miles and the water service area is approximately 3.3 square miles. The 2011 population within the Town limits was approximately 2,775 people.

Water supply to the Town is provided by surface water diverted from the Mashel River and four groundwater wells. Well Nos. 1, 2, 6, and 7 have been determined to be under the direct influence of surface water. The Mashel River water and well water is treated at the Town's membrane filtration plant. Water storage is provided by three reservoirs with a total capacity of 1.0 million gallons (MG) and an additional 0.2 MG of clearwell storage at the water treatment plant. In addition, the Town's water system has three pressure zones with six pressure reducing valve (PRV) stations, three booster pump stations, and more than 19 miles of water main. A summary of 2011 water system data for the Town's system is shown in **Table 1-2**.

Table 1-2
2011 Water System Data

Description	Data
Town Population	2,775
Population Served	2,835
Water Service Area	3.3 square miles
Total Connections	1,036
Total ERUs	1,237
Demand per ERU	274 gallons per day
Demand per Capita	120 gallons per day
Annual Supply	123,773,000 gallons
Average Day Demand	235 gpm
Distribution System Leakage	16%
Peak Day/Average Day Demand Factor[1]	2.50
Peak Hour/Peak Day Demand Factor[1]	1.80
Number of Pressure Zones	3
Number of Wells & Total Capacity	4 (955 gpm)
Mashel River Diversion Capacity	400 gpm
Treatment Plant Capacity	1.0 MGD
Number of Pump Stations & Total Capacity	3 (2,675 gpm)
Number of Reservoirs & Total Capacity	3 (1.0 MG)
Number of Pressure Reducing Valve Stations	6
Total Length of Water Main	19 miles

1: Sufficient data unavailable. Estimated values shown.

AUTHORIZATION AND PURPOSE

In January 2012, the Town authorized RH2 Engineering, Inc., (RH2) to prepare a comprehensive water system plan (WSP) as required by state law under the Washington Administrative Code (WAC) 246-290-100. In accordance with WAC 246-290-100, the plan must be updated and submitted to the DOH every 6 years. The previous WSP was approved by DOH in 2005. The purpose of this updated WSP is as follows:

- To evaluate existing water demand data and project future water demands.
- To analyze the existing water system to determine if it meets minimum requirements mandated by DOH, as well as the Town's policies and design criteria.
- To identify water system improvements that resolve existing system deficiencies and accommodate future needs of the system for at least 20 years into the future.

- To prepare a schedule of improvements that meets the goals of the Town's financial program.
- To evaluate past water quality and identify water quality improvements, as necessary.
- To document the Town's operations and maintenance program.
- To prepare water use efficiency, cross-connection control, watershed protection, and water quality monitoring plans.
- To comply with all other WSP requirements of DOH.

SUMMARY OF PLAN CONTENTS

A brief summary of the content of the chapters in the plan is as follows:

- The Executive Summary provides a brief summary of the key elements of this plan.
- **Chapter 1** introduces the reader to the Town's water system, the objectives of the plan, and the plan organization.
- **Chapter 2** presents the water service area, describes the existing water system, and identifies the adjacent water purveyors.
- **Chapter 3** presents related plans, land use, and population characteristics.
- **Chapter 4** identifies existing water demands and projected future demands.
- **Chapter 5** presents the Town's operational policies and design criteria.
- **Chapter 6** discusses the Town's water source and water quality monitoring program.
- **Chapter 7** discusses the water system analyses and existing system deficiencies.
- **Chapter 8** discusses the Town's operations and maintenance program.
- **Chapter 9** presents the proposed water system improvements, their estimated costs, and implementation schedule.
- **Chapter 10** summarizes the financial status of the water utility and presents a plan for funding the water system improvements.
- The **Appendices** contain additional information and plans that supplement the main chapters of the plan.

DEFINITION OF TERMS

The following terms are used throughout this plan:

Capital Facilities Charge: A one-time fee paid by a property owner when connecting to the Town's water system. This fee pays for the new customer's equitable share of the cost of the existing system. This fee offsets the costs of providing water to new customers and recognizes that the existing water system was largely built and paid for by the existing customers.

Consumption: The true volume of water used by the water system's customers. The volume is measured at each customer's connection to the distribution system.

Connection Charge: A one-time fee paid by a property owner when connecting to the Town's system and is made up of both the Capital Facilities Charge and Meter Service Connection Charge.

Cross-connection: Any physical connection, actual or potential, between a water system and any source of non-potable substance which, therefore, presents the potential for contaminating the public water system.

Demand: The quantity of water required from a water supply source over a period of time necessary to meet the needs of domestic, commercial, industrial, and public uses, and to provide enough water to supply fire fighting, system losses, and miscellaneous water uses. Demands are normally discussed in terms of flow rate, such as million gallons per day (mgd) or gallons per minute (gpm), and are described in terms of a volume of water delivered during a certain time period. Flow rates pertinent to the analysis and design of water systems are:

- **Average Day Demand (ADD):** The total amount of water delivered to the system in a year divided by the number of days in the year.
- **Peak Day Demand (PDD):** The maximum amount of water delivered to the system during a 24-hour time period of a given year.
- **Peak Hour Demand (PHD):** The maximum amount of water delivered to the system, excluding fire flow, during a 1-hour time period of a given year. A system's PHD usually occurs during the same day as the PDD.

Distribution System Leakage: Water that is measured as going into the distribution system, but not metered as going out of the system.

Equivalent Residential Units (ERUs): One ERU represents the amount of water used by one single-family residence for a specific water system. The demand of other customer classes can be expressed in terms of ERUs by dividing the demand of each of the other customer classes by the demand represented by one ERU.

Fire Flow: The rate of flow of water required during fire fighting, which is usually expressed in terms of gpm.

Head: A measure of pressure or force exerted by water. Head is measured in feet and can be converted to pounds per square inch (psi) by dividing feet by 2.31.

Head Loss: Pressure reduction resulting from pipeline wall friction, bends, physical restrictions, or obstructions.

Hydraulic Elevation: The height of a free water surface above a defined datum; the height above the ground to which water in a pressure pipeline would rise in a vertical open-end pipe.

Maximum Contaminant Level (MCL): The maximum permissible level of contaminant in the water that the purveyor delivers to any public water system user, measured at the locations identified under WAC 246-290-310, Table 4.

Meter Service Connection Charge: The installation charge or hook-up fee is a fee paid by a property owner to reimburse the Town for the cost incurred to make the physical connection to the water system. This cost includes both direct and indirect cost for installing the service line off of the system's water main to the customer's water meter. The charge also includes the cost of the water meter and meter box.

Potable: Water suitable for human consumption.

Pressure Zone: A portion of the water system that operates from sources at a common hydraulic elevation. For example, 996 Zone refers to the Town's lower pressure zone that has a reservoir with an overflow elevation of 996 feet.

Purveyor: An agency, subdivision of the state, municipal corporation, firm, company, mutual or cooperative association, institution, partnership, or persons or other entity owning or operating a public water system. Purveyor also means the authorized agents of such entities.

Supply: Water that is delivered to a water system by one or more supply facilities which may consist of supply stations, booster pump stations, springs, and wells.

Storage: Water that is "stored" in a reservoir to supplement the supply facilities of a system and provide water supply for emergency conditions. Storage is broken down into the following five components which are defined and discussed in more detail in **Chapter 7**: operational storage, equalizing storage, standby storage, fire flow storage, and dead storage.

LIST OF ABBREVIATIONS

The abbreviations listed below in **Table 1-3** are used throughout this WSP.

Table 1-3
Abbreviations

Abbreviation	Description
ADD	Average Day Demand
AWWA	American Water Works Association
CCR	Consumer Confidence Report
CIP	Capital Improvement Program
County	Pierce County
DBP	Disinfection By-product
DOH	Washington State Department of Health
DSL	Distribution System Leakage
EPA	Environmental Protection Agency
ERU	Equivalent Residential Unit
fps	feet per second
GMA	Growth Management Act
gpm	gallons per minute
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MG	Million Gallons
MGD	Million Gallons per Day
mg/l	milligrams per liter
OSHA	Occupational Safety & Health Administration
PDD	Peak Day Demand
PHD	Peak Hour Demand
psi	pounds per square inch
SDWA	Safe Drinking Water Act
SOC	Synthetic Organic Chemical
SWTR	Surface Water Treatment Rule
THM	Trihalomethane
Town	Town of Eatonville
UGA	Urban Growth Area
USGS	United States Geological Survey
VOC	Volatile Organic Chemical
WAC	Washington Administrative Code
WISHA	Washington Industrial Safety & Health Act

Water System Description

2

INTRODUCTION

This chapter describes the Town of Eatonville's (Town) existing and future water service areas, water service agreements, and provides a thorough description of the water system and its individual components. The results of the evaluation and analyses of the existing water system are presented later in **Chapter 7**.

WATER SERVICE AREA

History

The Town was incorporated in 1909 and the water system was started in 1910. Since 1910, the Town has renovated the water system, supplemented the system with additional supply and storage facilities, and expanded the distribution network.

Geology

The Town is located in southern Pierce County, Washington, along the Mashel River. The effects of the advance and retreat of the Vashon ice sheet from 18,000 to 14,000 years ago dominates the surficial geology. The Town is located primarily on glacial drift, predominately glacial till, with scattered deposits of recessional outwash overlying sandstone bedrock. The bedrock is comprised predominantly of sandstones of the Miocene age that belong to the Mashel Creek Formation.

The Town's groundwater wells are constructed in alluvial materials composed of sand, gravel, and silt. The materials change from silty sands and gravels to clean sand and gravel at the bottom of the aquifer. The wells draw from the clean sands and gravels of the unconfined aquifer.

Topography

The topography of the area currently served by the Town varies from the areas along the Mashel River up to the surrounding ridges. The lowest areas within the Town are located along the river, where the elevation is approximately 770 feet. A majority of the residential, commercial, and airport areas are located between 770 feet and 830 feet. Elevations begin to increase rapidly at the base of Dow Ridge and the Hilltop area. The highest elevation served on Dow Ridge is approximately 985 feet, and the Hilltop area has services as high as approximately 1,030 feet. Beyond the existing area served and within the water service area, elevations drop to approximately 500 feet in the Ohop Valley to the northwest of the town.

Water Service Area

The Town's corporate boundary encompasses an area of approximately 1.8 square miles, as shown in **Figure 2-1**. The existing water distribution system, shown as the Existing Water Service Area in **Figure 2-1**, extends south to the Mashel River, north to Airport Road E, east to Riverside Lane, and

west beyond Hilligoss Lane. The Town's existing water distribution system extends beyond the Town limits to serve a small area along Hilligoss Lane and 428th Street E to the north of 429th Street Court E as well as a few customers south of Eatonville Highway, as shown in **Figure 2-1**.

In Pierce County (County), the retail water service area, the future water service area, and the service area defined by Pierce County's Coordinated Water System Plan are the same areas. The Town's retail water service area boundary was defined in a 1990 interlocal agreement with the County in accordance with the Pierce County Coordinated Water System Plan. The 1990 service area was slightly modified for the 2005 Comprehensive Water System Plan (WSP) to include the north portion of the Town limits and UGA. Although the boundary was changed in the 2005 WSP, the revised service area agreement was not officially signed by the Town and County. During this WSP process, the Town revised the water service area boundary to match the urban growth area boundary, as shown in **Figure 2-3**. The Town and County plan to have the revised service area agreement, included in **Appendix A**, signed during the approval process for this WSP.

The Town is responsible for providing public water service, utility management, and water system development within the retail water service area. However, requests for new water service outside the Town limits will only be granted upon approval of a Town utility service agreement. The Town has the duty to serve an applicant for new service within its retail service area if there is sufficient capacity, the service request is consistent with local plans, there are sufficient water rights, and service can be provided in a timely and reasonable manner. The retail water service area extends north to approximately 412th Street E, east to approximately 142nd Avenue Court E, south to approximately 437th Street E, and west to approximately 102nd Avenue E. The Town's retail water service area boundary encompasses an area of approximately 3.3 square miles and extends beyond the existing distribution system to the urban growth boundary.

For any service requests within the retail water service area, the Town will review the four duty to serve requirements. **Figure 9-3** of **Chapter 9** schematically indicates how water could be provided to the Ohop valley, quarry area, south region, and west region of the retail water service area if the Town has adequate water rights and developers are capable of financing the improvements necessary to serve the areas.

Once this water system plan showing the service area is approved by the Washington State Department of Health (DOH), the Town's existing water rights can be used throughout the defined retail/future water service area per the 2003 Municipal Water Law. The place of use for the Town's water rights is the Town of Eatonville and, according to the law, the place of use is defined as the area served. Thus, the Town can utilize its water rights outside of its corporate boundaries if the use is within the defined retail/future water service area and all legal requirements defined in RCW 90.03.386(2) have been met. Within this WSP, the Town is expanding the water right place of use to be the water service area in accordance with the Municipal Water Law. **Figure 2-3** displays the retail/future water service area.

WATER SERVICE AGREEMENTS

Water Service Area Agreement

All water purveyors located within a Critical Water Supply Service Area (CWSSA) are required to have a water service area agreement that identifies the external boundary of their water service area. Pierce County was declared a CWSSA on November 8, 1983. The Town prepared and signed a water service area agreement in accordance with the Pierce County Coordinated Water System Plan, which was finalized in 1988. A copy of this agreement signed by the Town in 1990 is contained in **Appendix A**. The revised agreement reflecting the modified water service area is also included in **Appendix A**.

SATELLITE SYSTEM MANAGEMENT

A Satellite System Management Agency (SSMA) is defined as a person or entity that is certified by the DOH to own or operate more than one public water system without the necessity for a physical connection between such systems. SSMAs were created to stop the proliferation of small water systems, many of which could not meet federal and state water quality and water system planning regulations. Based on the success of SSMAs, DOH made recommendations to the legislature to include rules for designating entities as qualified SSMAs. In July 1995, Senate Bill 5448 became the law that governs approvals of new water systems and sets forth requirements for SSMAs. The goal of the new law is to ensure that the people of this state will receive safe and reliable water supplies in the future from professionally managed or properly operated water systems. SSMAs can provide three different levels of service:

1. Ownership of the satellite system.
2. Operations and management of the satellite system.
3. Contract services only.

The Town does not own or operate any satellite systems and is not currently a SSMA. The Town does not plan to be an SSMA.

EXISTING WATER FACILITIES

This section provides a detailed description of the existing water system and the current operation of the facilities. The analysis of the existing water facilities is presented in **Chapter 7**.

Pressure Zones

The Town currently serves customers within an elevation range of approximately 770 feet near the Mashel River to approximately 1,030 feet near the top of the Hilltop area. The wide range of elevations requires that the water pressure be increased or reduced to maintain pressures that are

safe and sufficient to meet the flow requirements of the system. This is achieved in the Town's system by dividing the water system into three distinct pressure zones, as shown in **Figure 2-1**.

The pressures in the 996 Zone, 1050 Zone, and 1077 Zone are regulated by reservoir levels, as illustrated in the hydraulic profile, **Figure 2-2**. Pressures in the 996 Zone, which has a maximum hydraulic elevation of 996 feet, are established by the surface water level in the 996 Zone Reservoir. The 996 Zone is primarily located in downtown Eatonville and the areas surrounding the Eatonville Airport. Pressures in the 1050 Zone, which has a maximum hydraulic elevation of 1,050 feet, are established by the surface water level in the 1050 Zone Reservoir. The 1050 Zone serves homes along Dow Ridge, which is northwest of downtown Eatonville. The Town's third pressure zone is the 1077 Zone and it serves homes in the Hilltop area. The pressures in the 1077 Zone are regulated by the Hilltop Reservoir, which has a maximum hydraulic elevation of 1,077 feet.

Supply Facilities

Introduction

Water supply to the Town water system is provided by the Mashel River and several wells adjacent to the river. The existing wells draw from an unconfined aquifer and are considered a wellfield under the direct influence of surface water.

Water Treatment

The Town utilizes an automated membrane filtration plant for treatment of its water supply sources. The treatment plant was constructed in 2006 and replaced the slow sand filtration plant previously used for water treatment. The Town currently has four active well sources and a surface water source that are treated by the membrane filtration plant. The surface water source flows by gravity and the well sources are pumped to a raw water holding tank at the water treatment plant. The surface water source is monitored for turbidity and the source can be diverted if turbidity levels are high.

Water Treatment Plant

Prior to entering the raw water holding basin, the raw water from the wells and surface water source is injected with a coagulant. The coagulant is injected directly from the bulk storage container to the dosing point using a chemical metering pump. After injection of the coagulant, a flash mixing system rapidly mixes the chemical into the water supply prior to entering the raw water holding basin. The raw water basin provides a minimum of 10 minutes of contact time for the coagulant to react with the natural organic material. The basin is equipped with three submersible pumps that pump the raw water from the basin to the membrane filter skids located in the main treatment plant building.

The treatment plant facility is equipped with two 500,000 gallon per day (gpd) filter skids. Each skid contains a small raw water tank, variable speed permeate pump, membrane modules, permeate storage/backwash supply tank, air scrub system, controller, water quality monitoring equipment, and other miscellaneous piping, valves, and instrumentation required for a fully automatic system. The Town has the ability to add a third 500,000 gpd skid in the future for a total plant capacity of 1.5 million gallons per day (MGD).

Treatment Filters

The filter system is a US Filter Memcor AXIA™ unit that utilizes the Memcor Continuous Microfiltration-Submerged (CMF-S) technology. During filtration, water is drawn through the membrane using the pressure differential developed from the suction of the filtrate pump. Particulate matter greater than 0.1 micrometer (μm) is removed at the surface of the membrane using a barrier filtration mechanism. As particulate matter accumulates on the membrane surface, the CMF-S system automatically performs a backwash process to remove the accumulated particles. The system also performs automatic cleans periodically with a phosphoric acid clean followed by a sodium hypochlorite clean. Citric acid is also used occasionally in the membrane cleaning process.

WTF Chlorination Room

The filter water is disinfected utilizing an on-site sodium hypochlorite generation system. The system is capable of generating 24 pounds of chlorine per day. Chemical metering pumps are used to control the injection of chlorine. The pH of the filter water is also adjusted downstream of the filter system. Chemical metering pumps are used to control the amount of caustic soda added to the water for pH adjustment. The pH is adjusted to a level above 7.0 and the normal range is between 7.3 and 7.6. The treated water is routed through a baffled CT basin, which is adjacent to the raw water basin, to provide adequate contact time. A chlorine residual analyzer analyzes the chlorine residual at three locations: pump station discharge, pre-CT basin downstream of injection and mixing, and post-CT basin. Approximately 1.0 milligrams per liter (mg/L) free residual is provided.

The treated water is routed to two on-site clear wells with a total storage of approximately 232,000 gallons. A third basin of 116,000 gallons will be available in the future. Water flows by gravity

through the clear wells into the Main Pump Station, where it is pumped through a transmission main to the 996 Zone.

Mashel River

The intake on the Mashel River consists of three slotted well-type screens that span the river underneath the bed, and are connected to a manhole on the northwest side of the river. The manhole is set flush with the river, and contains a fish screen for debris removal. In approximately 2007, the screens were lowered to accommodate a change in the river's path. Each spring, the screens are jetted to remove the buildup of winter debris. When the source is utilized, an air compressor system is in place to remove leaves from the intake screens. In the summer, daily monitoring and cleaning by the Town's operations staff of the screens is necessary.

Mashel River

The water from the Mashel River intake flows by gravity to a manhole on the water treatment plant site that is equipped with an automatic shut-off valve. The master control system shuts down the surface water feed at a high turbidity set point. The set point is as high as 75 NTUs in the winter, when the Town does not utilize the source. In the summer, the automatic control valve is set to close at approximately 20 NTUs and will reopen when turbidity is between 10 and 15 NTUs. When the turbidity is acceptable, the surface water is combined with the well water in the raw water basin and routed through the treatment plant process.

The Mashel River intake water right was granted in 1986 with a maximum instantaneous withdrawal rate of 1,032 gpm and an annual withdrawal amount of 525 acre-feet per year (afy). Prior to the Town obtaining the water right, the Eatonville Lumber Company possessed the Mashel River water right.

Well No. 1

Well No. 1 is located north of the Mashel River and west of Weyerhaeuser Road on the Town's treatment plant property. The site is located in an undeveloped area on a fenced and secured property owned by the Town. The well is housed in a small building that contains the mechanical equipment. A separate on-site building houses the electrical and control equipment. An on-site emergency generator provides power in the event of a power outage.

Well No. 1 was drilled in 1966 and a supplemental water right was obtained. The 12-inch-diameter, 43-foot-deep well has a current supply rate of approximately 210 gpm. The submersible pump is equipped with a 5 horsepower motor. Water from Well No. 1 is pumped to the raw water basin at the treatment plant. Water from the raw water basin is routed through the membrane filters and the

CT basin prior to entering the clearwells, where the water is stored until it is pumped by the Main Booster Pump Station to the 996 Zone. Chlorination and pH adjustment occur within the treatment process. Well No. 1 is within a well field that is under the direct influence of surface water. Additional data on Well No. 1 and the Town's other sources is contained in **Appendix B**.

Well No. 2

Well No. 2 is located approximately 80 feet east of Well No. 1 within the same fenced area. The well is housed in a CMU block box that contains the mechanical equipment. A separate on-site building houses the electrical and control equipment. An on-site emergency generator provides power in the event of a power outage.

Well No. 2 was drilled in 1969, and a supplemental water right was obtained for the well in 1967. The 10-inch-diameter, 44-foot-deep well has a current supply rate of approximately 220 gpm. The submersible pump, which was replaced in 2011, is equipped with a 5 horsepower motor. Water from Well No. 2 is pumped to the raw water basin at the treatment plant. Water from the raw water basin is routed through the membrane filters and the CT basin prior to entering the clearwells, where the water is stored until it is pumped by the Main Booster Pump Station to the 996 Zone. Chlorination and pH adjustment occur within the treatment process. Well No. 2 is within a wellfield that is under the direct influence of surface water. Additional data on Well No. 2 and the Town's other sources is contained in **Appendix B**.

Well No. 5

Well No. 5 is located near the Mashel River intake. The well was drilled in 1976 and added to Well No. 2's water right. The 8-inch-diameter, 70-foot-deep well had a supply rate of approximately 40 gpm when it was equipped with a pump. Due to the low capacity, the submersible pump was removed and the Town uses the well for level monitoring. The well is considered an abandoned source of supply.

Well No. 6

Well No. 6 is located on the treatment plant property in the northwest corner of the site behind the control building. The well was drilled and equipped in 2004. Well No. 6 was added to the water right for Well No. 2 and Well No. 5. The 12-inch-diameter, 73.5-foot-deep well has a current maximum supply rate of approximately 200 gpm. The submersible pump is equipped with a 7.5 horsepower motor. An on-site emergency generator provides power in the event of a power outage.

Water from the well is pumped to the raw water basin at the treatment plant. Water from the raw water basin is routed through the membrane filters and the CT basin prior to entering the clearwells, where the water is stored until it is pumped by the Main Booster Pump Station to the 996 Zone. Chlorination and pH adjustment occur within the treatment process. Well No. 6 is considered ground water under the direct influence of surface water. Additional data on Well No. 6 and the Town's other sources is contained in **Appendix B**.

Well No. 7

Well No. 7 is located on the treatment plant property in the northeast corner of the site. The well was drilled and equipped in 2004. Well No. 7 was added to Well No. 1's water right. The 12-inch-diameter, 99-foot-deep well has a current maximum supply rate of approximately 325 gpm. The submersible pump is equipped with a 15 horsepower motor. An on-site emergency generator provides power in the event of a power outage.

Main Booster Pump Station

Water from the well is pumped to the raw water basin at the treatment plant. Water from the raw water basin is routed through the membrane filters and the CT basin prior to entering the clearwells, where the water is stored until it is pumped by the Main Booster Pump Station to the 996 Zone. Chlorination and pH adjustment occur within the treatment process. Well No. 7 is considered ground water under the direct influence of surface water. Additional data on Well No. 7 and the Town's other sources is contained in **Appendix B**.

Pump Station Facilities

Main Booster Pump Station

The above-grade Main Booster Pump Station is located at the water treatment plant. The pump station has three vertical turbine pumps that are used to pump water from the Town's sources to the 996 Zone Reservoir. Each pump is rated at 750 gpm and powered by a 60 horsepower motor. The normal pumping rate of the facility is approximately 750 gpm, the pumping rate of the facility is 1,500 gpm when two pumps are utilized, and the maximum facility pumping rate is 2,250 gpm when three pumps are utilized. The facility is equipped with an emergency generator to provide power in the event of a power outage. Additional data on the Main Booster Pump Station and the Town's other pump stations is contained in **Appendix B**.

Center Street Booster Pump Station

The above-grade Center Street Booster Pump Station is located on property that is owned by the Town near the intersection of Center Street and Conant Drive North. The pump station has two end-suction centrifugal pumps and one vertical multi-stage pump that are used to pump water from the 996 Zone to the 1050 Zone. The primary pump is the vertical multi-stage pump, which is rated at 75 gpm and has a 5 horsepower motor. Pump No. 2 is rated at 125 gpm and powered by 5 horsepower motor. Pump No. 3 is a 50 gpm pump with a 3 horsepower motor. The maximum pumping

Center Street Booster Pump Station

rate of the facility is approximately 250 gpm. The pump station is not equipped with an engine generator for backup power in the event of a power failure. Additional data on the Center Street Booster Pump Station and the Town's other pump stations is contained in **Appendix B**.

Hilltop Booster Pump Station

The above-grade Hilltop Booster Pump Station is located on property adjacent to the 996 Zone Reservoir within a fenced site owned by the Town. The pump station has one end-suction centrifugal pump and one vertical multi-stage pump that are used to pump water from the 996 Zone to the 1077 Zone. Pump No. 1 is capable of pumping 75 gpm and is equipped with a 5 hp motor. Pump No. 2 is capable of pumping 100 gpm and is equipped with 7.5 hp motor. The normal pumping rate of the facility is approximately 175 gpm. The pump station supplies the Hilltop Reservoir and the 1077 Zone. The pump station is also equipped with chlorine residual and pH monitoring equipment for the 996 Zone Reservoir. An on-site emergency generator provides power in the event of a power outage. Additional data on the Hilltop Booster Pump Station and the Town's other pump stations is contained in **Appendix B**.

Hilltop Booster Pump Station

Storage Facilities

996 Zone Reservoir

The 996 Zone Reservoir is located adjacent to a gravel road on a fenced site in a residential area. The reservoir provides 282,000 gallons of water storage for the 996 Zone. The 40-foot-diameter, 32-foot-tall concrete tank provides approximately 9,400 gallons of storage per foot height. The tank has separate 12-inch fill and draw lines for improved mixing. In 1991, the tank's roof and liner were replaced. The 996 Zone Reservoir is equipped with telemetry for communication with the Main Booster Pump Station. Additional data on the 996 Zone Reservoir and the Town's other reservoirs is contained in **Appendix B**.

996 Zone Reservoir

1050 Zone Reservoir

The 223,000 gallon 1050 Zone Reservoir is located along a gravel road on Dow Ridge. The 1050 Zone Reservoir provides water storage for the 1050 Zone. The 30-foot diameter, 49-foot tall steel tank provides approximately 5,310 gallons of storage per foot height. A single 8-inch-diameter water main serves as the reservoir's common inlet/outlet pipe. The reservoir was retrofitted for seismic events after the 2001 Nisqually Earthquake. The 1050 Zone Reservoir is equipped with telemetry for communication with the Center Street Booster Pump Station. Additional data on the 1050 Zone Reservoir and the Town's other reservoirs is contained in **Appendix B**.

1050 Zone Reservoir

Hilltop Reservoir

The 500,000 gallon Hilltop Reservoir is located on a fenced site at the top of a hill. The 48-foot-diameter, 40-foot-tall steel tank was completed in 2005 and provides approximately 13,514 gallons of storage per foot height for the 1077 Zone. Separate 12-inch-diameter water mains serve as the reservoir's inlet and outlet pipes. The Hilltop Reservoir is equipped with telemetry for communication with the Hilltop Pump Station. Additional data on the Hilltop Reservoir and the Town's other reservoirs is contained in **Appendix B**.

Hilltop Reservoir

Distribution and Transmission System

The Town's water service area contained more than 19 miles of water main at the end of 2011 ranging in size from 4 inches to 12 inches. As shown in **Table 2-1**, most of the water main (approximately 72 percent) within the service area is 8-inch-diameter or smaller. Approximately 30 percent of the water mains are larger than 8-inches in diameter.

Table 2-1
Water Main Inventory

Diameter (Inches)	Length (Feet)	% of Total
4	8,032	7.9%
6	23,015	22.5%
8	42,096	41.2%
10	23,361	22.9%
12	5,712	5.6%
Totals	**102,216**	**100%**

Approximately 60 percent of the water main in the system is PVC. The other 40 percent of the pipe in the system is primarily asbestos-cement, cast iron or ductile iron. All new water main installations are required to use PVC or ductile iron water main in accordance with the Town's development and construction standards.

The life expectancy of water main is generally 50 years. Although the age of individual water mains is unknown, it is assumed that the cast iron pipe (approximately 15 percent of the system) is more than 50 years old, and the asbestos-cement pipe (approximately 15 percent of the system) is approximately 45 years old. The cast iron and asbestos-cement pipes are probably reaching their life expectancies and are of particular concern. All other pipe was likely installed in the 1970s or later.

Pressure Reducing Stations

Pressure reducing stations are connections between adjacent pressure zones that allow water to flow from the higher pressure zone to the lower pressure zone by reducing the pressure of the water as it flows through the station, thereby maintaining a safe range of pressures in the lower zone. A pressure reducing station is essentially a below-grade vault (typically concrete), which normally contains two pressure reducing valves (PRV), sometimes a pressure relief valve, piping, and other appurtenances. The pressure reducing valve hydraulically varies the flow rate through the valve (up to the flow capacity of the valve) to maintain a constant pressure on the downstream side of the valve for water flowing into the lower pressure zone.

Center Street PRV

Pressure reducing stations can serve multiple purposes. They can function as an active supply facility by maintaining a continuous

supply of water into a lower zone that has no other source of supply, such as a well or reservoir. Pressure reducing stations can also function as standby supply facilities that are normally inactive (no water flowing through them). The operation of this type of station is typically triggered by a drop in water pressure near the downstream side of the station. A typical application of this function is a pressure reducing station that is only needed to supply additional water to a lower zone during a fire flow situation. The pressure setting of the control valve within the station allows it to remain closed during normal system operation and open only during high demand conditions, like fire flows, to provide the additional supply needed.

The Town's water system has a total of six pressure reducing stations, as shown in profile view in **Figure 2-2**. Four are located at the boundary between the 1050 Zone and 996 Zone, and two are located at the boundary between the 1077 Zone and the 996 Zone. The pressure reducing stations between the 1050 Zone and 996 Zone only provide water to the lower zone during fire flow situations and occasionally during peak demand events. The two PRVs between the 1077 Zone and 996 Zone are equipped with a large PRV and a small PRV. The large PRVs only provide water to the lower zone during fire flow situations and occasionally during peak demand events. The small valves are set to provide a small amount of continuous supply to the 996 Zone to facilitate turnover in the Hilltop Reservoir. A listing of all pressure reducing stations and related data is contained in **Appendix B.**

Water System Interties

Water system interties are physical connections between adjacent water systems. Interties are normally separated by a closed isolation valve or control valve. Emergency supply interties provide water from one system to another during emergency situations only. An emergency situation may occur when a water system loses its main source of supply or a major transmission main and is unable to provide a sufficient quantity of water to its customers. Normal supply interties provide water from one system to another during non-emergency situations and typically supply water at all times.

The Town's water system currently has no interties. The Town does not currently have excess supply for providing water to neighboring communities and there are no significant, reliable water systems in the vicinity of the Town capable of providing an intertie. Unless Pierce County develops significantly around the Town and sources of supply significantly improve, interties are likely unfeasible.

Telemetry and Supervisory Control System

Successful operation of any municipal water system requires gathering and using accurate water system information. A telemetry and supervisory control system gathers information and can efficiently control a system by automatically optimizing facility operations. A telemetry and supervisory control system also provides instant alarm notification to operations personnel in the event of equipment failure, operation problem, flood, fire, or other emergency situations.

The Town's primary Supervisory Control and Data Acquisition System (SCADA) was installed when the water treatment plant was upgraded in 2006. The system consists of a Programmable Logic Controller (PLC) that serves as the Master Telemetry Unit (MTU), a Graphical User Interface (GUI) computer system, and a laptop computer for communicating to the GUI from a remote location. The MTU controls and monitors the sources of supply and the treatment plant. The system has the ability to control remote facilities in the future. A Local Area Network (LAN) provides communication between the treatment process equipment and the MTU. The 996 Zone Reservoir is monitored and communication is via a wireless signal. The analog signal of the level transmitter at the 996 Zone Reservoir is connected to a wireless transmitter at the top of the Hilltop Reservoir. A wireless receiver at the water treatment plant converts the wireless signal to an analog signal that connects to the PLC at the water treatment plant. The system is also equipped with a software based automatic dialer system for notifying staff of alarm events.

Control of the 1050 and 1077 Zones is not connected to the MTU at the treatment plant. However, the Center Street Booster Pump Station is controlled by the level in the 1050 Zone Reservoir and the Hilltop Booster Pump Station is controlled by the level at the Hilltop Reservoir. The level data information is communicated to the Center Street Booster Pump Station through buried cable. For the Hilltop Booster Pump Station, the level data is transmitted by an analog signal from the Hilltop Reservoir to the station's pump controller.

Water System Operation and Control

The Town's groundwater and surface water supply sources feed the raw water basin at the treatment plant. Level monitoring equipment in the clear wells sends a signal to the MTU to call the sources of supply on. The river source is the lead source of supply in the summer and the wells are the lead sources of supply during the other months of the year. Generally, the river source is only used during the summer months. When the turbidity level is high in the summer, an automatic valve on the river inlet is closed and water is diverted. When the clear well levels are low, the lead well, Well No. 7, is turned on. The lag supply sources, in call order, are Well No. 2, Well No. 1, and Well No. 6.

The Main Booster Pump Station pumps water from the clear wells to the 996 Zone Reservoir. When the level of the 996 Zone Reservoir drops, a signal is sent to the booster pump station to start the pumps. The 996 Zone is served by the 996 Zone Reservoir. The number of pumps turned on depends on the demand in the system and the pumps turn off when the reservoir is full.

In a similar manner, the Center Street Booster Pump Station is controlled by the level in the 1050 Zone Reservoir. The pumps are turned on when the level in the reservoir is drawn down and the pumps are turned off when the reservoir is full. The Hilltop Booster Pump Station is controlled by the level in the Hilltop Reservoir. The pumps are turned on when the level in the reservoir is drawn down and the pumps are turned off when the reservoir is full.

The four pressure reducing stations between the 1050 Zone and 996 Zone do not normally supply water, but are set to supply water to the 996 Zone upon a suppressed level in the 996 Zone

Reservoir or during a localized drop in pressure, such as during a fire flow. The large pressure reducing valves between the 1077 Zone and the 996 Zone also only operate during suppressed levels in the 996 Zone Reservoir or drops in pressure. The small pressure reducing valves between the 1077 Zone and the 996 Zone are set to improve turnover in the Hilltop Reservoir and allow water to flow from the higher zone to the lower zone.

ADJACENT WATER SYSTEMS

The Town is located in rural Pierce County and is not adjacent to any large water systems. A few small water systems are located in the vicinity of the Town's water service area. The water systems are shown in **Figure 2-3.** The following is a brief description of each of these water systems.

Pack Forest

The water system for the Charles Lathrop Pack Forest, a University of Washington demonstration forest, is located southwest of the Town's service area boundary. The water system has approximately 17 connections. Water is supplied to the system by a single well that was drilled in 2005. The system has a spring source that is under the influence of surface water and is only used in the event of an emergency. A feasibility study was performed in 1996 to determine if the Town could supply water to Pack Forest, but the University of Washington decided to pursue its own additional sources of supply.

Barneys Corner Water System

The Barneys Corner Water System is located northwest of the Town. The small water system serves approximately three connections with a single well. There are no plans for interties between this system and the Town's water system at this time.

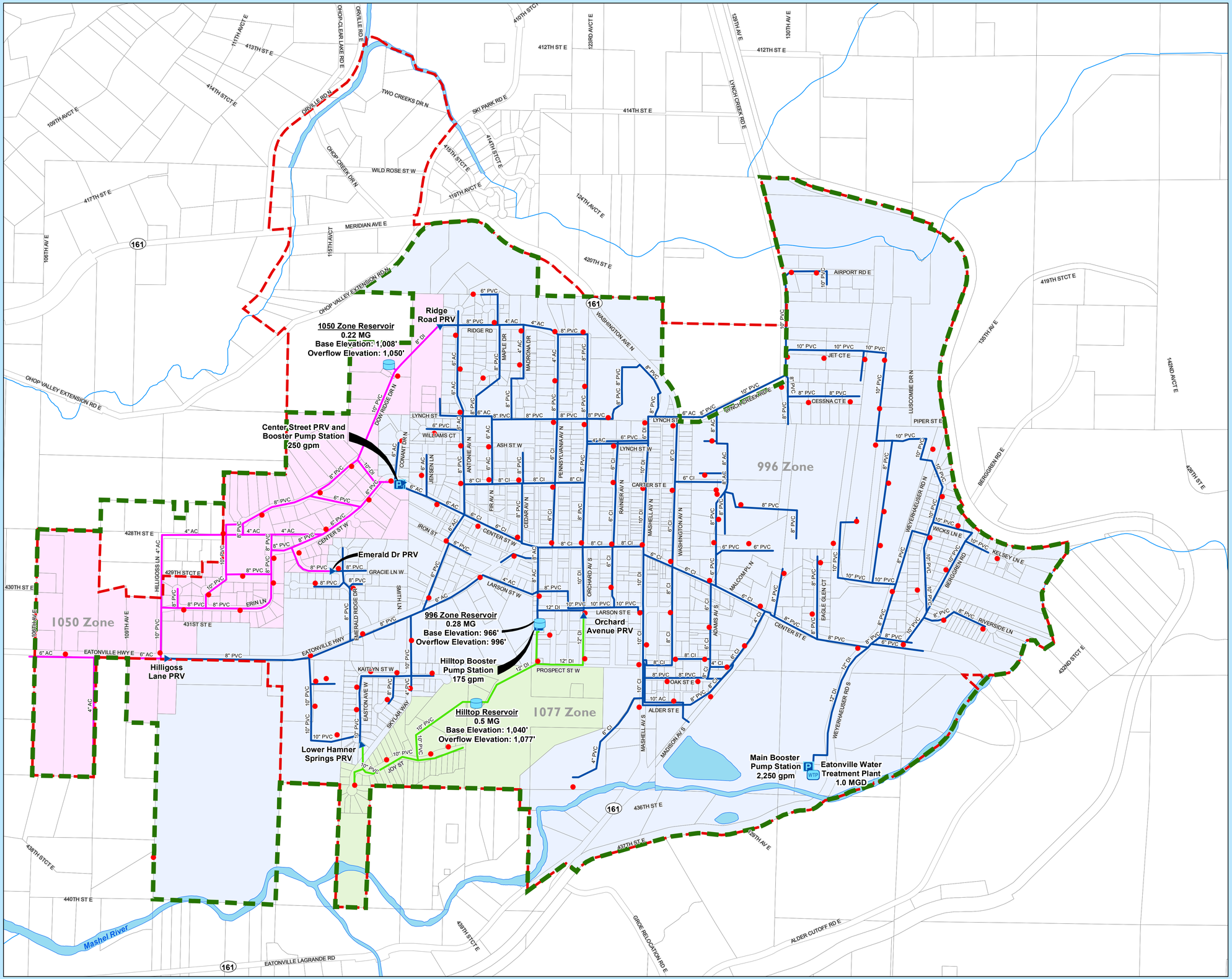
Pioneer Farm Museum

The Pioneer Farm Museum has its own water system supplied by a groundwater well with one connection. The water system is located west of the Town along the Ohop Valley Road. There are no plans for interties between this system and the Town's water system at this time.

Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

FIGURE 2-1
EXISTING WATER SYSTEM



Legend

- Existing Water Service Area
- Town Limits

Water Infrastructure

- Water Treatment Plant
- Reservoir
- BPS
- PRV
- Fire Hydrant

Water Main

- 996 Zone
- 1050 Zone
- 1077 Zone

Pressure Zone

- 996 Zone
- 1050 Zone
- 1077 Zone

1 INCH = 500 FEET

0 500 1,000

DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG

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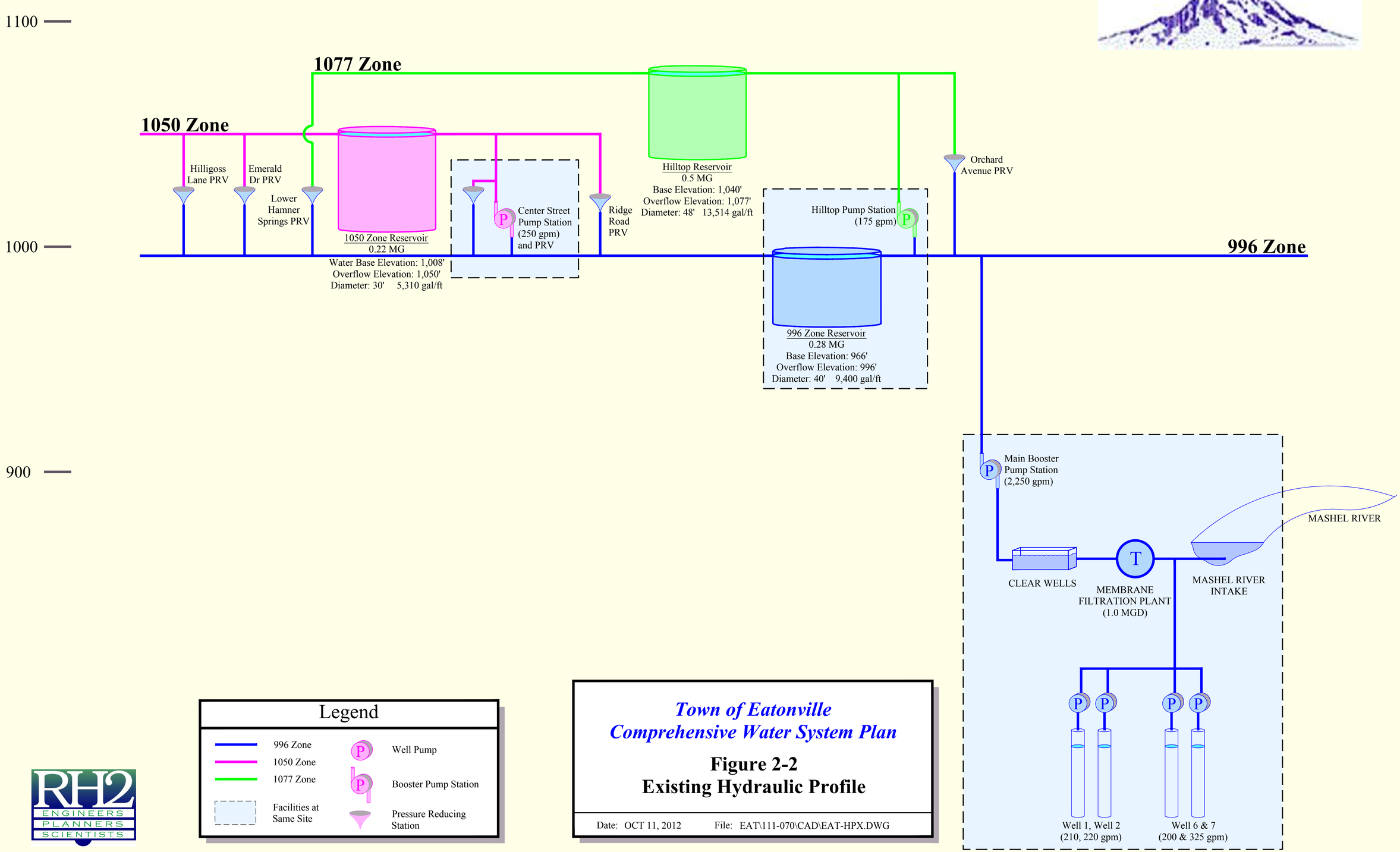
Town of Eatonville



Legend

- 996 Zone
- 1050 Zone
- 1077 Zone
- Facilities at Same Site
- Well Pump
- Booster Pump Station
- Pressure Reducing Station

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Town of Eatonville
Comprehensive Water System Plan

Figure 2-2
Existing Hydraulic Profile

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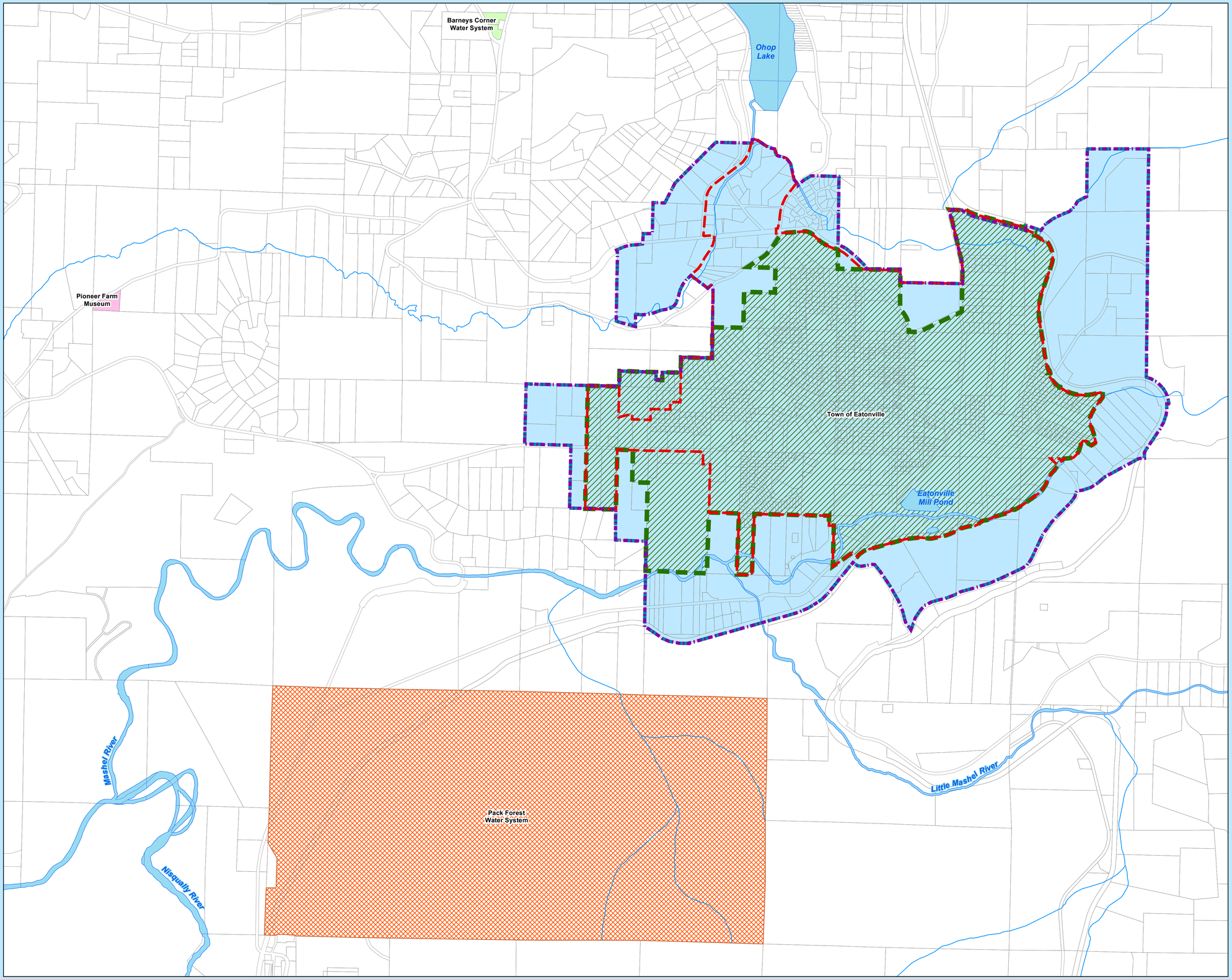
Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

FIGURE 2-3
SERVICE AREA AND ADJACENT WATER SYSTEMS



Legend

- Town Limits
- Eatonville Urban Growth Boundary
- Existing Water Service Area
- Retail Water Service Area / Future Water Service Area

Adjacent Water Systems

- Barneys Corner Water System
- Pack Forest Water System
- Pioneer Farm Museum

N

1 INCH = 1,000 FEET

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DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG

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REV DATE: 2/13/2013

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Land Use and Population

3

INTRODUCTION

The Town of Eatonville's (Town) *Comprehensive Plan* was completed in December 1993 and was last updated in October 2005. Minor amendments have been made to the plan since the 2005 update. The plan was developed to meet the requirements of the State of Washington Growth Management Act (GMA). The GMA requires, among other things, consistency between land use and utility plans and their implementation. This chapter demonstrates the compatibility of the Town's Comprehensive Water System Plan (WSP) with other plans; identifies the designated land uses within the existing and future service area; and identifies population projections within the Town planning area.

COMPATIBILITY WITH OTHER PLANS

Introduction

To ensure that the WSP is consistent with the land use policies that guide it and other related plans, the following planning documents were examined.

- Growth Management Act
- *Town of Eatonville Comprehensive Plan*
- *Pierce County Comprehensive Plan*
- *Pierce County Coordinated Water System Plan*

Growth Management Act

The State of Washington Growth Management Act of 1990 (and its multiple amendments) defined four goals relevant to this WSP:

1. Growth and services should be in urban areas;
2. There should be consistency between land use and utility plans and their implementation;
3. There should be concurrency of growth with public facilities and services; and
4. Critical areas should be designated and protected.

Urban Growth Area

The GMA requires that Pierce County (County) and the Town cooperate in designating an Urban Growth Area (UGA). As part of the development of its *1993 Comprehensive Plan*, the Town designated an UGA that would accommodate the Town's projected population growth and projected growth within the unincorporated portion of the UGA. Since this time, the Town has modified its UGA on several occasions. The current UGA is shown in **Figure 3-1**.

Consistency

The GMA requires planning consistency from two perspectives. First, it requires consistency of plans among jurisdictions. This means that plans and policies of the Town and the County must be consistent (RCW 36.70A.100). Second, the GMA requires the implementation of the plan be consistent with the *Comprehensive Plan* (RCW 36.70A.120).

The 2003 Municipal Water Law also requires that WSPs are consistent with local plans and regulations. The signed Consistency Statement Checklists, included in **Appendix D**, from the Town and County Planning Departments document the determination that the WSP is consistent with the Town and County plans and regulations.

Concurrency

Concurrency means that adequate public facilities and services must be provided at the time growth occurs, which is defined as being within a 6-year time frame. For example, growth should not occur where schools, roads, and other public facilities are overloaded. Concurrency provides assurance that public dollars are used efficiently and that quality of life is preserved. To achieve this objective, the GMA directs growth to areas already served or readily served by public facilities and services (RCW 36.70A.110). It also requires that when public facilities and services can not be maintained at an acceptable level of service, the new development should be prohibited (RCW 36.70A.100).

Critical Areas

The GMA requires that critical areas be designated and protected. Critical areas include fish and wildlife habitats, flood zones, aquifer recharge areas, streams, creeks, rivers, lakes, wetlands, and other surface water, and geologic hazard areas such as steep slopes and liquefaction zones. **Appendix E** contains a SEPA checklist that addresses other environmental concerns.

Town of Eatonville Comprehensive Plan

The Land Use Element of the Town's *Comprehensive Plan* is the Town's vision of how growth and development should occur over a 20-year horizon. While the Land Use Element goals and policies set forth general standards for locating land uses, the *Comprehensive Plan's* Land Use Plan Map, which has been reproduced and is shown in **Figure 3-1**, indicates geographically where certain types of uses may be appropriate. The Land Use Plan Map is a blueprint for development of an area, whereas the zoning code is the regulatory means for implementing it.

The Land Use Element articulates many of the same goals and concerns of the GMA. Like the GMA, the Land Use Element seeks to accommodate growth while preserving the Town's character and protecting the environmentally sensitive areas. It seeks to promote a strong local economy and vital commercial, industrial, and airport industrial districts by focusing economic development within them and establishing development guidelines. The Utilities Element ensures that new development will be adequately serviced without compromising existing levels of service, similar to the principal of concurrency as defined in the GMA.

The Town encompassed an area of approximately 1,102 acres or 1.7 square miles at the time of the *2005 Comprehensive Plan*. The Town's UGA consists of approximately 2,160 acres, or approximately 3.3 square miles. According to the *Comprehensive Plan*, approximately 82 percent (261 of 318 acres) of

the residential land area within the Town limits was developed. The vacant or undeveloped land within the Town limits in addition to the available land in the urban growth expansion area was determined to be sufficient for accommodating the Town's projected number of housing units.

Pierce County Comprehensive Plan

The Pierce County Commissioners adopted the *Pierce County Comprehensive Plan* on November 29, 1994. The plan was effective on January 1, 1995. Since this time, the plan has been amended several times to incorporate UGA, Capital Facility Plan, and land use changes. The plan designates incorporated cities and towns, including the Town, as subareas and acknowledges these areas as having individual comprehensive plans. Together with these subareas, the County determines adequate growth areas for each subarea. The County's *Comprehensive Plan* also guides development in unincorporated Pierce County. The *Pierce County Comprehensive Plan* is codifed as Title 19A of the Pierce County Code.

Similar to the Town's *Comprehensive Plan*, the County's *Comprehensive Plan* contains the following land use goals:

- "manage growth so that delivery of public facilities and services will occur in a fiscally responsible manner to support development and redevelopment in the County;
- …achievement of a stable and diversified economy offering a wide variety of employment opportunities;
- achieve a well-balanced and well-organized combination of open space, commercial, industrial, recreation and public uses served by a convenient and efficient transportation network while protecting the fabric and character of the residential neighborhoods; and
- ensure proper management of the environment and conservation of natural resources".

Pierce County Coordinated Water System Plan

The Pierce County Coordinated Water System Plan (CWSP), dated April 2001, is the result of a study performed by consultants under direction of the Pierce County Water Utility Coordinating Committee (WUCC), Pierce County, Pierce County Planning Agency, City of Tacoma, and the Tacoma-Pierce County Health Department. The members of the WUCC represent the collective efforts of all public water systems with more than ten service connections that provide service within the County. The CWSP was adopted in 1996 and updated in 2001.

The purpose of the CWSP is to assist the area's water utilities in establishing an effective process for planning and development of public water systems and restricting the proliferation of small public water systems. The CWSP accomplishes this by establishing future service area boundaries, minimum design standards, service review procedures, appeals procedures, long-term regional water supply strategy, water conservation program and goals, and the satellite system management program. As can be seen in the following sections of this WSP, the Town has established policies, design criteria, and goals that meet or exceed the requirements and goals of the CWSP.

LAND USE

The existing Town limits currently encompass an area of approximately 1,176 acres. The Town's existing UGA encompasses approximately 900 additional acres outside of the current Town limits. The retail/future water service area is equivalent to the UGA. The Town's Land Use Map, shown in **Figure 3-1** and originally published in the Town's *Comprehensive Plan*, guides development within the Town and the UGA.

Existing Land Use

The County maintains parcel-based information regarding existing land use. Within the existing retail water service area (WSA), approximately 45 percent of the land has an existing residential use and approximately 12 percent has an existing commercial use. Approximately 35 percent of the retail water service area is unbuilt, which includes vacant, open space, and recreational land. A summary of the existing land uses is provided in **Table 3-1**.

Table 3-1
WSA Existing Land Use

Existing Land Use	Percent of WSA
Residential	45%
Commercial	12%
Industrial	3%
Transportation/Utility	1%
Education	2%
Public Facilities	1%
Unbuilt	35%
Total	100%

Town Land Use Designations

Approximately 60 percent of the area within the current Town limits is designated for residential use. The remaining 40 percent is commercial, industrial, aerospace, park, school land, and other small uses. Within the current UGA, and outside of the Town limits, the land use is approximately 44 percent residential. The remaining land within the UGA and outside of the Town limits is commercial, industrial, utilities or parks, and open space land. The land use categories are defined in the Town's *Comprehensive Plan* and allowable densities are defined by the Town's zoning code. Brief descriptions of the Town's land use designations are as follows:

- Single Family Residential: Residential development at a density not less than two dwelling units per acre.
- Multi-Family Residential: Residential development at an average density of 10 dwellings per gross acre or 12 dwellings per net acre.

- Mixed Used: Diverse development of various housing types, commercial, and office uses.
- Commercial: Varied retail and office development.
- Industrial: Primarily light industrial activities.

A summary of Town land use designations and associated percentages of the UGA and retail WSA are provided in **Table 3-2**.

County Land Use Designations

The land use for the area outside of the Town's UGA is designated by the County and is comprised of residential, parks and recreation, agricultural resource and designated forest land. A brief description of each of the County's land use designations surrounding the Town's WSA is provided within. The County also allows one accessory unit per residential lot where an existing single-family dwelling exists for each of these land use designations.

- Rural 10: Generally allows 1 dwelling unit per 10 acres.
- Rural 20: Generally allows 1 dwelling unit per 20 acres.
- Moderate Density Single Family: Generally allows residential densities of up to 4 dwelling units per acre without sewer and up to 6 dwelling units per acres with sewer.
- Parks and Recreation: Land designated for park and recreational use.
- Designated Forest Land: Limited development is allowed on Designated Forest Land.
- Agricultural Resource Land: Land is devoted to agricultural and livestock production with an allowance for 1 dwelling unit per 10 acres.

Table 3-2
Summary of Land Use Designations in the UGA and WSA

Land Use Designation	Acreage	Percent of UGA/WSA
Town Land Use		
Single Family Residential	941	45%
Multi-Family Residential	56	3%
Commercial	166	8%
Aerospace	130	6%
Industrial	213	10%
Mixed Use	43	2%
Parks and Open Space	250	12%
Cemetery	4	0%
Schools	43	2%
Utilities	50	2%
Right-of-Way/No Designation	194	9%
Total	2,089	100%

POPULATION

Household Trends

The Town's residential community is comprised largely of single family residences. In 2010, approximately 692 housing units, or 70 percent, were owner-occupied housing units and approximately 300 housing units, or 30 percent, were renter-occupied housing units. According to the U.S. Census Bureau, the average household size in the Town was 2.78 persons per household in 2000, which has increased from 2.69 in 2000. The average number of persons per household was 2.84 for owner-occupied housing units and 2.64 for renter-occupied units. The average household size in the entire County was 2.57 persons per household in 2000. The higher average household size in the Town reflects the high percentage of single family homes in the Town.

Existing and Future Population

The County experienced population growth and physical development in the recent years at rates that were slower than the previous 10 years. The population of the County increased approximately 13.5 percent from 2000 to 2010 per the U.S. Census Bureau data. The population of the Town increased approximately 37 percent during the same period, due to various annexations and new home construction.

Table 3-3 illustrates the historical population growth since 1980, and the projected future growth for the Town. The historical population data shown in **Table 3-3** represents the population within the established Town limits for each year, whereas the projected population data is based on growth estimates both inside the current Town limits and within the UGA. The Town's population is expected to grow from 2,775 people in 2011 to approximately 5,770 people in 2032 within the Town limits and UGA, which is an average growth rate of approximately 3.4 percent per year. Growth is

expected to be slow through 2013 and to annually increase between 2014 and 2022. The Town's 2022 population forecast of 4,120 people was established by the Town's *Comprehensive Plan* and adopted in Pierce County Ordinance 2003-104s.

Table 3-3
Town Population Trends and Projections

Year	Population
Historical	
1980	998
1990	1,374
2000	2,012
2001	2,087
2002	2,161
2003	2,236
2004	2,310
2005	2,385
2006	2,460
2007	2,534
2008	2,609
2009	2,683
2010	2,758
2011	2,775
Projected	
2012	2,785
2013	2,792
2014	2,848
2015	2,919
2016	3,007
2017	3,112
2018 (+ 6 years)	3,236
2022 (+ 10 years)	4,120
2032 (+ 20 years)	5,770

NOTE: The historical population represents the population within the Town limits. The projected population is based on estimated growth rates within the current Town limits and the UGA.

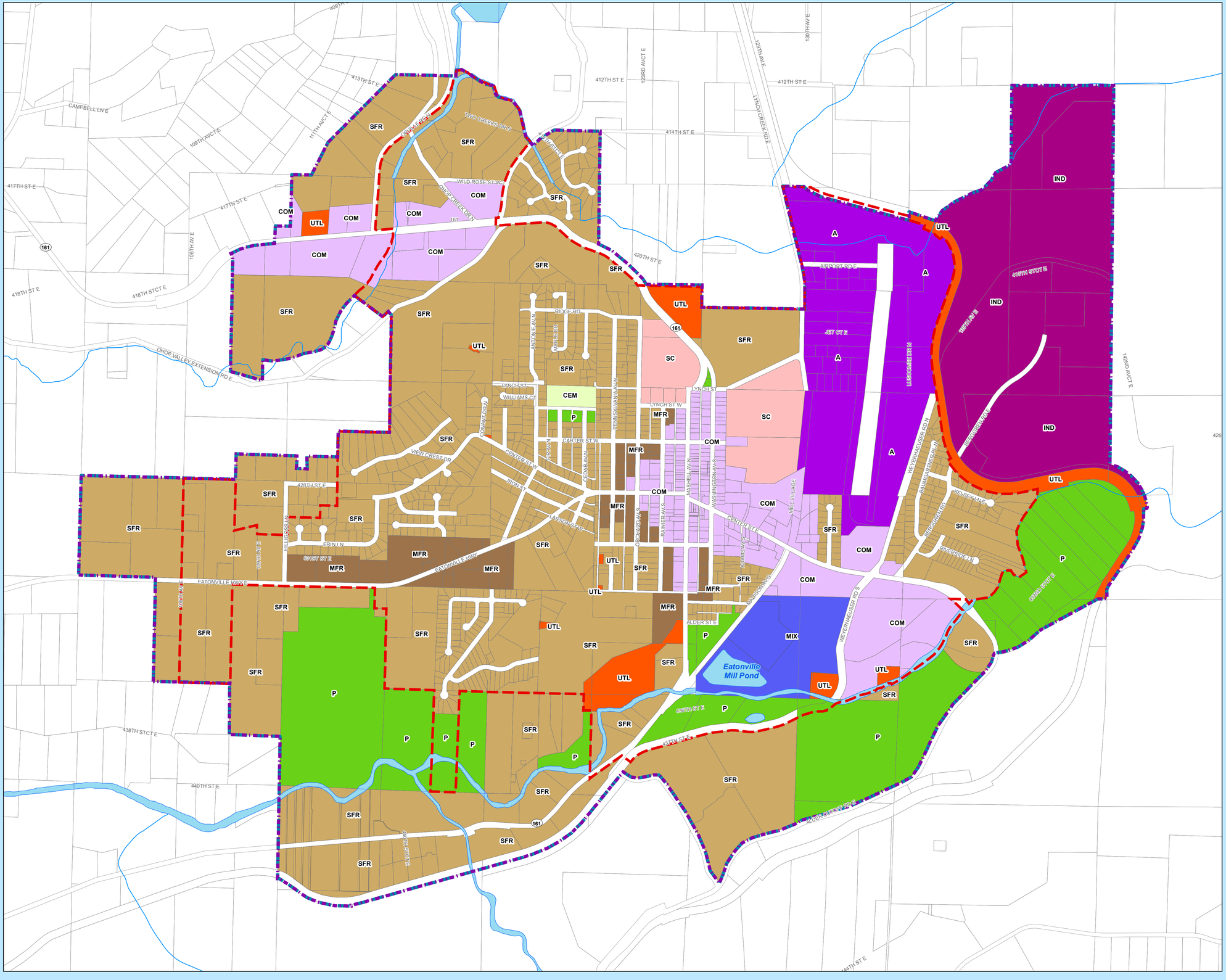
Buildable Lands Analysis

The County prepared a Buildable Lands Report, dated September 2007, that includes a buildable lands analysis for the Town. The purpose of the analysis was to determine the additional housing unit capacity within the Town limits. The analysis examined each individual parcel of land and determined the additional housing unit capacity available based on parcel area, constructability, and land use designation. The results indicated that there was the capability to construct approximately 1,837 additional housing units within the Town's limits. The analysis also calculated a housing unit need of 257 units to accommodate the projected 2022 population of the Town. The 2022 population estimate of 2,780 people was for the Town limits and did not include the UGA. The report indicated that the Town's housing unit capacity at the time of the report exceeded the housing unit need.

For the purposes of this WSP, the buildable lands analysis was expanded to encompass the Town's retail WSA beyond the Town limits. Since a detailed buildable lands analysis was completed for the Town limits in the County's 2007 Buildable Lands Report, the effort within the Town limits was not duplicated. The retail WSA analyses are based on existing land use and zoning to determine the total number of potential water connections within the service area outside of the Town limits. The County code allows detached accessory dwelling units (ADUs) for each residential unit and one ADU was assumed for each residential parcel in the WSA. **Table 3-4** summarizes the results of the analysis and detailed calculations are provided in **Appendix R**. The UGA, which is equivalent to the retail WSA, has the capacity for approximately 2,570 total equivalent residential units (ERUs) based on existing land use categories. A sum of the totals from the two buildable lands analyses indicates that the retail WSA has the capacity for approximately 4,410 ERUs or potential water service connections.

Table 3-4
Retail Water Service Area Buildable Lands Summary

Area	Housing Unit Capacity/ERUs
Town Limits	1,837
UGA outside of the Town Limits	2,573
Total	4,410



Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

FIGURE 3-1
LAND USE

Legend

- Town Limits
- Eatonville Urban Growth Boundary
- Retail Water Service Area / Future Water Service Area

Town of Eatonville Land Use

- SFR — Single Family Residential
- MFR — Multi-Family Residential
- COM — Commercial
- A — Aerospace
- IND — Industrial
- MIX — Mixed Use
- P — Parks and Open Space
- CEM — Cemetery
- SC — Schools
- UTL — Utilities

N

1 INCH = 600 FEET

0 600 1,200

DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG

RH2 ENGINEERS PLANNERS SCIENTISTS

REV DATE: 2/13/2013

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Water Demands

4

INTRODUCTION

A detailed analysis of water system demands is crucial to the planning efforts of a water supplier. A demand analysis first identifies current demands to determine if the existing system can effectively provide an adequate quantity of water to its customers under the most crucial conditions, in accordance with federal and state laws. A future demand analysis identifies projected demands to determine how much water will be needed to satisfy future growth of the water system and continue to meet federal and state laws.

Demands on the water system determine the size of storage reservoirs, supply facilities, water mains, and treatment facilities. Several different types of demands were analyzed and are addressed in this chapter, including average day demand (ADD), peak day demand (PDD), peak hour demand (PHD), fire flow demand, future demands, and a water use efficiency demand reduction forecast.

The magnitude of water demands is typically based on three main factors: 1) population, 2) weather, and 3) water use classification. Population and weather have the two largest impacts on water system demands. Population growth has a tendency to increase the annual demand; whereas, high temperature has a tendency to increase the demand over a short period of time. Population does not solely determine demand, because different populations use varying amounts of water. The use varies based on the number of users in each type of customer class, land use density, and irrigation practices. Water conservation efforts will also impact demands and can be used to accommodate a portion of system growth without increasing a system's supply capacity.

Certificate of Water Availability

In accordance with the requirements of the Growth Management Act (GMA), the Town of Eatonville (Town) must identify that water is available prior to issuing a building permit. A "Certificate of Water Availability" (CWA) is issued if there is sufficient water supply to meet the domestic water service and fire flow requirements of the proposed building. The requirement for providing evidence of an adequate water supply was codified in 1990 under Title 19.27.097 of the Revised Code of Washington (RCW) in the Building Code Section. To assist governments with implementing these requirements, the Department of Health (DOH) has developed a handbook titled *Guidelines for Determining Water Availability for New Buildings*.

CURRENT POPULATION AND SERVICE CONNECTIONS

Residential Population Served

The population within the Town limits was 2,775 in 2011. The Town serves water to approximately 21 customer connections outside of the Town limits along Eatonville Highway and near the intersection of Hilligoss Lane and 428th Street East. At approximately 2.78 people per residence, an estimated 60 additional people are served outside of the Town limits.

In 2011, the Town provided water service to an average of 1,036 customer accounts, of which approximately 870 or 84 percent of these accounts were single-family residential customers, 160 accounts or 15 percent were multi-family residential, schools, commercial and other customers, and 6 accounts or 1 percent were fire hydrants and fire sprinklers.

Water Use Classifications

The Town has divided all water customers into categories based on water meter size and customer class for billing purposes. For planning purposes, the water customers have been distributed into three different groups – single-family residential; multi-family residential, schools, commercial and other; and fire sprinklers and fire hydrants. The demand analysis that follows will report on the water use patterns of these three user groups.

EXISTING WATER DEMANDS

Water Consumption

Water consumption is the amount of water used by all customers of the system, as measured by the customers' meters. **Table 4-1** shows the historical average number of connections, average annual consumption, and average daily consumption per connection of each customer class for the Town from 2008 through 2011. Data between 2004 and 2007 was unavailable due to a new billing system that was introduced in mid-2007.

As shown in **Chart 4-1**, the single-family residential class represents approximately 84 percent of all connections, but only 70 percent of total system consumption, as shown in **Chart 4-2**. This is due to the lower consumption per connection of the single-family residential customers as compared to the other customers. As shown in **Table 4-1,** the single-family residential customers use an average of approximately 177 gallons per day (gpd) per connection, compared to the multi-family, school, commercial and other customers that use an average of approximately 407 gpd per connection, and the fire sprinkler and fire hydrant customers that only use water occasionally. The higher consumption of non-single family customers is expected, since these customers include multi-family residential customers where one connection typically serves several units, and commercial customers that include the system's highest individual water users.

Table 4-1
Average Annual Metered Consumption and Service Connections

Year	Customer Class			Totals
	Single Family	Multi-Family, Schools, Commercial, Other	Fire Sprinklers, Hydrants	
Average Number of Connections				
2008	865	161	6	1,032
2009	881	156	6	1,043
2010	874	157	6	1,037
2011	870	160	6	1,036
Average Annual Consumption (1000 gals)				
2008	60,488	25,120	0	85,608
2009	66,269	25,098	0	91,367
2010	58,970	23,226	0	82,196
2011	56,290	23,743	0	80,034
Average Daily Consumption Per Connection (gal/day/conn)				
2008	192	428	0	
2009	206	441	0	
2010	185	406	0	
2011	177	407	0	

The general decline in average annual consumption from 2008 to 2011 for all customer classes is shown in **Table 4-1**. In 2011, the single-family residential customers used an average of 8 percent less water than in 2008. The customer class consisting of multi-family residential, schools, commercial and other users also shows a decreasing trend in water consumption per connection. The decline in consumption is likely due to the Town's water use efficiency efforts.

Chart 4-1
2011 Water Connections by Customer Class

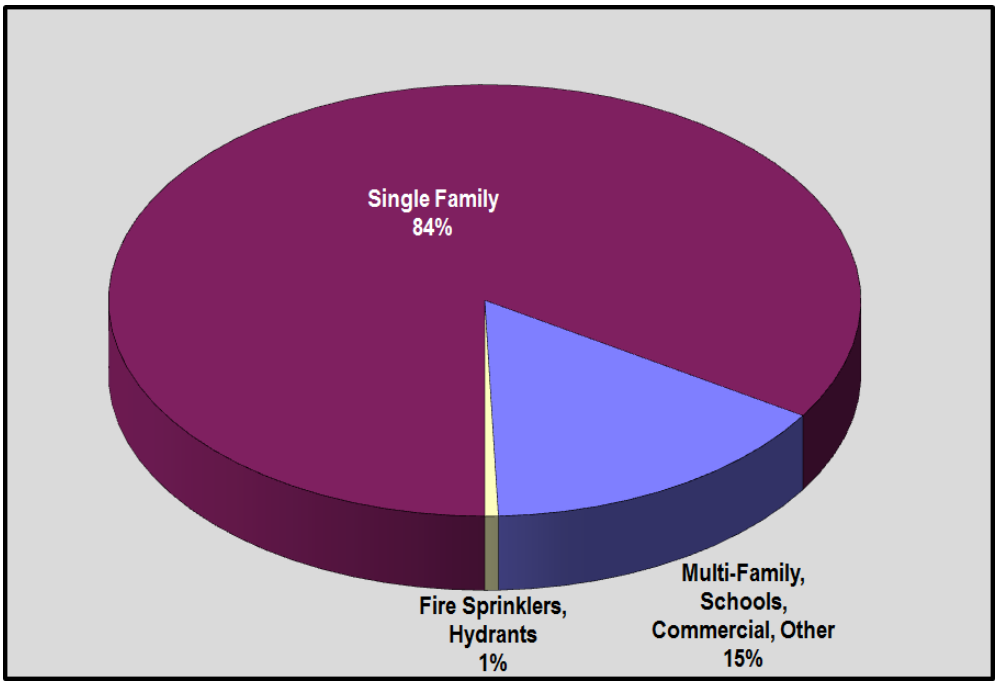


Chart 4-2
2011 Water Consumption by Customer Class

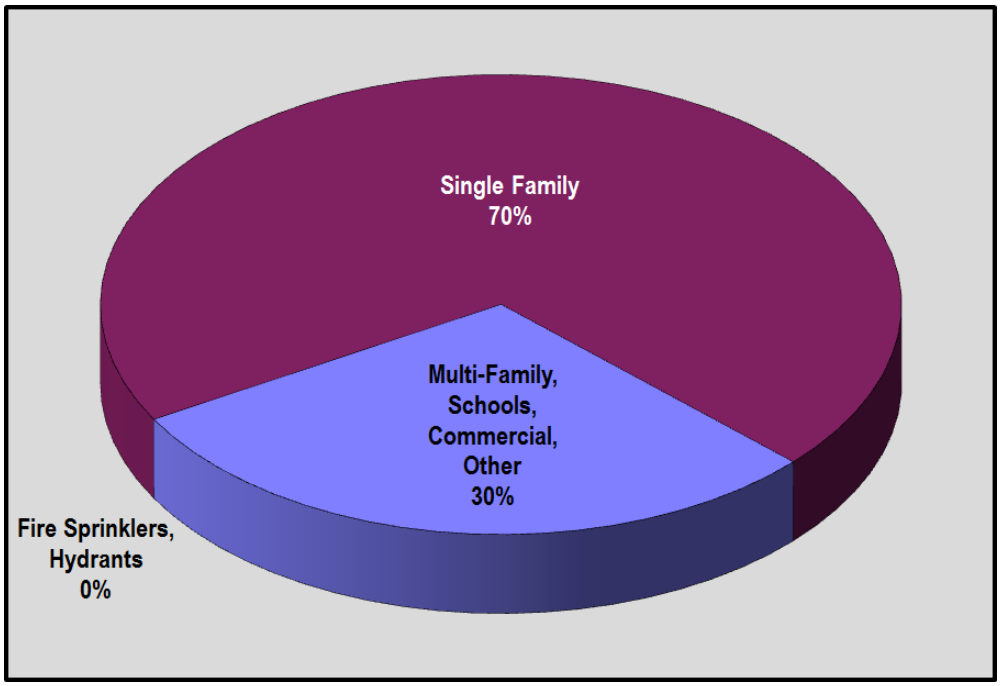


Table 4-2 shows the largest water users of the system in 2010 and their total amount of metered consumption for the year. The total water consumption of these 11 water accounts represented approximately 15 percent of the system's total consumption in 2010. The list of accounts in the table consists of schools, multi-family residences, commercial facilities, the sewer treatment plant, and a church. In 2011 a leak was found at Keybank, the fourth largest water user in 2011. The fix was repaired in 2011 and Keybank is no longer one of the largest water users in the system.

Table 4-2
2010 Largest Water Users

Name	Address	Yearly Consumption (gals)
Eatonville School District Irrigation	209 Washington Ave N	3,423,969
Town of Eatonville Sewer Plant	370 Mashell Ave S	2,140,000
Nybo Redi Mix Concrete	675 Center St E	1,091,900
Keybank	101 Center St W	922,610
Eatonville School District Sprinkler	302 Mashell Ave N	859,800
Eatonville School District Gym	302 Mashell Ave N	828,100
Malcom's Laundromat	320 Center St E #A4	735,850
Glacier Village Apartments	212 Glacier Ave N	707,000
Daka Inc. Apartments	206 Carter St E	633,300
Westwood (John Hightower)	815 Eatonville Hwy W	624,830
Eatonville Baptist Church	825 Eatonville Hwy W	618,500
Largest Water Users Total		12,585,859
Water System Total		82,195,951
Percent of Total		15%

Demand for residential and commercial customers varies throughout the year, typically peaking in the hot summer months. Residential and commercial customers often peak at different times or have different peaking factors because their uses differ. The demand for single-family residential customers in the Town generally peaks in August as shown in **Chart 4-3**. For the Town, the demand for the multi-family residential, schools, commercial and other customers also peaks in August, as shown in **Chart 4-4**. However, the peak month consumption versus average month consumption factor for multi-family residential, schools, commercial and other customers in the Town's water system is slightly higher than the peak month consumption versus average month consumption factor for single family residential customers, indicating that the non-single family class experiences slightly higher peaks than the single family class as indicated in **Chart 4-5**.

Chart 4-3
Historical Monthly Single Family Consumption

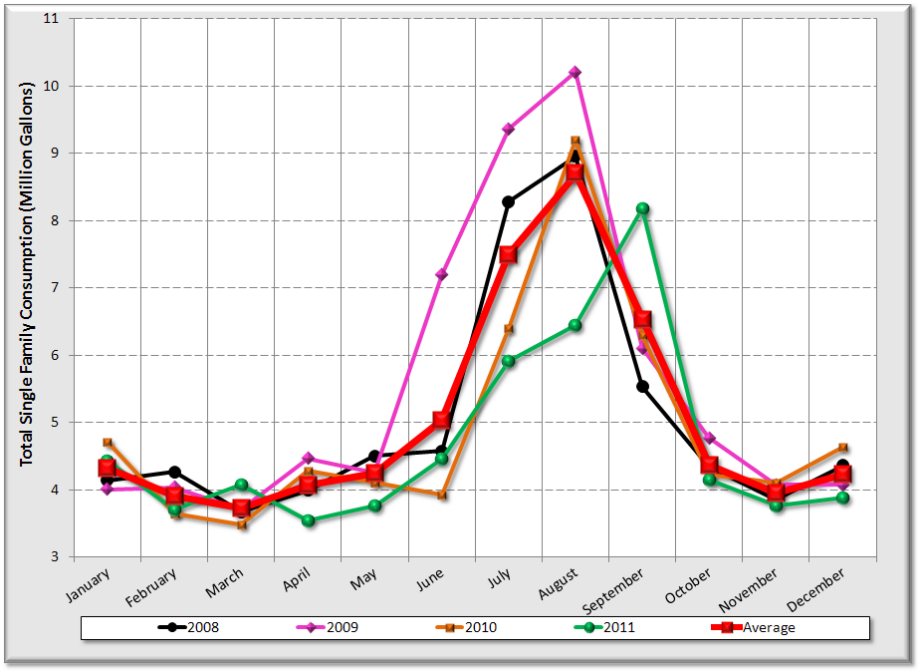


Chart 4-4
Historical Monthly Non-Single Family Consumption

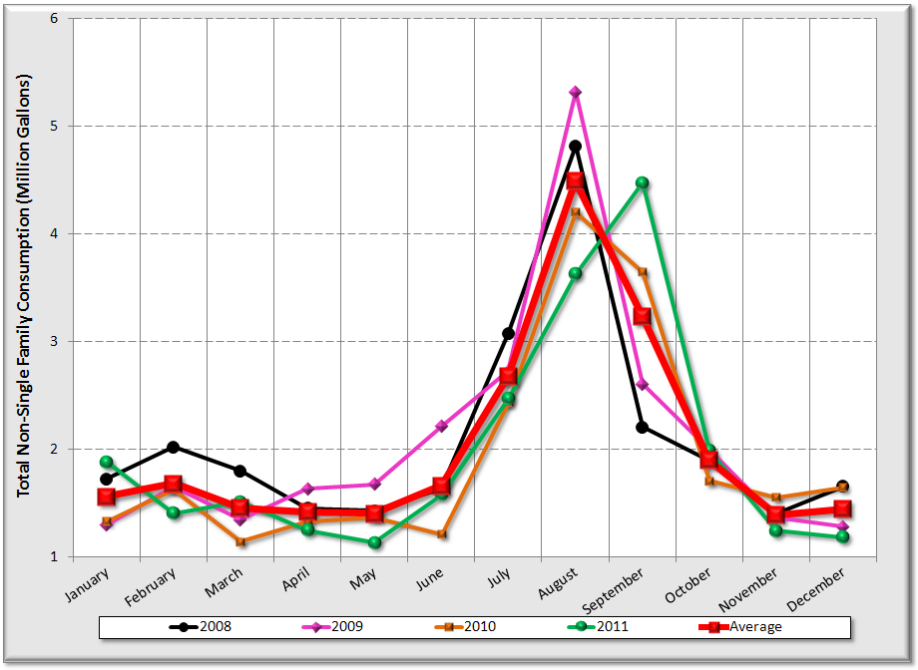
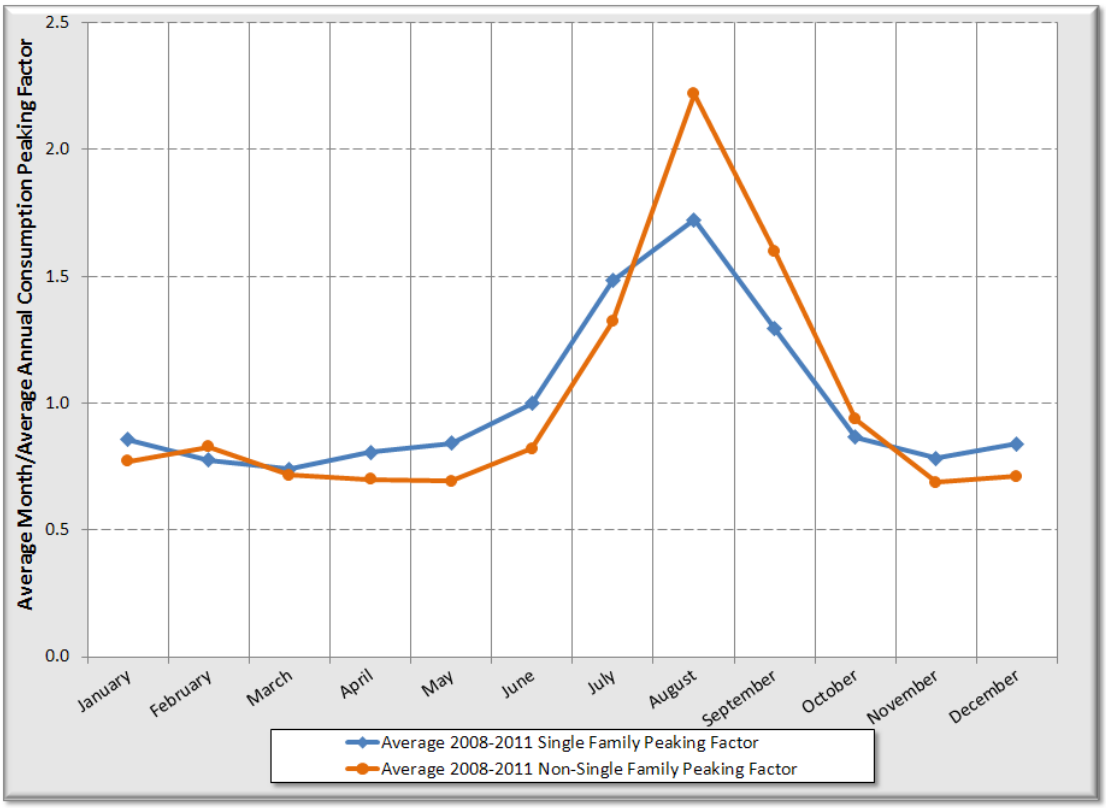


Chart 4-5
Average Monthly Peaking Factors by Customer Class



Water Supply

Water supply, or production, is the total amount of water supplied to the system, as measured by the meters at each supply source. Water supply is different than water consumption in that water supply is essentially the recorded amount of water put into the system, and water consumption is the recorded amount of water taken out of the system. The measured amount of water supply in any system is typically larger than the measured amount of water consumption, due to non-metered water use and water loss (i.e., distribution system leakage). **Table 4-3** summarizes the total amount of water supplied by the sources for 2004 through 2011 and the calculated ADD for each year.

Table 4-3
Historical Water Supply and System Demand

Year	Population in Town Limits	Population Outside Town	Total Population Served	Annual Supply (gal)	Average Daily Demand (gpm)	Average Demand Per Capita (gpd)
2004	2,310	60	2,370	106,102,043	202	123
2005	2,385	60	2,445	109,419,274	208	123
2006 [1]	2,460	60	2,520	126,053,920	240	137
2007	2,534	60	2,594	164,323,600	313	174
2008	2,609	60	2,669	126,539,000	241	130
2009	2,683	60	2,743	132,585,000	252	132
2010	2,758	60	2,818	132,098,000	251	128
2011	2,775	60	2,835	123,773,000	235	120
Average 2008 - 2011						128

1 = River supply data is missing for 2006 and the annual supply quantity is lower than the actual amount supplied.

In general, the Town experienced a trend of increasing water supply, or system-wide water demand between 2004 and 2007, as shown in **Table 4-3**, due to system-wide growth and the associated increase in water usage. The decline between 2007 and 2011 is likely due to water use efficiency practices, the replacement of old water mains, and the repair of water main leaks to decrease water supply. The ADD has remained relatively steady for the last 4 years.

Table 4-3 also presents the computation of the demand per capita for 2004 through 2011. Although the average demand per capita has fluctuated, the average demand per capita for the last 4 years is 128 gpd, which is a 16 percent reduction from the average demand per capita of 153 gpd per capita reported in the previous Water System Plan (WSP). The average per capita demand is used later in this chapter to forecast water demands in future years, based on future population estimates.

Table 4-4 shows the average demand of each of the Town's pressure zones, based on 2011 master meter data. The master meter supply data in **Table 4-4** was used for the existing demands in the hydraulic model. The total master meter supply data in **Table 4-4** is less than the annual supply in **Table 4-3** due to water usage for treatment purposes and potential leakage between the sources of supply and the master meter, which will be discussed later in this chapter.

Like most other water systems, the Town's water supply varies seasonally. **Chart 4-6** shows the historical amount of water supplied by the Town's sources for each month from 2008 to 2011. As shown in **Chart 4-6**, water supply increases significantly during summer months, primarily due to lawn watering. The Town's highest water use typically occurs in July and August. Water production from the Mashel River is added to the system to meet the additional demand during these peak periods, as shown in **Chart 4-7**.

Table 4-4
2011 Demands by Pressure Zone

Pressure Zone	2011 Master Meter Supply (gallons)	Average Daily Demand (gpm)	Percent of Total Demand (%)
996	81,269,325	155	84.9%
1050	10,270,357	20	10.7%
1077	4,173,318	8	4.4%
Total	95,713,000	182	100%

Chart 4-6
Historical Monthly Water Supply

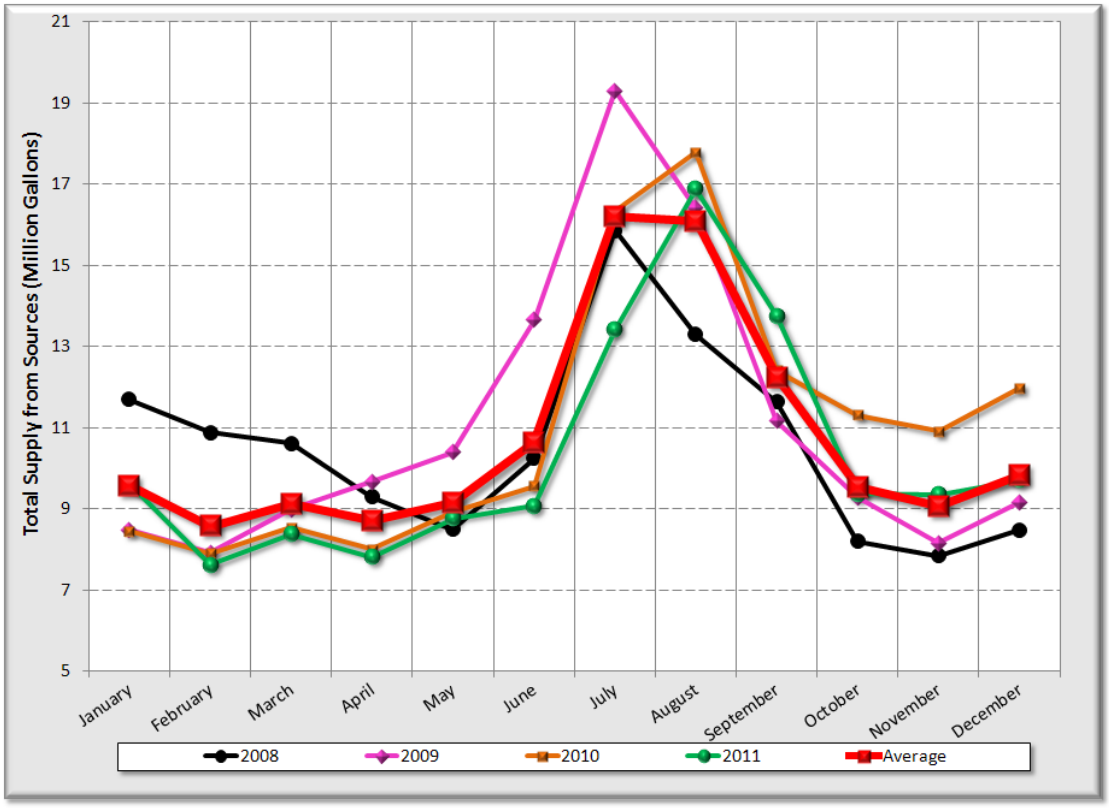
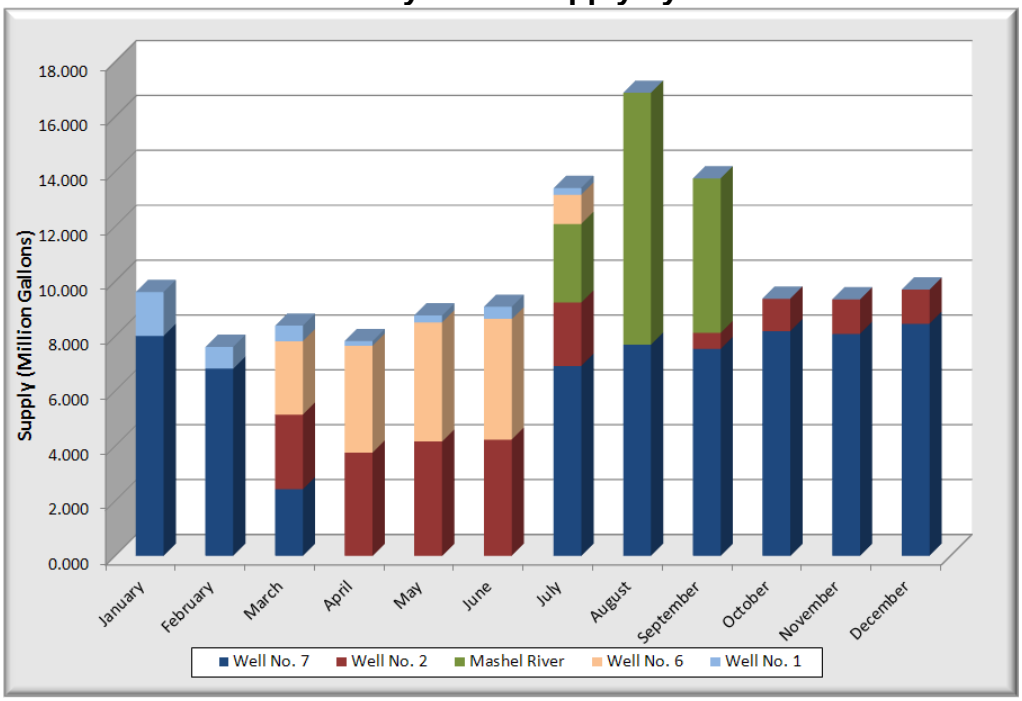


Chart 4-7
2011 Monthly Water Supply by Source



Distribution System Leakage

The difference between the amount of water supply and water consumption is the amount of distribution system leakage (DSL). The amount of DSL in a water system is calculated as the difference between the amount of water supply and the amount of authorized water consumption. There are many sources of DSL in a typical water system, including water system leaks; inaccurate supply metering; inaccurate customer metering; illegal water system connections or water use; fire hydrant usage; water main flushing; and well backwash and malfunctioning telemetry and control equipment resulting in reservoir overflows. Several of these types of usages, such as water main flushing, fire hydrant usage, and well backwash, may be considered authorized uses if they are tracked and estimated. Although real losses from the distribution system, such as reservoir overflows and leaking water mains, should be tracked for accounting purposes, these losses must be considered leakage. The Water Use Efficiency (WUE) Rule, which became effective in 2007, established a DSL standard of 10 percent or less based on a 3 year average.

Table 4-5 reports the total system leakage and the distribution system leakage for 2008 through 2011. Total system leakage is based on the difference between the amount of water supplied by the sources and the total authorized consumption. The rolling 3-year average for total system leakage in 2011 was approximately 31 percent. Distribution system leakage is based on the difference between the amount supplied by the master meter after the supply water is treated and the total authorized consumption after the master meter. The rolling 3-year average for DSL in 2011 was approximately 16 percent.

The total supply production and the total master meter supply differ by approximately 28 million gallons (MG) per year resulting in the two different leakage rates. Approximately 4.5 MG of the 28 MG is authorized consumption utilized in the treatment process for backwash, filter cleaning, and water quality testing. A portion of the leakage at the water treatment plant (WTP) site is due to known clear well leaks. The Town plans to further investigate the clear well leakage and locate any on-site leakage as a capital improvement project, which is identified in **Chapter 9**. The total production and total system leakage will be utilized for projecting demands and water system analyses.

Table 4-5
Distribution System Leakage

	2008	2009	2010	2011
Authorized Consumption (AC)				
Metered Customer Use (1,000 gal)	85,608	91,367	82,196	80,034
Construction/Hydrant Meter Use (1,000 gal)	102	102	16	322
Fire Department Usage (1,000 gal)	241	79	126	93
Hydroseeding (1,000 gal)	7	1	2	0
Flushing (1,000 gal)	20	174	0	0
Treatment Plant Water Usage (1,000 gal)	4,563	4,563	4,563	4,563
Total Authorized Consumption (1,000 gal)	90,541	96,284	86,902	85,010
Total Production (TP)				
Total Production (1,000 gal)	126,539	132,585	132,098	123,773
Total System Leakage (TP - AC)				
Total System Leakage (1,000 gal)	35,998	36,301	45,196	38,763
Total System Leakage (%)	28.4%	27.4%	34.2%	31.3%
Rolling 3-Year Average DSL (%)	28%	28%	30%	31%
Total Master Meter Supply (TMM)				
Total Master Meter Supply (1,000 gal)	103,892	105,346	102,055	95,713
Distribution System Leakage (TMM - AC) [1]				
Total Distribution System Leakage (1,000 gal)	17,914	13,625	19,715	15,265
Total Distribution System Leakage (%)	17.2%	12.9%	19.3%	15.9%
Rolling 3-Year Average DSL (%)	17%	15%	16%	16%

1 = AC in the DSL equation does not include "treatment plant water usage" since the water is utilized prior to the master meter.

The amount of DSL in the Town's distribution system has been as low as 12.9 percent in 2009 and as high as 19.3 percent in 2010. Although earlier years are not shown in **Table 4-5**, the Town experienced DSL as high as 26 percent in 2007. Thus, the Town has managed to decrease DSL in

the system by repairing water main leaks and reducing the usage of non-metered water for construction projects. The DSL percentage is utilized for compliance with the WUE requirements.

The Town plans to decrease the amount of DSL by performing more leak detection on its system and repairing the leaks found to reduce the amount of water lost. The Town will continue to record the water used for construction, flushing, and fire department uses. The Town will also implement the WUE Program contained in **Appendix F**.

Equivalent Residential Units

The demand of each customer class can be expressed in terms of equivalent residential units (ERUs) for demand forecasting and planning purposes. One ERU is equivalent to the amount of water used by a single-family residence. The number of ERUs represented by the demand of the other customer classes is determined from the total demand of the customer class and the unit demand per ERU from the single-family residential demand data.

Table 4-6 presents the computed number of ERUs for each customer class for 2008 through 2011 for the Town's service area. The demands shown are based on supply data that was computed from the consumption of each class and the average amount of total system DSL from each year. The demand per ERU for 2011 was 274 gpd. This lies in the typical range of between 250 and 300 gpd for single-family demand in the Puget Sound area.

Table 4-6
Equivalent Residential Units (ERUs)

Year	Average Number of Connections	Average Annual Demand (gallons)	Demand per ERU (gal/day/ERU)	Total ERU's
Single Family Residential (ERU Basis)				
2008	865	89,408,312	283	865
2009	881	96,164,349	299	881
2010	874	94,770,817	297	874
2011	870	87,053,778	274	870
Multi-Family Residential, Schools, Commercial, Other				
2008	161	37,130,688	283	359
2009	156	36,420,651	299	334
2010	157	37,327,183	297	344
2011	160	36,719,222	274	367
Fire Sprinklers, Hydrants				
2008	6	0	283	0
2009	6	0	299	0
2010	6	0	297	0
2011	6	0	274	0
System-Wide Totals				
2008	1,032	126,539,000	283	1,225
2009	1,043	132,585,000	299	1,215
2010	1,037	132,098,000	297	1,218
2011	1,036	123,773,000	274	1,237

Average Day Demand

Average Day Demand (ADD) is the total amount of water delivered to the system in a year divided by the number of days in the year. The ADD is determined from historical water use patterns of the system and can be used to project future demand within the system. ADD data is typically used to determine standby storage requirements for water systems. Standby storage is the volume of a reservoir used to provide water supply under emergency conditions when supply facilities are out of service. Water production records from the Town's sources were reviewed to determine the system's ADD. The system's ADD from 2004 through 2011 is shown in **Table 4-3**.

Peak Day Demand

Peak Day Demand (PDD) is the maximum amount of water used throughout the system during a 24-hour time period of a given year. PDD typically occurs on a hot summer day when lawn watering is occurring throughout much of the system. In accordance with *WAC 246-290-230 - Distribution Systems*, the distribution system shall provide fire flow at a minimum pressure of 20 psi during maximum day demand (i.e., peak day demand) conditions. Supply facilities (wells, springs, pump stations, interties) are typically designed to supply water at a rate that is equal to or greater than the system's PDD.

The PDD is typically determined from the combined flow of water into the system from all supply sources and reservoirs on the peak day. The Town's PDD likely occurred during the week of July 31, 2009 when the sources of supply experienced a peak supply rate of 587 gpm and temperatures approached 90 degrees Fahrenheit in the Town. While the Town's daily supply information is available for that week, the reservoir flow data is not available; therefore, the system's PDD could not be computed based on actual system data. Instead, a typical PDD/ADD factor for the Puget Sound region of 2.50 was applied to the system's actual ADD. This resulted in an estimated PDD of 631 gpm for the peak day in 2009 as shown in **Table 4-7**.

Peak Hour Demand

Peak Hour Demand (PHD) is the maximum amount of water used throughout the system, excluding fire flow, during a 1 hour time period of a given year. In accordance with *WAC 246-290-230 - Distribution Systems*, new public water systems or additions to existing systems shall be designed to provide domestic water at a minimum pressure of 30 psi during PHD conditions. Equalizing storage requirements are typically based on PHD data.

The PHD, like the PDD, is typically determined from the combined flow of water into the system from all supply sources and reservoirs. Hourly water production records and chart recordings of reservoir levels were not available for the Town's supply and storage facilities. Therefore, the system's PHD could not be computed based on actual system data. Instead, it was estimated by applying a typical PHD/PDD ratio of 1.80 to the system's estimated PDD amount. This resulted in an estimated PHD of 1,135 gpm for the peak hour as shown in **Table 4-7**.

Table 4-7 also shows the peaking factors of the water system based on the ADD, PDD, and PHD data presented above. The PDD/ADD ratio of 2.50 is within the typical range of 1.2 to 2.5 for most systems. The estimated PHD/PDD ratio of 1.8 is within the typical range of 1.3 to 2.0 for most systems. These peaking factors will be used later in this chapter in conjunction with projected ADD to project future PDDs and PHDs of the system.

Table 4-7
Peak Day Demands and Peaking Factors

Peak Day Demand Data

Demand Type	Date	Demand (gpm)
Average Day Demand (ADD)	2009	252
Peak Day Demand (PDD)	Daily reservoir data unavailable Assumed PDD/ADD = 2.50	631
Peak Hour Demand (PHD)	Hourly data unavailable Assumed PHD/PDD = 1.80	1,135

Peaking Factors

Peak Day Demand/Average Day Demand (PDD/ADD) (typ. value assumed)	2.50
Peak Hour Demand/Peak Day Demand (PHD/PDD) (typ. value assumed)	1.80
Peak Hour Demand/Average Day Demand (PHD/ADD)	4.50

Fire Flow Demand

Fire flow demand is the amount of water required during fire fighting as defined by applicable codes. Fire flow requirements are established for individual buildings and expressed in terms of flow rate (gpm) and flow duration (hours). Fighting fires imposes the greatest demand on the water system because a high rate of water must be supplied over a short period of time, requiring each component of the system to be properly sized and configured to operate at its optimal condition. Adequate storage and supply is useless if the transmission or distribution system cannot deliver water at the required rate and pressure necessary to extinguish a fire.

General fire flow requirements were established for the different land use categories to provide a target level of service for planning and sizing future water facilities in areas that are not fully developed. The general fire flow requirement for each land use category is shown in **Table 4-8**. The water system analyses presented in **Chapter 7** are based on an evaluation of the water system for providing sufficient fire flow in accordance with these general fire flow requirements. The fire flow requirements shown in the table do not necessarily equate to actual existing or future fire flow requirements for all buildings, since this is typically based on building size, construction type, and fire suppression systems provided. Improvements to increase the available fire flow to meet actual fire flow requirements greater than those shown in the table shall be the responsibility of the developer.

Table 4-8
General Fire Flow Requirements

Land Use Category	Fire Flow Requirement (gpm)	Flow Duration (hours)
Single Family Residential	1,000	2
Multi-Family Residential	2,500	2
Commercial/Business Park	2,500	3
Industrial/Airport	2,500	3
Schools	2,500	3

FUTURE WATER DEMANDS

Basis for Projecting Demands

Future demands were calculated from the results of the existing per capita demand computations shown in **Table 4-3** and the projected population data from **Chapter 3**. Future demand projections were computed with and without water savings expected from implementing WUE measures contained in the Town's WUE Program in **Appendix F**. The calculated future per capita demand of 128 gpd was used for all demand projections without savings from WUE measures. The per capita demand was reduced to reflect the WUE goals and used as the basis for future water demand projections with implementation of the WUE Program. The Town's WUE Program presents a goal to reduce the 4-year rolling average demand per capita by 6 percent by the year 2018 and by 8 percent by the year 2032.

Future demands for the hydraulic model were calculated from the results of the total master meter supply data shown in **Table 4-4**. Differences between the master meter supply and per capita demand is discussed earlier in this chapter.

Demand Forecasts and Conservation

Table 4-9 presents the 1-year, 2-year, 3-year, 4-year, 5-year, 6-year, 7-year, and 20-year water demand forecasts for the Town's water system. The actual demand data from 2011 and the estimated demand for 2012 are also shown in the table for comparison purposes. The future ADDs were projected based on population estimates for the given years and the estimated demand per capita values. The future PDDs and PHDs shown were computed from the projected ADDs and the existing system peaking factors shown in **Table 4-7**. The future demand projections are also shown with and without estimated reductions in water use from achieving WUE goals.

The analysis and evaluation of the existing water system with proposed improvements, as presented in **Chapters 7** and **9**, is based on the 20-year projected demand data without WUE reductions. This ensures that the future system will be sized properly to meet all requirements, whether or not

additional water use reductions are achieved. However, the Town will continue to pursue reductions in water use by implementing the WUE Program contained in **Appendix F** of this WSP.

Table 4-10 presents the existing and projected ERU's of the system. The 6-year and 20-year ERU forecast is based on the projected water demand data. The historical and projected water demand and ERU data from **Tables 4-9** and **4-10** are also shown graphically in **Chart 4-8**.

Table 4-9
Future Water Demand Projections

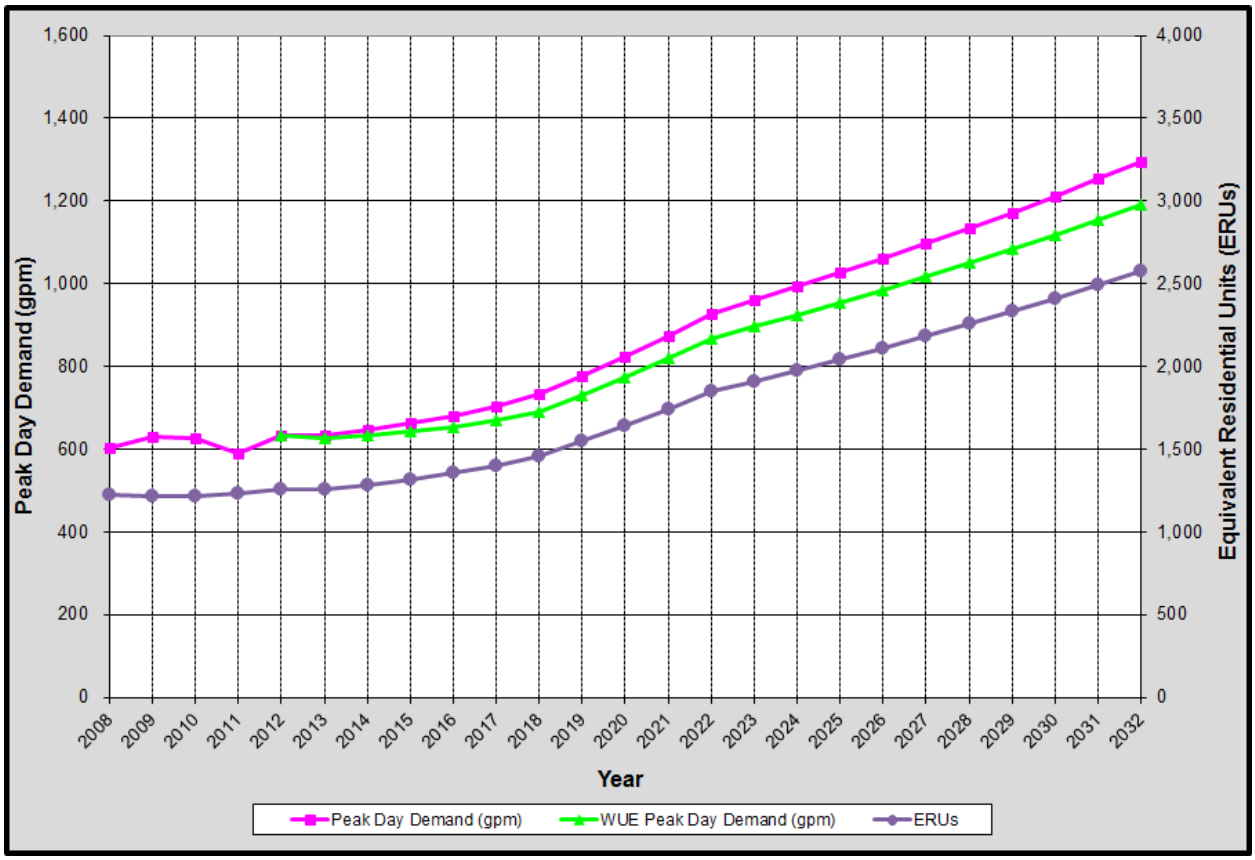
Description	2011 Actual [1]	2012 Projected	2013 Projected (+ 1 yrs)	2014 Projected (+ 2 yrs)	2015 Projected (+ 3 yrs)	2016 Projected (+ 4 yrs)	2017 Projected (+ 5 yrs)	2018 Projected (+ 6 yrs)	2019 Projected (+7 years)	2032 Projected (+ 20 yrs)
Population Data										
Population Served [2]	2,835	2,845	2,852	2,908	2,979	3,067	3,172	3,296	3,498	5,830
Increase from Base Year 2011		10	17	73	144	232	337	461	653	2,995
Demand Basis Data (gal/day/capita)										
Avg Day Demand without WUE	120	128	128	128	128	128	128	128	128	128
Avg Day Demand with WUE			127	125	124	123	122	120	120	118
Average Day Demand (gpm)										
Demand without WUE	235	253	254	258	265	273	282	293	311	518
Demand with WUE			251	253	257	262	268	275	292	477
Peak Day Demand (gpm)										
Demand without WUE	589	632	634	646	662	681	705	733	777	1,296
Demand with WUE			627	633	642	654	670	689	730	1,192
Peak Hour Demand (gpm)										
Demand without WUE	1,060	1,138	1,141	1,163	1,192	1,227	1,269	1,319	1,399	2,332
Demand with WUE			1,129	1,140	1,156	1,178	1,205	1,239	1,313	2,146

1 = 2011 Peak Day Demand and Peak Hour Demand values are based on the actual Average Day Demand amounts for the year and estimated peaking factors, and do not necessarily represent actual peak demands for this year.
2 = Population Served is the estimated Town population plus an estimated 60 customers outside of the Town limits.

Table 4-10
Future ERU Projections

Description	Actual	Projected								
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2032
Demand Data (gpm)										
Avg Day Demand without WUE	235	253	254	258	265	273	282	293	311	518
ERU Basis Data (gal/day/ERU)										
Demand per ERU without WUE	274	289	289	289	289	289	289	289	289	289
Demand per ERU with WUE		288	285	283	280	277	274	271	271	265
Equivalent Residential Units (ERUs)										
Total System ERUs	1,237	1,259	1,262	1,287	1,318	1,357	1,404	1,459	1,548	2,580

Chart 4-8
Future Water Demand and ERU Projections



Policies and Design Criteria

5

INTRODUCTION

The Town of Eatonville (Town) operates and plans water service for the area's residents and businesses according to the design criteria, laws, and policies that originate from the following seven sources, listed in descending order from those with the broadest authority to the most narrow:

Agency	Design Criteria/Laws/Policies
U.S. Department of Health & Human Services	Federal Regulations
U.S. Environmental Protection Agency	Federal Regulations
Washington State Department of Health	State Regulations
Washington State Department of Ecology	State Regulations
Pierce County Council	County Regulations
Eatonville Town Council	Administrative Policies
American Water Works Association	Design Criteria

These laws, design criteria, and policies guide the Town's operation and maintenance (O&M) of the water system on a daily basis, and its planning for growth and improvements. Their overall objective is to ensure that the Town provides high-quality water service at a fair and reasonable cost to its customers. They also set the standards that the Town must meet to ensure that the water supply is adequate to meet existing and future water demands. The system's ability to meet these demands is detailed in **Chapter 7** and the recommended improvements are identified in **Chapter 9**.

The highest three governmental entities establishing policies and laws – U.S. Government, Washington State, and Pierce County Council – establish requirements in statutes, regulations, or ordinances. The Town Council adopts regulations and policies that cannot be less stringent or in conflict with those established by governments above them. The Town's policies take the form of ordinances, memoranda, and operation procedures, many of which are summarized in this chapter.

The policies associated with the following categories are presented in this chapter:

- Supply
- Customer Service
- Facilities
- Finance
- Organization

SUPPLY POLICIES

Quality Protection

- The Town will pursue steps to meet or exceed all water quality laws and standards.
- The Town will take all reasonable measures to protect its system and customers.

Cross-Connection Control

- The Town has a responsibility to protect the public water system from contamination due to cross-connections. Cross-connections that can be eliminated will be eliminated.
- The Town has a cross-connection control program for eliminating cross-connections. A copy of the Town of Eatonville Cross-Connection Control Plan is contained in **Appendix G**.
- The Town has staff that is certified to facilitate backflow prevention installation and inspection. Backflow testing is performed by private testers.
- The Town will comply with the backflow prevention assembly installation and testing requirements as indicated in WAC 246-290-490, and as published in the *Cross Connection Control Manual Accepted Procedure and Practice*, Pacific Northwest Section – American Water Works Association (AWWA).

Quantity

- The Town will plan for at least 20 years into the future, so that future water resource limitations can be handled effectively.
- The Town will ensure that the capacity of the system, including wells, pump stations, and transmission mains, is sufficient to meet the peak day demand of the system.

Fire Flow

The Town will plan to provide the following minimum fire flows for future development:

Single-Family Residential:	1,000 gpm for 2 hours duration
Multi-Family Residential:	2,500 gpm for 2 hours duration
Commercial/Business Park:	2,500 gpm for 3 hours duration
Industrial/Airport:	2,500 gpm for 3 hours duration
Schools:	2,500 gpm for 3 hours duration

The Town's planning level fire flow requirements are greater than the minimum fire flow requirements established by Pierce County Code 17C.60.165. Actual fire flow requirements for buildings shall be determined by the local fire authority in accordance with Pierce County Code 17C.60.160.

Water Use Efficiency

The Town will promote the efficient and responsible use of water and will conserve water.

Regional Participation

- The Town will participate in regional supply management and planning activities.
- The Town will strive to supply all potential customers within the Town's water service area.

CUSTOMER SERVICE POLICIES

Duty to Serve

The Town has a duty to provide service to all new connections within the retail service area when the circumstances meet four threshold factors:

- The Town has sufficient capacity to serve water in a safe and reliable manner.
- The service request is consistent with local plans and development regulations.
- The Town has sufficient water rights to provide service.
- The Town can provide service in a timely and reasonable manner.

The following section, Water Service and Connection, provides additional detail regarding the Town's duty to serve policies.

Water Service and Connection

- The Town will strive to provide potable water service to the people within the Town limits and designated water service area, provided all policies related to service can be met.
- All proposed developments within the Town limits and designated water service area shall connect directly to the Town's water system, unless deemed unfeasible by the Town at the time of the request.
- Water system extensions required to provide water service to proposed developments shall be approved by the Department of Public Works and must conform to the Town's adopted design criteria, and construction standards and specifications, as shown in the Town's Public Works Water Development and Construction Standards contained in **Appendix H**. All costs of the extension shall be borne by the developer or applicant.
- Water service can be extended outside of the Town limits and within the Urban Growth Area (UGA) as long as the project is in compliance with the Town's adopted land use plan, zoning and development regulations, and the Town's water system standards.
- Water service cannot be extended outside the Town's UGA/water service area.

- For water service applications within the Town limits, the Town will review the availability for water service at the time of site development and building permit. The complete permitting process takes several months to be completed.
- For water service applications outside of the Town limits, the applicant must first obtain a water utility service agreement from the Town. The Town will review the agreement and determine the availability of water. Water availability requests can be processed in approximately two to three weeks.
- Water system capacity will be evaluated at the time of water service application. The Town will use the capacity analysis contained in **Chapter 7** of this Plan to evaluate source of supply, storage, and water rights capacity available to the applicant.
- Water system capacity, pressure, and fire flow will be considered when providing water availability to applicants.
- Water availability shall expire at the time that the associated permit expires.
- Time extensions in regards to water availability shall be granted in accordance with the associated permit requirements. When extensions are denied, the disputes are handled through the rules guiding the associated permit process. Disputes can be brought to the Town Council for discussion.
- Individual wells may be installed on existing platted lots within the Town's service area if the Town determines it is unfeasible to provide direct connection to the Town's water system at the time of the request. According to the Tacoma-Pierce County Health Department's Environmental Health Code, Chapter 3, Section 6, C, 13, adopted February 3, 2010, individual wells as a water source are prohibited within the Town's service area unless the Town cannot furnish water service to the property within 120 days.

Annexations

- Areas annexed without existing municipal supply will be served by the Town.
- Areas annexed with existing municipal supply must meet Town water standards.
- The Town will follow state guidelines in the assumption of facilities in annexation areas.

Temporary Services

- No temporary service is allowed, unless there are plans for permanent water service that meets all Town standards.

Emergency Service

- Compliance with standards may be temporarily deferred for emergency water service.
- Policy criteria may be waived for emergency service.

Planning Boundaries

- For planning purposes, the Town will use water service boundaries established by an agreement as a result of the *Pierce County Coordinated Water System Plan and Regional Supplement*.
- The Town will follow State of Washington guidelines in assuming portions of adjacent water systems as a result of annexation.

Satellite System Management

The Town does not plan to provide satellite system management or ownership services within the Town's retail service area.

FACILITY POLICIES

This section describes the planning criteria and policies used to establish an acceptable hydraulic behavior level and a standard of quality for the water system.

Minimum Standards

All proposed developments within the Town's existing and future service areas shall conform to the Town's adopted design criteria, construction standards, and specifications. Additional criteria are contained in the Town of Eatonville Public Works Water Development and Construction Standards and the Town of Eatonville Water Distribution and Wastewater Collection Specifications, copies of which are included in **Appendix H** of this Plan. Pierce County's minimum design standards for public water systems are identified in Pierce County Code Chapter 19D.130.

The Town's Development and Construction Standards were prepared in 1991 and the specifications were prepared more recently. The Town's water system and standard water system guidelines have undergone numerous changes since the preparation of the 1991 standards. An update of the standards is identified as an improvement in **Chapter 9**.

Pressure

- The Town will endeavor to maintain a minimum pressure of 40 pounds per square inch (psi) at customer meters during normal demand conditions, excluding a fire or emergency.
- The Town will endeavor to maintain a maximum pressure of 120 psi in the water mains during normal demand conditions, excluding pressure surges. Individual residences are responsible for reducing pressures over 80 psi.
- The Town will endeavor to maintain a minimum pressure of 30 psi at customer meters during all demand conditions, excluding a fire or emergency.
- During fire conditions, the minimum pressure at customer meters and throughout the remainder of the system will be 20 psi.
- During a failure of any part of the system, the maximum pressure will not exceed 150 psi.

Velocities

- During normal demand conditions, the velocity of water in a water main should be less than 5 feet per second (fps).
- During emergency conditions such as a fire, and for design purposes, the velocity of water in a water main may exceed 5 fps, but may not exceed 10 fps.

Storage

- Storage within the distribution system must be of sufficient capacity to supplement supply when system demands are greater than the supply capacity (equalizing storage), and still maintain sufficient storage for proper pump operation (operational storage), fire suppression (fire flow storage), and other emergency conditions (standby storage).
- Standby storage must be located above the elevation that yields a 20 psi service pressure to all services in the zone under peak hour demand (PHD) conditions with the largest source of supply out of service.
- Fire flow storage must be located above the elevation that yields a 20 psi service pressure to all services in the zone under peak day demand (PDD) conditions.
- The Town will provide sufficient standby storage for an emergency condition in which a major supply source is out of service. The volume of storage will be sufficient to maintain uninterrupted supply to the system during the emergency condition.
- The Town will provide sufficient storage for a fire condition equal to the system's maximum fire protection water demand and the required duration.
- The Town will have high-water level and low-water level alarms at the water treatment plant.
- A water level indicator will be located at the water treatment plant.
- Storage facilities will be located in areas where they will satisfy the following requirements:
    1. Minimize fluctuations in system pressure during normal demands;
    2. Maximize use of the storage facilities during fires and peak demands; and
    3. Improve the reliability of supply to the Town.

Transmission and Distribution

- Where practical, transmission and distribution mains will be looped to increase reliability and fire flow capacity and decrease head losses.
- All mains will comply with the generally recognized design criteria from the AWWA and Department of Health guidelines that follow:
    1. All new construction will be in accordance with Town of Eatonville Public Works Water Development and Construction Standards, of which a copy is included in **Appendix H** of this Plan.

2. Distribution system design assumes that adequately-sized service lines will be used. All residential service lines will be 1-inch or larger. Service lines will be the same size as the meter or larger.
3. The minimum diameter of distribution mains will be 8 inches. All water mains will be ductile iron or C900 PVC pipe.
4. All new distribution mains will be sized by a hydraulic analysis.
5. All new mains providing fire flow will be sized to provide the required fire flow at a minimum residual pressure of 20 psi and maximum pipeline velocity of 10 fps during PDD conditions. In general, new water mains that will carry fire flow in residential areas shall be a minimum of 8-inches in diameter and looped for multi-family residential developments. New water mains in commercial, business park, industrial, and school areas shall be a minimum of 12-inches in diameter and looped.
6. Valve installations will satisfy the following criteria:
    a. Zone valves will be located at all pressure zone boundaries to allow future pressure zone realignment without the need for additional pipe construction.
    b. Isolation valves will be installed in the lines to allow individual pipelines to be shut down for repair or installing services. Unless it is impractical to do so, the distance between isolation valves will not exceed 660 feet. A minimum of three valves will be provided per cross and two valves per tee.
    c. Air/vacuum release valves will be placed at all high points, or "crowns", in all pipelines.
    d. Blowoff assemblies shall be located at main dead ends where there is not a fire hydrant. The blowoff assembly shall have a valve the same size as the main with concrete thrust blocking.
    e. Individual pressure-reducing or check valves must be installed in all new customer service lines in the Town. Pressure-reducing valves protect customers from high pressures in case a mainline pressure-reducing station fails. Check valves prevent hot water tanks from emptying into the Town's distribution system when a nearby water main is empty or when the pressure in the main is less than the pressure in the tank. Check valves also prevent contamination of the system's mains caused by possible cross-connections in customer's pipes or fixtures.
7. Fire hydrant installations will satisfy the following criteria:
    a. Fire hydrants serving detached single-family dwellings or duplex dwellings on individual lots will be located not more than 500 feet on center, such that all lots are within 250 feet from a fire hydrant, as measured along the path of vehicular access.
    b. Fire hydrants serving any use other than detached single-family dwellings or duplex dwellings on individual lots will be located not more than 300 feet on

center, and will be located so that at least one hydrant is located within 150 feet of all structures, but not closer than 50 feet, unless approved by the Town's Fire Department.

c. The Town's Fire Department will review all proposed fire hydrant installations to ensure the correct number and spacing of fire hydrants for each project.

Supply and Booster Pump Stations

- All existing and future booster pump stations will be modified/constructed to comply with the following minimum standards:
    1. All structures will be non-combustible, where practical.
    2. All buildings will have adequate heating, cooling, ventilation, insulation, lighting, and work spaces necessary for on-site operation and repair.
    3. Sites will be fenced to reduce vandalism and Town liability, where appropriate.
    4. Each station will be equipped with a flow meter and all necessary instrumentation to assist personnel in operating and troubleshooting the facility.
    5. Emergency power capability will be provided to at least one booster pump station supplying each pressure zone.
- Pumps will be operated automatically, with flexibility in pump start/stop settings.
- Stations will be operated with the provision for at least two methods of control, to minimize system vulnerability.
- Manual override of stations will be provided for, and located at the water treatment plant using the Town's telemetry and supervisory control system.
- Stations will be monitored with alarms for the following conditions:
    1. Pump started automatically or manually.
    2. Power phase failure.
    3. Power outage/generator running.
    4. Communication failure.
    5. Water in structure.
    6. Low suction pressure.
    7. High and low discharge pressure.
    8. Intrusion.
    9. Smoke detector.
    10. Heat detector.
- Stations will have the following indicators:
    1. Local flow indication and totalizing.
    2. Flow indication and totalizing at the water treatment plant.

3. Recording of combined supply flow to the system.

- Booster pump stations will be placed wherever necessary to fulfill the following criteria:
  1. Provide supply redundancy to a pressure zone.
  2. Improve the hydraulic characteristics of a pressure zone.
  3. Maximize storage availability and transmission capacity.
  4. Improve water quality (i.e., increase circulation) and quantity.

Pressure Reducing Stations

- All pressure-reducing valves will be placed in vaults that are large enough to provide ample workspace for field inspection and valve repair.
- Vaults will drain to daylight, or will be equipped with sump pumps to prevent vault flooding.
- Pressure-relief valves will be provided on the low pressure side of the pressure reducing valves to prevent system overpressurizing in case of a pressure reducing valve failure.

Control

The Town's control system must be capable of efficiently operating the water system's components in accordance with this Plan, and in response to reservoir levels, system pressures, abnormal system conditions, electrical power rate structures, and water costs.

Maintenance

- Facility and equipment breakdown is given highest maintenance priority. Emergency repairs will be made even if overtime labor is involved.
- Equipment will be scheduled for replacement when it becomes obsolete and as funding is available.
- Worn parts will be repaired, replaced, or rebuilt before they represent a high failure probability.
- Spare parts will be stocked for all equipment items whose failure will impact the ability to meet other policy standards.
- Equipment that is out of service will be returned to service as soon as possible.
- A preventive maintenance schedule will be established for all facilities, equipment, and processes.
- Tools will be obtained and maintained to repair all items whose failure will impact the ability to meet other policy standards.
- Dry, heated shop space will be available for maintenance personnel to maintain facilities.
- All maintenance personnel will be trained to efficiently perform their job descriptions.

- Maintenance will be performed by the water maintenance staff or other approved sources and supervised by the Water Utility Supervisor.
- Written records and reports showing O&M history will be maintained on each facility and item of equipment.

FINANCIAL POLICIES

General

- The Town will set rates that comply with state regulations.
- Rates and additional charges established for the Town should be:
    1. Cost-based rates which recover current, historical and future costs associated with the Town's water system and services;
    2. Equitable charges to recover costs from customers, commensurate with the benefits they receive; and
    3. Adequate and stable source of funds to cover the current and future cash needs of the Town.
- The existing Town customers will pay the direct and indirect costs of operating and maintaining the facilities through user rates. In addition, the user rates will include debt service incurred to finance the capital assets of the Town.
- New customers seeking to connect to the water system will be required to pay a connection charge for an equitable share of the historical cost of the system and for the system's capital improvement program (CIP). Connection charge revenues will be used to fund the CIP in conjunction with rate revenue.
- New and existing customers will be charged for extra services through separate ancillary charges based on the costs to provide the services. Ancillary charges can increase equitability, as well as increase operating efficiency by discouraging unnecessary demand for services. The charges should be reviewed regularly and updated annually, based on increases in the Consumer Price Index. Revenue from ancillary charges will be used to finance annual O&M.
- The Town will maintain information systems that provide sufficient financial and statistical information to ensure conformance with rate setting policies and objectives.
- User charges must be sufficient to provide cash for the expenses of operating and maintaining the system. To ensure the fiscal and physical integrity of the utility, an amount should be set aside each year and retained for capital expenditures that will cover some portion of the depreciation of the physical plant. The amount may be transferred from the O&M Fund to the Water Improvement Fund for general purposes or for specific purposes.
- A Working Capital Reserve will be maintained to cover unanticipated emergencies and fluctuations in cash flow.

- Water rates will be based on either the Base-Extra Capacity Method or Commodity-Demand Method rates. Both methods strive to equitably charge customers with different service requirements based on the cost of providing water service. Service requirements relate to the total volume of water used, peak rates of use, and other factors.
- Fees and charges are calculated for the service area as a whole. Rates will be the same regardless of the existing customers' service locations. Rates charged in annexed areas will be evaluated on an individual basis.

Connection Charges

Owners of properties that have not been assessed, charged, or have not borne an equitable share of the cost of the water system will pay one or more of the following connection charges prior to connection to a water system:

1. *Latecomers Fees*: Latecomers fees are negotiated with developers and property owners; they provide for the reimbursement of a pro rata portion of the original cost of water system extensions and facilities.
2. *Connection Charge*: The connection charge will be assessed against any property that has not participated in the development of the water system. Meter charges, or hookup fees, are additional in order to recover the cost of meter and service line installation.
3. *Developer Extension Charges*: These charges are for the administration, review, and inspection of a developer extension project.

ORGANIZATIONAL POLICIES

Staffing

- Personnel certification will comply with state standards.
- The Water Department will promote staff training.

Relationship with Other Departments

- The Finance Department is responsible for customer billing, payment collection, project cost accounting, and fund activity reporting.
- The Human Resources Department is responsible for employee records and salary schedules.
- The Building Department, Fire Department, and Engineering Department establish fire flow requirements.
- The Fire Department uses water utility facilities for fire protection.
- The Fire Department is responsible for emergency responses to hazardous events at water system facilities.

- The Police Department and/or the Water Department and/or Code Enforcement are responsible for enforcing violations of Town water ordinances.
- The Fire Department or its representative is responsible for hydrant fire flow testing.

Water Source and Quality

6

INTRODUCTION

The two basic objectives of a water system are to provide a sufficient quantity of water to meet customer usage demands, and to provide high quality water. **Chapter 7** discusses the Town of Eatonville's (Town) ability to supply a sufficient quantity of water and identifies future source requirements. This chapter discusses the Town's existing water sources, water rights, water quality regulations, and water quality monitoring results.

EXISTING WATER SOURCES AND TREATMENT

Water Sources

The Town's water supply is provided by the Mashel River and several groundwater wells. The Mashel River diversion location and the wells are located southeast of the Town. Well Nos. 1 and 2 have been significant water producers for the Town for many years. Well Nos. 6 and 7 were added to the system in 2004. The wells are located adjacent to the Mashel River and are all under the influence of surface water. Additional information on each of the Town's existing sources is presented in **Chapter 2** and contained in **Appendix B**.

Water Treatment

The Town utilizes an automated membrane filtration plant for treatment of its water supply sources. The treatment plant was constructed in 2006 to replace the slow sand filtration plant previously used for water treatment. The surface water source flows by gravity, and the well sources are pumped to a raw water holding tank at the water treatment plant. Prior to entering the raw water holding basin, the raw water from the wells and surface water source is injected with a coagulant. Submersible pumps in the raw water basin pump the raw water from the basin to the membrane filter skids located in the main treatment plant building. During filtration, water is drawn through the membrane using the pressure differential developed from the suction of the filtrate pump. Particulate matter is removed at the surface of the membrane using a barrier filtration mechanism. The filtered water is disinfected utilizing an on-site sodium hypochlorite generation system, and chemical metering pumps are used to control the injection of chlorine. The pH of the filter water is also adjusted downstream of the filter system. Chemical metering pumps are used to control the amount of caustic soda added to the water for pH adjustment. The treated water is routed through a baffled contact time (CT) basin to provide adequate contact time. The treated water is routed to two on-site clear wells.

WATER RIGHTS

Overview

A water right is a legal authorization to use a specified amount of public water for specific beneficial purposes. The water right amount is expressed in terms of an instantaneous withdrawal rate and annual withdrawal volume. Washington State law requires users of public water to receive approval from the Washington State Department of Ecology (Ecology) prior to actual use of the water.

Approval is granted in the form of a water right permit or certificate; however, a water right is not required for certain purposes (typically individual residences) that use 5,000 gallons per day (gpd) or less of groundwater from a well.

The process for obtaining a water right involves obtaining a water right permit first, then a water right certificate. A water right permit provides permission to develop a water right by constructing, developing, and testing the water source. A water right permit remains in effect until a water right certificate is issued (if all terms of the permit are met) or the permit has been canceled. A water right certificate is issued by Ecology following a review process and determination that the amount of water put to beneficial use is consistent with the amount and conditions indicated on the water right permit.

A water right permit is issued by Ecology, only if the proposed use meets the following requirements:

- Water will be put to beneficial use;
- No impairment to existing or senior rights;
- Water is available for appropriation; and
- Issuance of the requested water right will not be detrimental to the public's interest.

The water right decision process also considers existing basin management plans, stream closures, instream flows, hydraulic continuity (surface water interconnected to groundwater), seawater intrusion, utilization of existing water sources, water conservation, and availability of alternative water supplies, among other things. The water right decision process is becoming more complex and time-consuming, due to the many competing interests for water, environmental issues, and regulatory requirements.

Existing Water Rights

The Town currently holds one claim and three certificates for its sources of municipal water supply. A summary of this water rights information is presented in **Table 6-1**. Existing sources being utilized by the Town to provide water supply to the system include the Mashel River diversion and several wells near the Mashel River. The oldest groundwater right (GWC 5676-A) was applied for in 1966 and allows 360 gpm of instantaneous withdrawal and 394 acre-feet of annual withdrawal. The groundwater right was issued as a supplemental supply to the claim of vested rights to divert water from the Mashel River. Prior to the Claims Registration Act of 1967 (Chapter 90.14 RCW), there was no documentation on file with the state regarding water rights that vested prior to the adoption of the Water Code in 1917. However, it was common for the state to recognize that vested rights did exist and to make mention of them in water right documents, as was the case here. So, even though GWC 5676-A was the first state-issued water right for the Town, the annual volume granted was not considered additive to the vested rights that were unquantified at that time. Following issuance of the original certificate, additional points of withdrawal have been added to this water right through change applications and through Showing of Compliance with RCW 90.44.100(3). Currently, the superseding certificate issued on June 22, 2006, identifies Wells Nos. 1, 2, 6, and 7 as

the approved points of withdrawal under this water right. The superseding certificate also identifies the cumulative total of the Town's certificated water rights to be 525 acre-feet per year (afy).

Table 6-1
Existing Certificated Water Rights

DOH No.	Source Name	Certificate Number	Priority Date	Primary or Supplemental Right	Existing Water Rights			
					Instantaneous		Annual	
					(gpm)	(cfs)	(acre-ft)	(gpm)
S05	Mashel River	10307	8/18/1967	Both	1,032	2.3	525	325
S06	Well Nos. 1, 2, 6 & 7	5676-A	11/29/1966	Both	360	0.8	394	244
S06	Well Nos. 1, 2, 6 & 7	G2-01087C	8/18/1967	Supplemental	250	0.6	400	247
Totals					1,642	3.7	525	325

The Town applied for and was granted a state-issued water right for the Mashel River diversion in 1967 with a maximum instantaneous diversion rate of 2.3 cubic feet per second (1,032 gpm) (SWC 10307). The annual water right for the river diversion was issued as 131 acre-feet of primary (additive) rights and 394 acre-feet of supplemental right (non-additive to GWC 5676-A) for a maximum annual diversion of 525 afy from all existing rights.

The Town's second groundwater right (G2-01087C) was applied for and granted in 1967. The right allows for an instantaneous withdrawal of 250 gpm and an annual withdrawal of 400 acre-feet, with the annual volume being non-additive to existing rights. The groundwater right for the wells is supplemental, allowing the Town a maximum annual withdrawal of 525 acre-feet. Following issuance of the original certificate, additional points of withdrawal have been added to this water right through change applications and through Showing of Compliance with RCW 90.44.100(3). Currently, the superseding certificate issued on June 22, 2006, identifies Wells Nos. 1, 2, 6, and 7 as the approved points of withdrawal under this water right. The superseding certificate also identifies the cumulative total of the Town's certificated water rights to be 525 afy.

The Town also has a water right claim (#004455) which was filed in June, 1971. At that time, the Town formally claimed a vested right for use of surface water that pre-dated the 1917 surface water code. The claim form states that the surface water was first put to use in June, 1908. The significance of this claim is that, if it were found to be valid, it would establish a priority date for at least a portion of the Town's surface water use as June, 1908. Claimed quantities on the document are 4.0 cubic feet per second (cfs) and 1,000 afy. At the time of filing, it is stated that 2.3 cfs and 588 afy were being used. The Town is uncertain how Ecology will view the extent of this water right claim under the 2003 Municipal Water Law.

Based on the review of the water right records, and taking the most conservative interpretation, the Town is only using the quantities contained in the existing state-issued water right certificates as the basis for this chapter. However, the Town believes there are some questions remaining to be

answered specifically related to the extent of the vested right, and may elect to pursue further discussions with Ecology in the future. The Town foregoing including the water right claim in this chapter should not be interpreted as the Town abandoning any right that might exist under the claim.

Ecology does not have the authority to validate or invalidate water right claims, which may only be done by a judge in Superior Court. Ecology is only able to make tentative determinations. GWC 5676-A is specifically issued as a supplemental supply to the claim of vested rights; therefore, the quantities of water claimed are partially covered by the water right certificates which have been issued by the State so, as the worst case scenario, even if the claim were found invalid, the Town would still have those water rights with the more recent priority dates. Although the water rights certificate was issued prior to the Claims Registration Act of 1969, the Town and state were aware of vested water rights.

All water rights held by the Town, and described above, are for municipal water supply proposes. The 2003 Municipal Water Law and Ecology Water Resources Program Policy 2030 defines the place of use of a municipal water supplier as being defined by the service area identified and approved in a water system plan (WSP). Thus, the place of use for all of these water rights is the Town of Eatonville's service area, as defined in this WSP, which extends beyond the Town's corporate boundaries. Additional water rights information for each source may be found on the water right documents in **Appendix J** and the water rights self assessment forms in **Appendix P**.

Water Rights Evaluation

An evaluation of the Town's existing water right certificates was performed to determine the sufficiency of the water rights to meet both existing and future water demands. **Table 6-2** compares the combined maximum instantaneous water right amounts of the sources with the peak day demand of the system and the combined maximum annual water right amounts of the sources with the average day demand of the system. As shown in the table, the Town has sufficient water rights (both instantaneous and annual amounts) to meet the demands of the existing customers.

Table 6-2
Existing Certificated Water Rights Evaluation

Description	Instantaneous Rights/ Peak Day Demand (gpm)	Annual Rights/ Average Day Demand	
		(acre-feet)	(gpm)
Total Certificated Water Rights	1,642	525	325
Existing (2011) Water Demand	589	380	235
Surplus (or Deficient) Rights	1,053	145	90

Table 6-3 summarizes the results of the future water rights evaluation, which compares the water rights of the existing sources with the future 6-year and 20-year demand projections of the system. The analysis considered future demand projections with and without additional water use reductions from planned water use efficiency (WUE) efforts, as shown in **Table 6-3**. The results of the future water rights evaluation indicate that the Town has sufficient annual water rights to meet the projected average day demands and sufficient instantaneous rights to meet the peak day demands through 2018. Prior to 2032, demand will exceed the current annual water rights limit; therefore, the Town will need to acquire new water rights to meet the projected demands.

Table 6-3
Future Certificated Water Rights Evaluation

Description	Instantaneous Rights/ Peak Day Demand (gpm)	Annual Rights/ Average Day Demand (acre-ft)	Annual Rights/ Average Day Demand (gpm)
Year 2018 Without WUE Measures			
Total Certificated Water Rights	1,642	525	325
Projected (2018) Water Demand	733	473	293
Surplus (or Deficient) Rights	909	52	32
Year 2032 Without WUE Measures			
Total Certificated Water Rights	1,642	525	325
Projected (2032) Water Demand	1,296	836	518
Surplus (or Deficient) Rights	346	-311	-193
Year 2018 With WUE Measures			
Total Certificated Water Rights	1,642	525	325
Projected (2018) Water Demand	689	444	275
Surplus (or Deficient) Rights	953	81	50
Year 2032 With WUE Measures			
Total Certificated Water Rights	1,642	525	325
Projected (2032) Water Demand	1,192	769	477
Surplus (or Deficient) Rights	450	-244	-152

Water Rights Planning

The Town's well sources have the capability to provide supply to the system at their maximum instantaneous water rights. Thus, the well facilities are able to fully utilize their existing water rights. However, the Mashel River's instantaneous water right is significantly greater than the amount of water the Town can divert from the river. The river's instantaneous water right is 1,032 gpm and the Town is only physically capable of withdrawing approximately 400 gpm when the intake is completely clean.

Prior to 2018, the peak day water demand will exceed the existing well water rights, but the Mashel River intake should be capable of providing the remaining portion of the peak day demand (approximately 123 gpm without reductions from WUE efforts). In 2032, the river water right must be capable of supplying approximately 686 gpm (without reductions from WUE efforts) to meet the peak day demand, which is greater than the river's current intake capacity. Thus, the Town will need to improve the river intake, transfer instantaneous water rights from the river to the wells, or obtain additional instantaneous water rights. Improvements related to instantaneous water rights are identified in **Chapter 9**.

Shortly after 2018, the Town will also need to obtain additional annual water rights in order to meet the projected future demands. The Town is planning to investigate the water right claim #004455, which claims a significantly larger quantity of annual water right than is stated as the Town's maximum combined annual volume on the existing water right certificates. Improvements related to annual water rights are identified in **Chapter 9**.

In addition, the Town will strive to use its existing water sources efficiently by continuing the current WUE measures and implementing proposed measures, as outlined in the Town's Water Use Efficiency Program, which is included in **Appendix F**. The Town will also consider the salmon and steelhead species that the Mashel River provides critical habitat for when considering how to meet future demands, as discussed in the following **Alternative Water Resources** section.

Alternative Water Resources

In accordance with the October 2003 *Nisqually Watershed Management Plan*, the Town may attempt to move away from its dependence on surface water sources by assessing the potential to develop alternative sources in the Nisqually Watershed. In January 2013, a *Draft Alternative Water Source Investigation Report* was prepared by RH2 for the Town in coordination with the Nisqually Tribe (Tribe). The Town and the Tribe are investigating ways to increase flow in the Mashel River during the low-flow period for the protection of salmon and steelhead, while protecting, and possibly enhancing, the ability of the Town to have a secure source of supply to meet existing and projected water demands. The Tribe awarded the Town a grant to conduct an alternative water source investigation with a goal to increase the base flow in the Mashel River during the summer months.

The Mashel River provides critical habitat for several salmon and steelhead species, including two classified as "Threatened" under the Endangered Species Act. These threatened salmon utilize the river during the summer months, when the water level is the lowest. At low levels, the temperature in the river increases and there is limited access for fish at the mouth of the Mashel River. Increasing

summer stream flows would benefit salmon survival and productivity, and thus would be an important component of the recovery for these threatened species.

Several source of supply alternatives were evaluated. The purpose was to determine potential options for the Town to reduce its reliance on the Mashel River during low river flow periods. Low-flow months in the Mashel River coincide with peak demand months for the Town's water system and the timing of fish runs. Climate change is expected to further exacerbate low flows in the future. Increasing flow in the Mashel River during low-flow months is expected to reduce river temperatures, improve salmon survival and productivity, and aid in the recovery of these threatened species. Each alternative was examined for general feasibility, water rights options, cost considerations, overall risk level, and the impact on flow in the Mashel River. The alternatives studied included aquifer storage and recovery (ASR), altering the uses of existing water supplies, preliminary new source evaluation, conservation, reclaimed water, and forest management.

Of the six alternatives examined, altering the use of existing supply sources is not expected to have an appreciable impact on flow in the Mashel River. Reclaimed water and forest management are also not viable options for alternative water sources.

Conservation (i.e. water use efficiency) is expected to slightly improve flow in the Mashel River and the Town should proceed with the recommended improvements as discussed in **Chapter 4** and **Chapter 9**. The ASR alternative is expected to have some impact on flow in the Mashel River if the uncertainties and risks can be further evaluated and reduced. Additional studies are necessary to fully realize the feasibility and scope of ASR.

Obtaining new sources of supply from outside of the Mashel River basin, such as new water diversions from the Nisqually River or Alder Lake, will have the greatest impact on flow in the Mashel River. Increasing flow will likely reduce temperature and aid in fish habitat recovery. These two options also have the extra potential for the infrastructure to be utilized not only for the Town's existing and future supply, but also for Mashel River flow enhancement. The risks and uncertainties with the Nisqually River or Alder Lake diversions also need further evaluation. Additional studies are necessary to fully realize the feasibility and scope of the Nisqually River or Alder Lake diversions.

The initial study determines the flow impacts on the Mashel River for each alternative. In general, more flow in the Mashel River, during periods of low flow, is assumed to improve fish habitat by increasing flow and decreasing temperature. The Tribe will be utilizing the hydrologic impact information contained within the report to calculate the potential benefits to fish habitat.

The next step for the Town and the Tribe is to determine which alternative or alternatives to focus future efforts on. Feasibility studies will then be necessary to further define the alternative and move from planning to design. Related studies and improvements associated with alternative sources of supply are identified in **Chapter 9**.

DRINKING WATER REGULATIONS

Overview

The quality of drinking water in the United States is regulated by the Environmental Protection Agency (EPA). Under provisions of the Safe Drinking Water Act (SDWA), the EPA is allowed to delegate primary enforcement responsibility for water quality control to each state. In the State of Washington, the Department of Health (DOH) is the agency responsible for implementing and enforcing the drinking water regulations. For the State of Washington to maintain primacy (delegated authority to implement requirements) under the SDWA, the state must adopt drinking water regulations that are at least as stringent as the federal regulations. In meeting these requirements, the State DOH has published drinking water regulations that are contained in Chapter 246-290 of the Washington Administrative Code (WAC).

Existing Regulations

The Federal Safe Drinking Water Act (SDWA) was enacted in 1974, as a result of public concern about water quality. The SDWA sets standards for the quality of drinking water and requires water treatment, if these standards are not met. The SDWA also sets water testing schedules and methods that water systems must follow. In 1986, the SDWA was amended as a result of additional public concern and frequent contamination of groundwater from industrial solvents and pesticides. The 1986 Amendments require water systems to monitor and treat for a continuously increasing number of water contaminants identified in the new federal regulations. EPA regulated approximately 20 contaminants between 1974 and 1986. The 1986 Amendments identified 83 contaminants that EPA was required to regulate by 1989. Implementation of the new regulations has been marginally successful due to the complexity of the regulations and the associated high costs. To rectify the slow implementation of the new regulations, the SDWA was amended again and re-authorized in August of 1996.

In response to the 1986 SDWA Amendments, EPA established six rules, known as the Phase I Rule, Phase II & IIb Rules, Phase V Rule, Surface Water Treatment Rule, Total Coliform Rule, and Lead & Copper Rule. All of the Town's currently active sources are affected by these rules. EPA regulates most chemical contaminants through the Phase I, II, IIb, and V Rules.

EPA set two limits for each contaminant that is regulated under the rules. The first limit is a health goal, referred to as the Maximum Contaminant Level Goal (MCLG). The MCLG is zero for many contaminants, especially known cancer-causing agents (carcinogens). The second limit is a legal limit, referred to as the Maximum Contaminant Level (MCL). The MCL's are equal to or higher than the MCLG's; however, most MCL's and MCLG's are the same, except for contaminants that are regulated as carcinogens. The health goals (MCLG's) for carcinogens are typically zero, because they cause cancer and it is assumed that any amount of exposure may pose some risk of cancer. A summary of each rule follows.

To fully understand the discussion that follows, a brief definition of several key terms is provided below.

- Organic Chemicals – Animal or plant produced substances containing carbon and other elements such as hydrogen and oxygen.

- Synthetic Organic Chemicals (SOCs) – Man-made organic substances including herbicides, pesticides, and various industrial chemicals and solvents.
- Volatile Organic Chemicals (VOCs) – Chemicals, as liquids, that evaporate easily into the air.
- Inorganic Chemicals (IOCs) – Chemicals of mineral origin that are naturally occurring elements. These include metals such as lead and cadmium.

Phase I Rule

The Phase I Rule, which was EPA's first response to the 1986 Amendments, was published in the Federal Register on July 8, 1987, and became effective on January 9, 1989. This rule provided limits for eight VOCs that may be present in drinking water. VOCs are used by industries in the manufacture of rubber, pesticides, deodorants, solvents, plastics, and other chemicals. VOCs are found in everyday items such as gasoline, paints, thinners, lighter fluid, mothballs, and glue, and are typically encountered at dry cleaners, automotive service stations, and elsewhere in industrial processes. The Town currently complies with all contaminant monitoring requirements under this rule.

Phase II & IIb Rules

The Phase II & IIb Rules were published in the Federal Register on January 30, 1991, and July 1, 1991, and became effective on July 30, 1992, and January 1, 1993, respectively. These rules updated and created limits for 38 contaminants (organics and inorganics), of which 27 were newly regulated. Some of the contaminants are frequently applied agricultural chemicals (nitrate), while others are more obscure industrial chemicals. The Town currently complies with all contaminant monitoring requirements under this rule.

Phase V Rule

The Phase V Rule was published in the Federal Register on July 17, 1992, and became effective on January 17, 1994. This rule set standards for 23 additional contaminants, of which 18 are organic chemicals (mostly pesticides and herbicides) and 5 are inorganic chemicals (such as cyanide). The Town currently complies with all contaminant monitoring requirements under this rule.

Surface Water Treatment Rule

The Surface Water Treatment Rule (SWTR) was published in the Federal Register on June 29, 1989, and became effective on December 31, 1990. Surface water sources, such as rivers, lakes, and reservoirs (which are open to the atmosphere and subject to surface runoff), and groundwater sources that are under the direct influence of surface water (referred to as GWI sources) are governed by this rule. The SWTR seeks to prevent waterborne diseases caused by microbes, Legionella, and Giardia lamblia that are present in most surface waters. The rule requires disinfection of all surface water sources and GWI sources. All surface water sources and GWI

sources must also be filtered, unless a filtration waiver is granted. A filtration waiver may be granted to systems with pristine sources that continuously meet stringent source water quality and protection requirements. Currently, Well Nos. 1, 2, 6, and 7, and the river source are subject to the SWTR. The Town currently filters and chlorinates their sources in order to comply with the requirements of this rule.

Interim Enhanced Surface Water Treatment Rule

EPA proposed the Interim Enhanced Surface Water Treatment Rule (IESWTR) on July 29, 1994. The final rule was published in the Federal Register on December 16, 1998, and became effective on February 16, 1999, concurrent with the Stage 1 Disinfectants/Disinfection By-products Rule. The rule primarily applies to public water systems that serve 10,000 or more people and use surface water sources or GWI sources. The rule also requires primacy agencies (i.e., DOH in Washington State) to conduct sanitary surveys of all surface water and GWI systems, regardless of size. The rule is the first to directly regulate the protozoan Cryptosporidium and has set the MCLG for Cryptosporidium at zero. Water systems affected by this rule needed to comply with it by December 16, 2001. The Town currently filters and chlorinates their sources in order to comply with the requirements of this rule.

A sanitary survey of the Town's water system was completed by DOH in 2011 and a copy is included in **Appendix N**. Sanitary surveys of water systems with surface water treatment plants are required every 3 years. The findings of the survey required the Town to repair a leak in the treatment plant's monitoring basin, locate the 996 Reservoir overflow, modify the vents for Well Nos. 2 and 6, ensure adequate staffing and succession planning, and preparation of an updated Plan and Water Loss Control Plan. All of the requirements have been addressed by the Town, aside from the leaking basin and staffing issues. The leaking basins are addressed by a capital improvement project in **Chapter 9** of this WSP and the Town is working on its staffing and succession planning concurrently with the development of this WSP.

Long Term 1 Enhanced Surface Water Treatment Rule

This is the follow up rule to the IESWTR, which became effective in December of 1998. The final Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) was published on January 14, 2002, and became effective February 13, 2002. The rule addresses water systems using surface water or groundwater under the direct influence of surface water serving fewer than 10,000 people. The rule extends protections against Cryptosporidium for smaller water systems. The Town currently filters and chlorinates their sources in order to comply with the requirements of this rule.

Total Coliform Rule

The Total Coliform Rule was published in the Federal Register on June 29, 1989, and became effective on December 31, 1990. The rule set both health goals (MCLGs) and legal limits (MCLs) for total coliform levels in drinking water, and the type and frequency of testing that is required for water systems. The rule requires more monitoring than under the prior requirements, especially for

small systems. In addition, every public water system is required to develop a coliform monitoring plan, subject to approval by DOH.

Coliforms are a group of bacteria that live in the digestive tract of humans and many animals, and are excreted in large numbers with feces. Coliforms can be found in sewage, soils, surface waters, and vegetation. The presence of any coliforms in drinking water indicates a health risk and potential waterborne disease outbreak, which may include gastroenteric infections, dysentery, hepatitis, typhoid fever, cholera, and other infectious diseases.

The rule established the health goal for total coliforms at zero. To comply with the legal limit, systems must not find coliforms in more than five percent of the samples taken each month. For smaller systems like Eatonville that take fewer than 20 samples per month, one sample that contains coliforms would exceed the legal limit and trigger the follow-up sampling requirements. A list of the Town's coliform monitoring sample locations is contained in the Town's Water Quality Monitoring Plan, which is contained in **Appendix K** of this WSP.

Lead & Copper Rule

The Lead and Copper Rule was published in the Federal Register on June 7, 1991, and became effective on December 7, 1992. On January 12, 2000, the EPA published some minor revisions to the rule in the Federal Register, which primarily improved the implementation of the rule. The rule identifies "action levels" for both lead and copper. An action level is different than a MCL in that a MCL is a legal limit for a contaminant, and an action level is a trigger for additional prevention or removal steps. The action level for lead is greater than 0.015 milligrams per liter (mg/L). The action level for copper is greater than 1.3 mg/L. If the 90th percentile concentration of either lead or copper from the group of samples exceeds these action levels, a corrosion control study must be undertaken to evaluate strategies and make recommendations for reducing the lead or copper concentration below the action levels. The rule requires systems that exceed the lead level to educate the affected public about reducing its lead intake. Systems that continue to exceed the lead action level after implementing corrosion control and source water treatment may be required to replace piping in the system that contains the source of lead. Corrosion control is typically accomplished by increasing the pH of the water to make it less corrosive, which reduces its ability to break down water pipes and absorb lead or copper.

Lead is a common metal found throughout the environment in lead-based paint, air, soil, household dust, food, certain types of pottery, porcelain, pewter, and water. Lead can pose a significant risk to health if too much of it enters the body. Lead builds up in the body over many years and can cause damage to the brain, red blood cells, and kidneys. The greatest risk is to young children and pregnant women. Lead can slow down normal mental and physical development of growing bodies.

Copper is a common, natural, and useful metal found in our environment. It is also a trace element needed in most human diets. The primary impact of elevated copper levels in water systems is stained plumbing fixtures. At certain levels (well above the action levels), copper may cause nausea, vomiting, and diarrhea. It can also lead to serious health problems in people with Wilson's disease.

Long-term exposure to elevated levels of copper in drinking water could also increase the risk of liver and kidney damage. The Town currently complies with all contaminant monitoring and treatment requirements under this rule.

Radionuclides Rule

EPA established interim drinking water regulations for radionuclides in 1976, under the Safe Drinking Water Act. MCL's were established for alpha, beta and photon emitters, and radium 226/228. Radionuclides are elements that undergo a process of natural decay and emit radiation in the form of alpha or beta particles and gamma photons. The radiation can cause various kinds of cancers, depending on the type of radionuclide exposure from drinking water. The regulations address both man-made and naturally occurring radionuclides in drinking water.

The 1986 Amendments to the SDWA finalized the regulations for radionuclides by eliminating the term "interim". The Amendments also directed EPA to promulgate (publish as law) health-based MCLS's, as well as MCLs. EPA failed to meet the statutory schedules for promulgating the radionuclide regulations, which resulted in a lawsuit. In 1991, EPA proposed revisions to the regulations; but a final regulation based on the proposal was never promulgated. The 1996 Amendments to the SDWA directed EPA to revise a portion of the earlier proposed revisions, adopt a schedule, and review and revise the regulations every 6 years, as appropriate, to maintain or improve public health protection. Subsequent to the 1996 Amendments, a 1996 court order required EPA to either finalize the 1991 proposal for radionuclides or to ratify the existing standards by November, 2000.

The final rule was published in the Federal Register on December 7, 2000, and became effective on December 8, 2003. The rule established an MCLG of zero for the four regulated contaminates, and MCL's of 5 pico curies per liter (pCi/L) for combined radium-226 and radium-228, 15 pCi/L for gross alpha (excluding radon and uranium), 4 millirem per year (mrem/year) for beta particle and photon radioactivity, and 30 nanograms per liter (ug/L) for uranium. The Town currently complies with all contaminant monitoring and treatment requirements under this rule.

Wellhead Protection and Watershed Control Program

Section 1428 of the 1986 SDWA Amendments mandates that each state develop a wellhead protection program. In 1996, the SDWA was broadened to include requirements for the protection of surface water sources. The Washington State mandates for wellhead protection and watershed control are contained in WAC 246-290-135 Source Protection. In Washington State, DOH is the lead agency for the development and administration of the State's watershed control and wellhead protection program.

A watershed protection and wellhead control program is a proactive and ongoing effort of a water purveyor to protect the health of its customers by surveying the conditions and activities within the watershed affecting source water quality, and preventing contamination of the groundwater that it supplies for drinking water. Due to the type of sources utilized by the Town, the wellhead protection elements of the program do not specifically apply. All federally defined Group A public water systems that use surface water or groundwater under the influence of surface water as their

source are required to develop and implement a watershed control program. All required elements of a local watershed control program must be documented and included in either the Comprehensive Water System Plan (applicable to the Town) or Small Water System Management Program document (not applicable to the Town). A copy of the Town's Watershed Control Program is contained in **Appendix L** of this WSP.

Consumer Confidence Report

The final rule for the Consumer Confidence Report (CCR) was published in the Federal Register on August 19, 1998, and became effective on September 18, 1998. Minor revisions were posted in the Federal Register on May 4, 2000. The CCR is the centerpiece of the right-to-know provisions of the 1996 Amendments to the Safe Drinking Water Act. All community water systems, like Eatonville, were required to issue the first report to customers by October 19, 1999. The annual report must be updated and re-issued to all customers by July 1 of each year thereafter.

The CCR is a report on the quality of water that was delivered to the system during the previous 12 months. The reports must contain specific elements, but may also contain other information that the purveyor deems appropriate for public education. Some, but not all of the information that is required in the reports, include the source and type of the drinking water, type of treatment, contaminants that have been detected in the water, potential health effects of the contaminants, identification of the likely source of contamination, violations of monitoring and reporting, and variances or exemptions to the drinking water regulations. A copy of the Town's latest CCR is contained in **Appendix M** of this WSP.

Stage 1 Disinfectants/Disinfection By-products Rule

Disinfection by-products (DBP's) are formed when free chlorine reacts with organic substances, most of which occur naturally. These organic substances (called "precursors") are a complex and variable mixture of compounds. The disinfection by-products themselves may pose health risks. Trihalomethanes is a category of disinfection by-products that has been regulated. However, systems with groundwater sources that serve a population of less than 10,000 people have not been required to monitor for trihalomethanes in the past.

EPA proposed the Stage 1 Disinfectants/Disinfection By-products Rule (Stage 1 D/DBPR) on July 29, 1994. The final rule was published in the Federal Register on December 16, 1998, and became effective on February 16, 1999. The rule applies to the Town and most other water systems, including systems serving fewer than 10,000 people, which add a chemical disinfectant to the drinking water during any part of the treatment process. The rule reduced the MCL for total trihalomethanes, which are a composite measure of four individual trihalomethanes, from the previous interim level of 0.10 mg/L to 0.08 mg/L. The rule established MCL's and requires monitoring of three additional categories of disinfectant by-products (0.06 mg/L for five haloacetic acids, 0.01 mg/L for bromate, and 1.0 mg/L for chlorite). The rule also established maximum residual disinfectant levels (MRDL's) for chlorine (4.0 mg/L), chloramines (4.0 mg/L), and chlorine

dioxide (0.8 mg/L). The rule also requires systems using surface water or groundwater directly influenced by surface water to implement enhanced coagulation or softening to remove DBP precursors, unless alternative criteria is met. Compliance with this rule had to be satisfied by December 16, 2001, for large surface water systems (those serving over 10,000 people) and by December 16, 2003, for smaller surface water systems and all groundwater systems (i.e., Town of Eatonville). The Town currently complies with all treatment and contaminant monitoring requirements under this rule.

Arsenic

EPA established interim drinking water regulations for arsenic in 1976 under the SDWA. Arsenic is highly toxic, affects the skin and nervous system, and may cause cancer. The 1996 SDWA Amendments require EPA to conduct research to assess health risks associated with exposure to low levels of arsenic. EPA issued a proposed regulation on June 22, 2000, and allowed a 90-day public review period. The final rule, which was published in the Federal Register on January 22, 2001, was to become effective on March 23, 2001, except for certain amendments to several sections of the rule; however, because of the national debate regarding the science and costs related to the rule, EPA announced on May 22, 2001, that it was delaying the effective date for the rule to allow time to reassess the rule and to afford the public a full opportunity to provide further input. On October 31, 2001, EPA reaffirmed the final rule as published on January 22, 2001. The Arsenic Rule subsequently became effective on February 22, 2002.

The rule sets the MCLG of arsenic at zero and reduces the MCL from the previous standard of 0.05 mg/L to 0.01 mg/L. Arsenic's monitoring requirements will be consistent with the existing requirements for other inorganic contaminants. The Town complies with this rule by having sources with naturally low levels of arsenic.

Filter Backwash Recycling Rule

The 1996 SDWA Amendments required EPA to promulgate a regulation governing the recycling of filter backwash water within public water system's treatment processes. Public water systems using surface water or groundwater under the direct influence of surface water, which utilize filtration processes and recycling, must comply with the rule, which aims to reduce risks associated with recycling contaminants removed during filtration. EPA issued a proposed regulation on June 22, 2000, and allowed a 90-day public review period. The final rule was published in the Federal Register on June 8, 2001, and became effective on August 7, 2001.

The rule requires filter backwash water be returned to a location that allows complete treatment. In addition, filtration systems must provide detailed information regarding the treatment and recycling process to the State. The regulation required the Town to comply with the rule by December 8, 2003, if filter backwash water was recycled. The Town's existing water treatment facility backwash recycle method meets the requirements of this rule.

Stage 2 Disinfectants/Disinfection By-products Rule

This rule is the second part of the Disinfectants/Disinfection By-products Rule, of which Stage 1 D/DBPR became effective in February of 1999. The Stage 2 Disinfectants/Disinfection By-products Rule (Stage 2 D/DBPR) was published on January 4, 2006, in the Federal Register and became effective on March 6, 2006. EPA implemented this rule simultaneously with the Long Term 2 Enhanced Surface Water Treatment Rule.

Similar to the Stage 1 D/DBPR, this rule applies to most water systems that add a disinfectant to the drinking water other than ultraviolet light or those systems that deliver disinfected water. The Stage 2 D/DBPR changes the calculation procedure requirement of the MCLs for two groups of DBPs, total trihalomethanes and haloacetic acids (TTHM and HAA5). The rule requires each sampling location to determine compliance with MCLs based on their individual annual average DBP levels (termed the Locational Running Annual Average), rather than utilizing a system-wide annual average. The rule also proposes new MCLGs for chloroform (0.07 mg/L), trichloroacetic acid (0.02 mg/L), and monochloroacetic acid (0.03 mg/L).

Additionally, the rule requires systems to document peak DBP levels and prepare an Initial Distribution System Evaluation (IDSE) to identify Stage 2 D/DBPR compliance monitoring sites. The Town currently complies with all contaminant monitoring requirements under this rule and is scheduled to begin monitoring for Stage 2 D/DBP in November 2013. The IDSE is contained in **Appendix O** of this WSP.

Long Term 2 Enhanced Surface Water Treatment Rule

Following the publication of the IESWTR, EPA introduced the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) to supplement the preceding regulations. The second part of the regulations of the LT1ESWTR, which became effective in February of 2002, is mandated in the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). The final rule was published in the Federal Register on January 5, 2006, and became effective on March 6, 2006. The final rule was implemented simultaneously with the Stage 2 D/DBPR described in the previous section. This rule applies to all systems that use surface water sources or GWI sources.

This rule establishes treatment technique requirements for filtered systems based on their risk level for contamination, calculated from the system's average Cryptosporidium concentration. Requirements include up to 2.5-log Cryptosporidium treatment in addition to existing requirements under the IESWTR and LT1ESWTR. Filtered systems that demonstrate low levels of risk will not be required to provide additional treatment. Unfiltered systems under this rule must achieve at least a 2-log inactivation of Cryptosporidium if the mean level in the source water remains below 0.01 oocysts/L. If an unfiltered system's mean level of Cryptosporidium exceeds 0.01 oocysts/L, the LT2ESWTR requires the system to provide a minimum 3-log inactivation of Cryptosporidium. All unfiltered systems are also required to utilize a minimum of two disinfectants in their treatment process.

The LT2ESWTR also addresses systems with unfinished water storage facilities. Under this rule, systems must either cover their storage facilities or achieve inactivation and/or removal of 4-log virus, 3-log Giardia lamblia, and 2-log Cryptosporidium on a state-approved schedule. Lastly, the rule extends the requirement of the disinfection profiles mandated under the LT1ESWTR to the proposed Stage 2 D/DBPR. The Town currently filters and chlorinates their surface water sources in order to comply with the requirements of this rule.

Groundwater Rule

The Town is not required to comply with the requirements of this rule because all well field sources are disinfected and filtered at the water treatment plant.

SOURCE WATER QUALITY

This section presents the current water quality standards and the results of the Town's recent source water quality monitoring efforts. A discussion of the water quality requirements and monitoring results for the Town's distribution system is presented in the section that follows.

Drinking Water Standards

Drinking water quality is regulated at the federal level by EPA and at the state level by DOH. Drinking water standards have been established to maintain high quality drinking water by limiting the levels of specific contaminants (i.e., regulated contaminants) that can adversely affect public health and are known or are likely to occur in public water systems. Non-regulated contaminants do not have established water quality standards and are generally monitored at the discretion of the water purveyor and in the interest of customers.

The regulated contaminants are grouped into two categories of standards – primary standards and secondary standards. Primary standards are drinking water standards for contaminants that could affect health. Water purveyors are required by law to monitor and comply with these standards and notify the public if water quality does not meet any one of the standards. Secondary standards are drinking water standards for contaminants that have aesthetic effects, such as unpleasant taste, odor, or color (staining). The national secondary standards are unenforceable federal guidelines or goals, where federal law does not require water systems to comply with them. States may, however, adopt their own enforceable regulations governing these contaminants. The State of Washington has adopted regulations that require compliance with some of the secondary standards. Water purveyors are not required to notify the public if water quality does not meet the secondary standards.

Source Monitoring Requirements and Waivers

The Town is required to perform water quality monitoring at each of the active water sources for inorganic chemical and physical substances, organic chemicals, and radionuclides. The monitoring requirements that the Town must comply with are specified in WAC 246-290-300. A description of the source water quality monitoring requirements and procedures for each group of substances is

contained in the Town's Water Quality Monitoring Plan that is included in **Appendix K** of this WSP.

In 1994, DOH developed the Susceptibility Assessment Survey Form for water purveyors to complete for use in determining a drinking water source's potential for contamination. The results of the susceptibility assessment may provide monitoring waivers that allow reduced source water quality monitoring. According to the DOH *Water Quality Monitoring Report* for 2012, the Mashel River was assigned a high susceptibility rating, and the groundwater under the influence wellfield has not been rated.

Source Monitoring Results

The quality of the Town's sources has been good and meets or exceeds all drinking water standards. The Town monitored the Mashel River source annually for VOCs, IOCs, and physical substances. The river source was monitored for SOCs once during the 2004 – 2006 and 2007 - 2009 monitoring periods. Monitoring of IOCs, VOCs, and radionuclides for the Well Nos. 1, 2, 6, and 7 well field and river source was accomplished once per every 3 year monitoring period. Nitrate monitoring has been performed once per year since at least 1999. The results of IOC (including nitrate) monitoring and VOC monitoring for the Town's sources indicate that all primary and secondary standards were met. The results of radionuclide monitoring indicated that all of the Town's sources were in compliance with the regulations. SOC monitoring of the river source indicated that SOC levels were below the MCL's. In 2007, the Town sampled for arsenic and found that the levels were well below the MCLs, per the new arsenic rule.

DISTRIBUTION SYSTEM WATER QUALITY

Monitoring Requirements and Results

The Town is required to perform water quality monitoring within the distribution system for coliform bacteria, disinfectant (chlorine) residual concentration, disinfection byproducts, lead and copper, and asbestos in accordance with WAC 246-290. A description of the distribution system water quality monitoring requirements and procedures are contained in the Town's Water Quality Monitoring Plan that is included in **Appendix K** of this WSP.

The Town has been in compliance with all monitoring requirements for the past several years. A summary of the results of distribution system water quality monitoring within the Town's system is presented below.

Coliform Monitoring

The Town is required to collect a minimum of three coliform samples per month from different locations throughout the system, based on DOH requirements. The Town's historical coliform tests

were all satisfactory with the exception of two samples in July 2004 which may have been due to special circumstances.

Disinfectant Residual Concentration Monitoring

Disinfection requirements applicable to the treatment of the Town's sources are contained in WAC 246-290-451, which states that a disinfectant residual concentration shall be detectable in all active parts of the distribution system. Disinfection requirements applicable to the Town's river source are contained in WAC 246-290-662 for filtered systems, which states that a minimum 0.2 mg/L disinfectant residual concentration shall be maintained at the point the water enters the system and that the disinfectant residual concentration in the distribution system is detectable in at least 95 percent of the samples taken each calendar month. In an effort to comply with these requirements, the Town has established a chlorination target to maintain a residual disinfectant concentration of at least 0.2 mg/L in the distribution system. The preferred concentration at the 996 Zone Reservoir is approximately 1.20 mg/L. The Town is required to collect one distribution sample every day to monitor for chlorine residual.

Disinfectants/Disinfection By-products Monitoring

Trihalomethanes (THMs) are disinfection by-products that are formed when free chlorine reacts with organic substances (i.e., precursors), most of which occur naturally. Formation of THMs is dependent on such factors as amount and type of chlorine used, water temperature, concentration of precursors, pH, and chlorine CT. Trihalomethanes have been found to cause cancer in laboratory animals and are suspected to be human carcinogens. The Town's most recent samples for THM and HAA5, collected yearly since 2009, revealed concentrations lower than their MCLs; therefore, the Town is in compliance with this regulation. The Town did have HAA5 levels exceed its MCL in 2004-2006 and in 2008; however, this may have been due to process optimization with starting up the new water treatment plant. Current HAA5 levels have consistently been below the MCL.

In response to the Stage 1 and Stage 2 D/DBPR, the Town expanded their distribution system monitoring to include THM and HAA5.

Lead and Copper Monitoring

The Lead and Copper Rule identifies the action level for lead as being greater than 0.015 mg/L and the action level for copper as being greater than 1.3 mg/L. The results of the tests from 2009, which included 10 sample sites, indicate a range of 0.002 mg/L to 0.010 mg/L for lead and a range of 0.02 mg/L to 0.37 mg/L for copper. The results of the tests from the 2006 monitoring period, which included 10 sample sites, indicate a range of 0.002 mg/L to 0.014 mg/L for lead and a range of 0.02 mg/L to 0.4105 mg/L for copper. The 90th percentile concentration for lead and copper from each group of samples were below the action level.

Asbestos

Asbestos monitoring is required if the sources are vulnerable to asbestos contamination or if the distribution system contains more than 10 percent of asbestos cement pipe. The Town's surface water source, the Mashel River, is considered susceptible to asbestos contamination, and asbestos cement (AC) pipe composes more than 10 percent of the Town's distribution system. Therefore, the Town must monitor for asbestos at the source and in the distribution system. The current MCL for asbestos is seven million fibers per liter and greater than ten microns in length. Monitoring must be accomplished during the first 3-year compliance period of each 9-year compliance cycle. The water sample must be taken at a tap that is served by an AC pipe under conditions where asbestos contamination is most likely to occur. The Town's most recent samples in 2009 did not contain asbestos contamination.

Water System Analysis

7

INTRODUCTION

This chapter presents the analysis of the Town of Eatonville's (Town) existing water system. Individual water system components were analyzed to determine their ability to meet the policies and design criteria under both existing and future water demand conditions. The policies and design criteria are presented in **Chapter 5** and the water demands are presented in **Chapter 4**. A description of the existing water system facilities and current operation is presented in **Chapter 2**. The last section of this chapter presents the existing and projected system capacity analyses that were performed to determine the maximum number of equivalent residential units (ERUs) that can be served by the Town's water system.

PRESSURE ZONES

The ideal static pressure of water supplied to customers is between 40 and 80 pounds per square inch (psi). Pressures within a water system's distribution system are commonly as high as 120 psi, requiring pressure regulators on individual service lines to reduce the pressure to 80 psi or less. It is difficult for the Town's water system and most others to maintain distribution pressures between 40 and 80 psi, primarily due to the topography of the water service area.

Table 7-1 lists each of the Town's three pressure zones, the highest and lowest elevation served in each zone, and the minimum and maximum distribution system pressures within each zone, based on maximum static water conditions (full reservoirs and zero demands). The upper portion of the table illustrates the minimum and maximum pressures of the existing system and the lower portion of the table illustrates pressures after proposed pressure zone improvements are implemented. While this table presents the results of the evaluation of pressures based on the adequacy of the pressure zones (under static conditions), the hydraulic analysis section later in this chapter presents the results of the evaluation of pressures based on the adequacy of the water mains (under dynamic conditions).

The Town is currently providing water at pressures of at least 40 psi to most services in the system, except for limited areas within each pressure zone, as shown in the upper portion of **Table 7-1**. The low pressure in the 996 Zone occurs in the area of higher elevations near the intersection of Larson Street West and Orchard Avenue South, which borders the Hilltop 1077 Zone. The low pressure area will be eliminated in the future when the 1077 Zone distribution system is upgraded and expanded as described in **Chapter 9**.

The low pressure in the 1050 Zone occurs along Dow Ridge Road near the 1050 Zone Reservoir. Higher pressure zone water is not available in this area. The low pressure area in this zone is near the 1050 Zone Reservoir, shown in the top portion of **Table 7-1**, will continue to need individual booster pump stations to maintain adequate pressure. Pressures at services without individual booster pump stations are slightly below 40 psi, as indicated in the bottom portion of **Table 7-1**. If the dynamic analysis presented later in this chapter indicates that adequate pressures can be maintained, improvements are not necessary and the pressures that are slightly lower than 40 psi are acceptable.

The low pressures in the 1077 Zone occur in the higher elevations near the 1077 Zone Reservoir. Customers that currently reside at the top of the hill are required to have individual booster pump stations until a closed zone booster pump station is installed to increase pressure. When new development occurs above an elevation of approximately 985 feet, an 1140 Zone booster pump station will be installed. The low pressure area will be eliminated in the future when the proposed 1140 Pressure Zone improvements, described in **Chapter 9**, are implemented. The pressures in all of the zones after completion of the pressure zone improvements are shown in the lower portion of **Table 7-1**.

Table 7-1
Minimum and Maximum Distribution System Static Pressures

Pressure Zone	Highest Elevation Served		Lowest Elevation Served	
	Elevation (feet)	Static Pressure (psi)	Elevation (feet)	Static Pressure (psi)
Existing System - Before Proposed Zone Modifications				
996 Zone	940	24	771	97
1050 Zone	990	26	849	87
1077 Zone	1,040	16	847	100
Future System - After Proposed Zone Modifications				
996 Zone	895	44	771	97
1050 Zone	965	37	840	91
1060 Zone	976	36	833	98
1077 Zone	986	39	847	100
1140 Zone	1,045	41	978	70

Each pressure zone has areas of high pressure. The high pressures in the 996 Zone occur in the valley between Washington Avenue North and the airport, where the elevations are the lowest. In the 1050 Zone, high pressures exist in the Emerald Ridge neighborhood along the boundary between the 1050 Zone and the 996 Zone. High pressures also exist at the boundary between the 1077 Zone and 996 Zone. Individual services that have pressures greater than 80 psi are required to have pressure regulators to reduce the pressures to acceptable levels. In **Table 7-1** the listed pressures are calculated in the water main and the actual service pressure is lower due to the required pressure regulators. The Town mitigates these high pressures with the pressure regulator requirement. Pressure zone improvements will not be necessary to resolve the higher pressures.

SOURCE CAPACITY EVALUATION

This section evaluates the combined capability of the Town's existing sources (four existing groundwater wells and one surface water source) to determine if they have sufficient capacity to meet the overall demands of the system, based on existing and future water demands. The section that follows will address the evaluation of the individual facilities to determine if they have sufficient capacity to meet the existing and future demands of the individual zone, or zones, that they supply.

Analysis Criteria

Supply facilities must be capable of adequately and reliably supplying high-quality water to the system. In addition, supply facilities must provide a sufficient quantity of water at pressures that meet the requirements of WAC 246-290-230. The evaluation of the combined capacity of the sources in this section is based on the criteria that they provide supply to the system at a rate that is equal to or greater than the peak day demand (PDD) of the system.

Source Capacity Analysis Results

The combined capability of the Town's active sources to meet both existing and future demand requirements, based on existing pumping and intake capacities of the individual supply facilities, is presented in **Table 7-2**. The intake in the Mashel River has a maximum diversion rate of approximately 400 gallons per minute (gpm) when the intake pipes and structures are clean.

Table 7-2
Water Source Capacity Evaluation

Description	Existing	Future Projections	
	2011	2018	2032
Required Source Capacity (gpm)			
Peak Day Demand	589	733	1,296
Available Source Capacity (gpm)			
Mashel River	400	400	400
Well No. 1	210	210	210
Well No. 2	220	220	220
Well No. 6	200	200	200
Well No. 7	325	325	325
Totals	1,355	1,355	1,355
Surplus or Deficient Source Capacity (gpm)			
Surplus or Deficient Amt.	766	622	59

The demands used in the evaluation for 2018 and 2032 are future demand projections without reductions from enhanced water use efficiency (WUE) efforts, as shown in **Table 4-9** of **Chapter 4**. Therefore, if additional reductions in water use are achieved in the future through WUE efforts, the total source capacity required in the future will be less than that shown in **Table 7-2**.

The results of the analysis indicate that the Town has sufficient total pumping and intake capacity to meet existing and future demands.

Although the Town's sources appear to have sufficient capacity to meet the Town's demands beyond 2032, the pumping capacity of the Town's wells is greater than the water rights currently allocated to the wells. The pumping rate of the wells is limited to the amount of the designated water rights. As described in further detail in **Chapter 6**, Well Nos. 1 and 7 share a maximum

instantaneous water right equal to 360 gpm. Well Nos. 2 and 6 share a separate water right with a maximum instantaneous water right of 250 gpm. The total amount of water that the four wells can pump according to the water rights is 610 gpm. In addition, the Mashel River intake has a water right of 1,032 gpm, which is greater than the intake's current maximum diversion rate of approximately 400 gpm. The total instantaneous water rights for all of the sources is 1,642 gpm.

Table 7-3 is an additional source of supply analysis that limits the amount of water pumped by the wells to the amount of the instantaneous well water rights. The Town primarily relies on Well Nos. 6 and 7. The analysis assumes that 400 gpm is available from the Mashel River.

Table 7-3
Water Source Capacity Evaluation with
Well Water Rights and River Diversion Rate Limitations

Description	Existing	Future Projections	
	2011	2018	2032
Required Source Capacity (gpm)			
Peak Day Demand	589	733	1,296
Available Source Capacity (gpm)			
Mashel River	400	400	400
Well No. 1	35	35	35
Well No. 2	50	50	50
Well No. 6	200	200	200
Well No. 7	325	325	325
Totals	1,010	1,010	1,010
Surplus or Deficient Source Capacity (gpm)			
Surplus or Deficient Amt.	421	277	-286

The results of the analysis indicate that the Town will have sufficient supply and instantaneous water rights beyond 2018 if the sources can maintain their existing supply rates when PDD occurs, assuming that no additional sources or water rights are obtained. Prior to 2032, either additional well water rights, new sources of supply or an increase in the river's maximum diversion rate are required to meet the projected demand.

A third analysis was performed to display how much water must be diverted from the river to meet PDD if the wells are pumping at their maximum instantaneous water rights. **Table 7-4** assumes that no water is diverted from the river and only the wells are supplying water to the system.

Table 7-4
Water Source Capacity Evaluation with
Well Water Right Limitation and No River Diversion

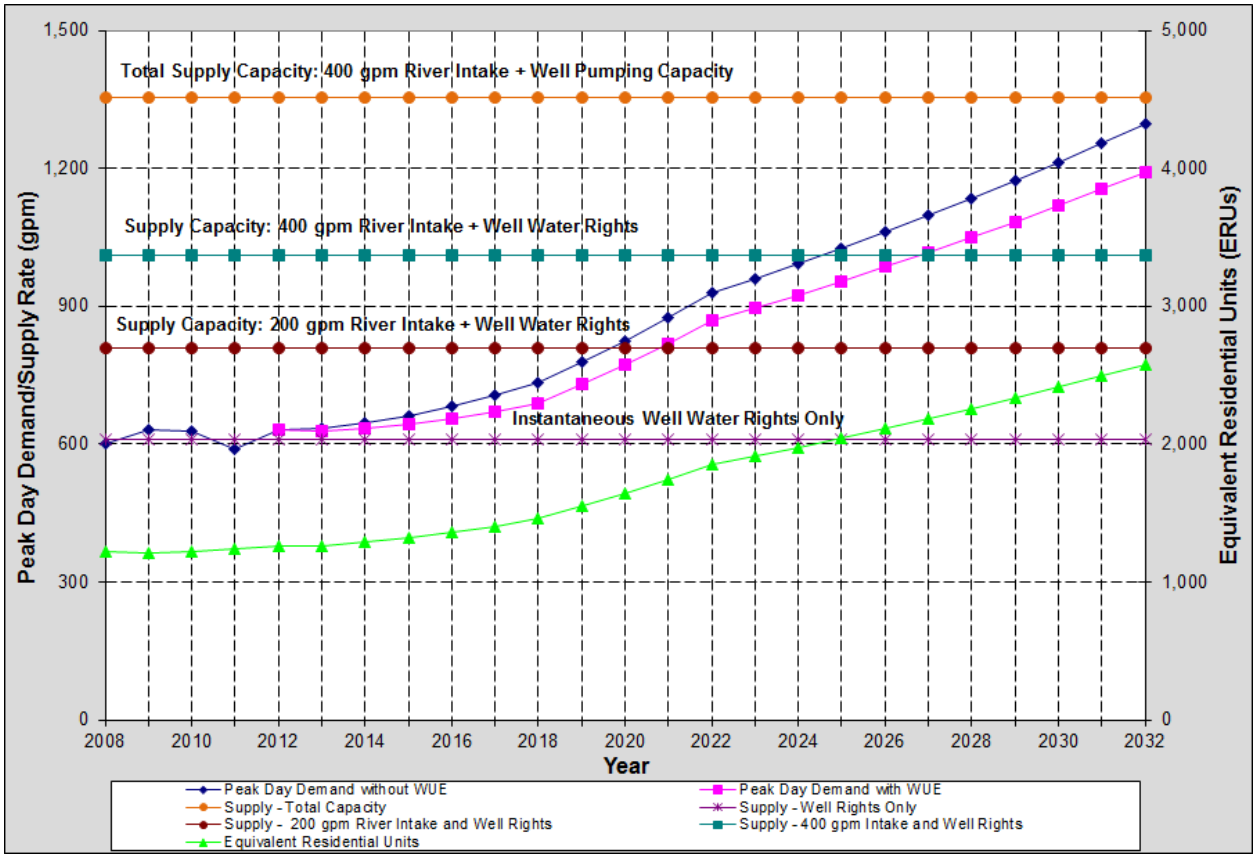
Description	Existing	Future Projections	
	2011	2018	2032
Required Source Capacity (gpm)			
Peak Day Demand	589	733	1,296
Available Source Capacity (gpm)			
Mashel River	0	0	0
Well No. 1	35	35	35
Well No. 2	50	50	50
Well No. 6	200	200	200
Well No. 7	325	325	325
Totals	610	610	610
Surplus or Deficient Source Capacity (gpm)			
Surplus or Deficient Amt.	21	-123	-686

Table 7-4 shows that the well water rights alone can supply the existing demand. Approximately 123 gpm is needed from the river in 2018 and approximately 686 gpm is needed from the river in 2032 to meet projected demands. It is likely that the river will be capable of meeting the necessary demands beyond 2018. However, prior to 2032, the 400 gpm maximum capacity of the river intake will be exceeded.

Additional well water rights or supply sources are necessary when the PDD approaches the combined capacity of the existing sources, which is limited by the available well water rights and the river's intake capabilities. **Chart 7-1** shows that the total supply capacity exceeds the PDD through 2032, but the total supply capacity exceeds the instantaneous water rights for the well field. The Town currently relies on the availability of water from the river intake to meet the demand that exceeds the instantaneous well water rights. **Chart 7-1** also shows that the river must supply approximately 200 gpm in 2019 to meet the PDD without reductions from WUE measures. In 2024, the river must supply approximately 400 gpm to meet PDD without reductions from WUE

efforts. Beyond 2024, the river will need to supply more than 400 gpm to meet projected demands. Improvements to the Mashel River intake facilities may be necessary to meet future demands if other sources of supply or water rights are not feasible. Since the river's supply rate fluctuates, the Town should proceed with water supply and water rights studies involving the pursuit of additional supply to ensure that future demands are met. The Mashel River source of supply is also impacted by the presence of threatened species and the pursuit of alternative water supply sources is discussed in **Chapter 6**. Proposed supply studies and supply improvements are identified in **Chapter 9**.

Chart 7-1
Future Water Supply and Demand Projections



An additional analysis was performed to compare the water treatment plant capacity to PDD, as shown in **Table 7-5**. The water treatment plant has an existing capacity of 1.0 million gallons per day (MGD) or 694 gpm, which is less than the total available supply as shown in previous analyses. The water treatment plant has the capability to be expanded to a capacity of 1.5 MGD or 1,042 gpm with the addition of a third treatment skid.

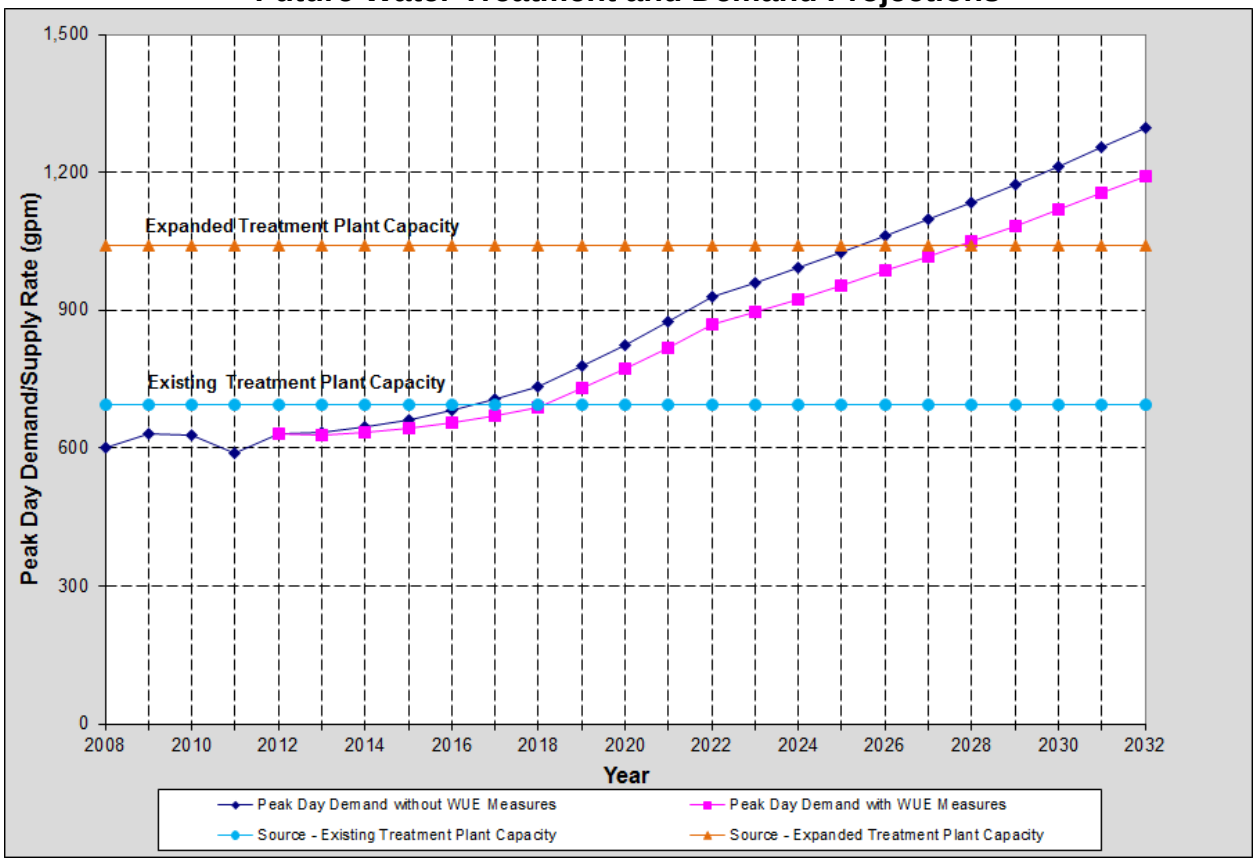
Table 7-5
Water Treatment Plant Capacity Evaluation

Description	Existing	Future Projections	
	2011	2018	2032
Required Treatment Capacity (gpm)			
Peak Day Demand	589	733	1,296
Available Treatment Capacity (gpm)			
Existing Treatment Plant	694	694	694
Expanded Treatment Plant	1,042	1,042	1,042
Surplus or Deficient Treatment Capacity (gpm)			
Surplus or Deficient Amt. with Existing Water Treatment Plant	106	-38	-601
Surplus or Deficient Amt. with Expanded Water Treatment Plant	453	309	-254

Table 7-5 shows that the existing water treatment plant was able to meet 2011 demands, but expanding the water treatment plant to include a third treatment skid is necessary prior to 2018 to meet projected PDD. It is likely that the expanded water treatment plant will be capable of meeting the projected demands beyond 2018. However, prior to 2032, approximately 254 gpm of additional water treatment capacity will be needed.

Chart 7-2 shows that the water treatment plant will require an expansion to include the third treatment skid by 2017 to meet the projected PDD without reductions from WUE efforts. The expanded treatment plant will be capable of treating the Town's maximum supply capacity of 1,010 gpm as indicated in **Table 7-3**. When the required supply improvements are completed for the 2025 supply deficiency (i.e., additional water rights, improved diversion rate, and/or new supply sources), additional water treatment improvements will also be necessary. The Town will need to retrofit the expanded water treatment plant or construct a new water treatment plant to treat the new supply sources. These proposed treatment improvements are identified in **Chapter 9**.

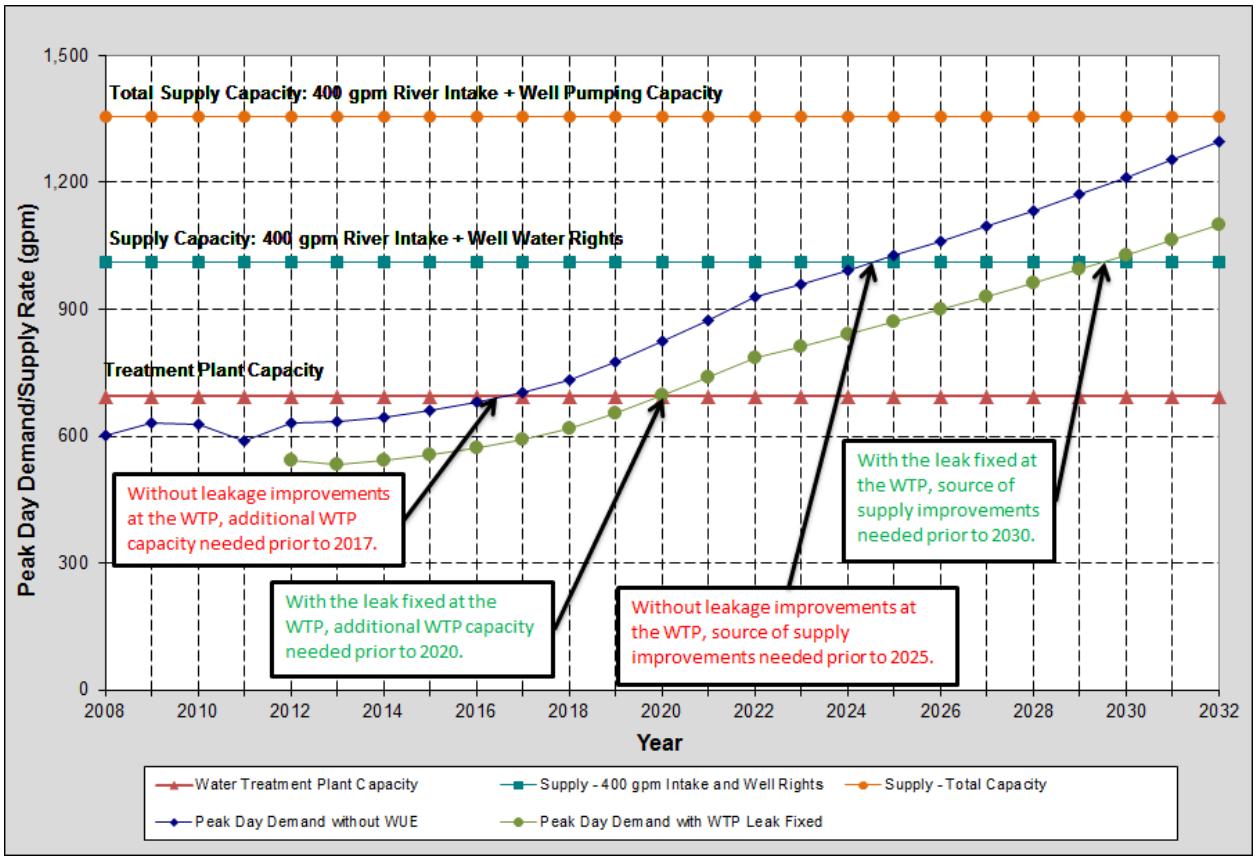
Chart 7-2
Future Water Treatment and Demand Projections



Implications of Leak at Water Treatment Plant

The PDD projections utilized in the source of supply analyses assume that the known leakage issue at the water treatment plant will not be resolved and the Town will continue to experience a total system leakage rate of approximately 30 percent as described in the **Distribution System Leakage** section of **Chapter 4**. Although sizing and scheduling of proposed improvements is generally based upon PDD without WUE measures to ensure that the facilities are properly sized whether or not additional WUE measures are achieved, the leakage at the water treatment plant is a localized problem that the Town has moved to the forefront of its priorities. The Town plans to inspect the clear wells, meters, and other water treatment plant components concurrently with the finalization of this WSP as identified in **Chapter 9**. If the water treatment plant leakage can be resolved with onsite improvements as early as 2013, the Town's need for source of supply and treatment improvements can be delayed by several years. **Chart 7-3** indicates that the water treatment plant capacity improvements can be delayed by approximately 3 years and source of supply improvements can be delayed by approximately 5 years. The Town plans to reevaluate the water demand projections and system analyses after the leakage issue is addressed to determine if the improvements can be delayed as indicated in **Chart 7-3**. A revaluation of the demand projections is identified as an improvement project in **Chapter 9**.

Chart 7-3
Water Treatment Plant Leak Implications on Projections



WATER SUPPLY FACILITIES EVALUATION

This section evaluates the existing supply facilities to determine if they have sufficient capacity to provide water supply at a rate that meets the existing and future demands of the one or more zones that they supply. This section also identifies facility deficiencies that are not related to the capacity of the supply facilities.

Analysis Criteria

The evaluation of supply facilities to determine if they have adequate capacity is based on one of two criteria, as follows. If the pressure zone that the facility provides supply into has water storage, then the amount of supply required is equal to the PDD of the zone. If the pressure zone that the facility provides supply into does not have water storage, then the amount of supply required is equal to the peak hour demand (PHD) of the zone. The higher supply requirement of the latter criteria is due to the lack of equalizing storage that is typically utilized to provide short-term supply during times of peak system demands.

996 Zone Facilities

All of the Town's supply sources provide water supply to the Main Booster Pump Station, which provides water supply to the 996 Zone and indirectly to the higher zones through the Town's other booster pump stations. **Table 7-6** summarizes the current and future supply requirements of the 996 Zone, based on existing and projected water demands for the 996 Zone and the transfer amount necessary to meet the existing and future demands of the 1050 and 1077 Zones. The supply requirement for the pressure zones is lower than the total PDD in the system as indicated in **Table 7-2** through **Table 7-5** due to water loss at the water treatment plant site, which is described in the **Distribution System Leakage** section of **Chapter 4. Table 7-6** also summarizes the current amount of water supply available to the 996 Zone based on the maximum supply rate of the Main Booster Pump Station. The results of the analysis, as shown in **Table 7-6**, indicates that the Main Booster Pump Station has the capacity to meet the future demands of the 996 Zone.

Table 7-6
996 Zone Supply Evaluation

Description	Existing 2011	Future Projections 2018	Future Projections 2032
Required Supply (gpm)			
996 Zone Peak Day Demand	387	543	776
Transfer to 1050 Zone [1]	49	77	333
Transfer to 1077/1140 Zone[1]	20	51	78
Total Required Supply	455	671	1,186
Available Supply (gpm)			
Main Booster Pump Station	2,250	2,250	2,250
Surplus or Deficient Supply (gpm)			
Surplus or Deficient Amount	1,795	1,579	1,064

(1) Transfer to upper zones is provided by Center Street and Hilltop Booster Pump Stations.

1050 Zone Facilities

The Center Street Booster Pump Station currently provides all of the water supply to the 1050 Zone. **Table 7-7** summarizes the current and future supply requirements of the 1050 Zone, based on existing and projected water demands for the zone. **Table 7-7** also summarizes the current amount of water supply available to the 1050 Zone based on the maximum pumping rate of the Center Street Booster Pump Station. The results of the analysis indicate that the facility has sufficient capacity to meet the existing demands of the 1050 Zone and the future demands of the 1050 Zone in 2018. However, the Center Street Booster Pump Station does not have sufficient capacity for the future demands of the 1050 Zone in 2032. The Town will need to install a new booster pump station for the anticipated development in the western portion of the 1050 Zone or install improvements at the Center Street Booster Pump Station prior to 2032. This supply improvement is identified in **Chapter 9**.

Table 7-7
1050 Zone Supply Evaluation

Description	Existing 2011	Future Projections 2018	Future Projections 2032
Required Supply (gpm)			
1050 Zone Peak Day Demand	49	77	333
Available Supply (gpm)			
Center Street Booster Pump Station	250	250	250
Surplus or Deficient Supply (gpm)			
Surplus or Deficient Amount	201	173	-83

1077 Zone Facilities

The Hilltop Booster Pump Station currently provides all of the water supply to the 1077 Zone. **Table 7-8** summarizes the current and future supply requirements of the 1077 Zone, based on existing and projected water demands for the zone. **Table 7-8** also summarizes the current amount of water supply available to the 1077 Zone based on the maximum pumping rate of the Hilltop Booster Pump Station. The results of the analysis indicate that the facility has sufficient capacity to meet the future demands of the 1077 Zone.

Table 7-8
1077 Zone Supply Evaluation

Description	Existing 2011	Future Projections 2018	Future Projections 2032
Required Supply (gpm)			
1077 Zone Peak Day Demand	20	51	78
Available Supply (gpm)			
Hilltop Booster Pump Station	175	175	175
Surplus or Deficient Supply (gpm)			
Surplus or Deficient Amount	155	124	97

Facility Deficiencies

The Main Booster Pump Station is in excellent condition and has sufficient pumping capability for the projected demands. The site is not furnished with frontage improvements; therefore, when the treatment facility undergoes upgrades in the future, frontage improvements in accordance with the Eatonville Municipal Code (EMC) may be required. Likewise, stormwater improvements are not currently installed and may be necessary per the EMC and for source protection purposes.

The Center Street Booster Pump Station's building, mechanical, and electrical equipment are in good condition. As demand increases, the Town will need to use additional existing pumps to meet projected demands. Additional pumping redundancy is recommended for the station as demand increases. Installing fencing around the site is suggested to improve water system security. Although the 1050 Zone has storage, installing a permanent engine generator is recommended for back-up power supply at this site to improve reliability in the zone. The site does not have frontage improvements and sidewalks are not installed in the immediate area. Frontage improvements may be necessary in the future when facility upgrades occur. Due to the size of the existing facility, stormwater improvements were likely not required at the time of original construction, but should be considered if the facility is expanded in the future.

The Hilltop Booster Pump Station is housed in a small, aging structure adjacent to the concrete 996 Zone Reservoir, which has not been seismically retrofitted. The aging structure has limited clearances and exposed wiring. In addition, the pumps and piping have signs of corrosion and are approaching their design life. An earthquake could severely damage the Hilltop Booster Pump Station and the adjacent 996 Zone Reservoir. If this were to occur, the Town would not have the ability to supply water to the 1077 Zone Reservoir, which provides the Town with a majority of its fire flow and emergency storage. Relocating the Hilltop Booster Pump Station away from the 996 Zone Reservoir in a structurally sound building with updated and reliable mechanical and electrical systems is recommended. The design of the facility should consider the ability to supply the 1077 Zone Reservoir when the 996 Zone Reservoir is offline for earthquake repair or regular maintenance. The existing site does not have frontage or stormwater improvements, but these improvements may be necessary when the facilities are expanded in the future. Proposed improvements to resolve these deficiencies are identified in **Chapter 9**.

STORAGE FACILITIES

This section evaluates the Town's existing water storage tanks to determine if they have sufficient capacity to meet the existing and future storage requirements of the system. This section also identifies facility deficiencies that are not related to the capacity of the water tanks.

Analysis Criteria

Water storage is typically made up of the following components: operational storage, equalizing storage, standby storage, fire flow storage, and dead storage. Each storage component serves a different purpose and will vary from system to system. A definition of each storage component and the criteria used to evaluate the capacity of the Town's storage tanks is provided below.

Operational Storage – Volume of the reservoir used to supply the water system under normal conditions when the source or sources of supply are not delivering water to the system (i.e., sources are in off-mode). Operational storage is essentially the average amount of draw down in the reservoir during normal operating conditions, which represents a volume of storage that will most likely not be available for equalizing storage, fire flow storage, or standby storage. The operational storage in the Town's reservoirs is the amount of storage between the fill, or pump starting setpoint level, and the overflow elevation of each tank.

Equalizing Storage – Volume of the reservoir used to supply the water system under peak demand conditions when the system demand exceeds the total rate of supply of the sources. The Washington State Department of Health (DOH) requires that equalizing storage be stored above an elevation

that will provide a minimum pressure of 30 psi at all service connections throughout the system under PHD conditions. Because the Town's supply sources primarily operate on a "call on demand" basis to fill the reservoirs, the equalizing storage requirements are determined using the standard DOH formula that considers the difference between the system PHD and the combined capacity of the supply sources.

Standby Storage – Volume of the reservoir used to supply the water system under emergency conditions when supply facilities are out of service due to equipment failures, power outages, loss of supply, transmission main breaks, and any other situation that disrupts the supply source. DOH requires that standby storage be stored above an elevation that will provide a minimum pressure of 20 psi at all service connections throughout the system. The criteria for determining the standby storage requirements for the Town's system, which has multiple supply sources, is based on the standard DOH formula that is based on average day demand and supply source capacity. The amount of standby storage required must be sufficient to supply the system for a 48-hour period when the primary supply facility is out of service and the system is experiencing demands that are close to average day demands.

Fire Flow Storage – Volume of the reservoir used to supply water to the system at the maximum rate and duration required to extinguish a fire at the building with the highest fire flow requirement. The magnitude of the fire flow storage is the product of the fire flow rate and duration of the system's maximum fire flow requirement established by the local fire authority, the Town of Eatonville Fire Department. DOH requires that fire flow storage be stored above an elevation that will provide a minimum pressure of 20 psi at all points throughout the distribution system under PDD conditions. The fire flow storage requirements shown in the analyses in this section are based on a maximum fire flow requirement of 2,500 gpm for a 3-hour duration in the 996 Zone; 1,500 gpm for a 2-hour duration in the 1050 Zone; and 1,500 gpm for a 2-hour duration in the 1077 Zone.

Dead Storage – Volume of the reservoir that can not be used because it is stored at an elevation that does not provide system pressures that meet the minimum pressure requirements established by DOH without pumping. This unusable storage occupies the lower portion of most ground-level reservoirs. Water that is stored below an elevation that can not provide a minimum pressure of 20 psi is considered dead storage for the analyses that follow.

Storage Analysis Results

The storage analyses are based on an evaluation of the existing storage facilities providing water to three supply areas: the 996 Zone, 1050 Zone, and 1077 Zone.

Existing Storage Analysis

As shown in **Table 7-9**, the maximum combined storage capacity of the Town's reservoirs and clear wells is approximately 1.23 million gallons (MG). The storage in the clear wells is available to the 996 Zone because the Main Booster Pump Station that pumps water from the clear wells to the 996 Zone is equipped with two redundant pumps for normal supply, a third pump for additional supply of the clear well storage, and the facility has a permanent engine generator for back-up power supply. The total amount of usable storage for operational, equalizing, standby, and fire flow purposes is reduced to 1.06 MG, due to dead storage (i.e., non-useable storage) in the lower portions of the 996 Zone and 1050 Zone Reservoirs. The dead storage is due to the water services that are

located at the higher elevations in the 1050 Zone near the 1050 Zone Reservoir and in the 996 Zone near the Orchard Avenue pressure reducing valve (PRV) station. It is unlikely that higher pressure water will be available to the low pressure services in the 1050 Zone in the future, and the 1050 Zone Reservoir will always have some dead storage. The dead storage in the 996 Zone will be converted to usable storage in the future, upon completion of proposed pressure zone improvements that are described in **Chapter 9**.

The results of the existing storage evaluation, as shown in **Table 7-9**, indicate that the system has a storage surplus of approximately 0.12 MG, with a zone deficiency of 0.06 MG in the 1050 Zone. The calculations assume that the fire flow storage in the 1050 and 1077 Zones is available to the 996 Zone through PRV stations.

The storage analysis presented in **Table 7-10** is based on the existing system with the proposed pressure zone improvements described in **Chapter 9**. The results of this analysis indicate that the system will have a surplus storage capacity of approximately 0.28 MG with the proposed pressure zone improvements that remove the dead storage in the 996 Zone. The calculations assume that the fire flow storage in the 1050 and 1077 Zones is available to the 996 Zone through PRV stations.

Table 7-9
Existing Storage Evaluation

Description	Supply Area			Totals
	996 Zone	1050 Zone	1077 Zone	
Available/Usable Storage (MG)				
Maximum Storage Capacity	0.51	0.22	0.50	1.23
Dead (Non-usable Storage)	-0.15	-0.02	0.00	-0.17
Total Available Storage	0.36	0.20	0.50	1.06
Required Storage (MG)				
Operational Storage	0.12	0.01	0.03	0.16
Equalizing Storage	0.01	0.00	0.00	0.01
Standby Storage	0.21	0.07	0.03	0.31
Fire Flow Storage	0.00	0.18	0.27	0.45
Totals	0.34	0.26	0.33	0.94
Surplus or Deficient Storage (MG)				
Surplus or Deficient Amt.	0.02	-0.06	0.17	0.12

Note: Fire flow for the 996 Zone is provided by the 1050 and 1077 Zones through various PRVs.

Table 7-10
Existing Storage Evaluation with Proposed Pressure Zone Improvements

Description	Supply Area			Totals
	996 Zone	1050 Zone	1077 Zone	
Available/Usable Storage (MG)				
Maximum Storage Capacity	0.51	0.22	0.50	1.23
Dead (Non-usable Storage)	0.00	-0.02	0.00	-0.02
Total Available Storage	0.51	0.20	0.50	1.21
Required Storage (MG)				
Operational Storage	0.12	0.01	0.03	0.16
Equalizing Storage	0.01	0.00	0.00	0.01
Standby Storage	0.21	0.07	0.03	0.31
Fire Flow Storage	0.00	0.18	0.27	0.45
Totals	0.33	0.26	0.33	0.93
Surplus or Deficient Storage (MG)				
Surplus or Deficient Amt.	0.17	-0.06	0.17	0.28

Note: Fire flow for the 996 Zone is provided by the 1050 and 1077 Zones through various PRVs.

Future Storage Analysis

Future storage requirements of the system were computed for the 6-year and 20-year planning periods, based on year 2018 and 2032 demand projections. The results of the analyses, shown in **Table 7-11**, are based on the scenario that the proposed pressure zone improvements described in **Chapter 9** are completed. The calculations assume the storage capacity of the clear wells is available to the 996 Zone in 2018 since redundant pumping would be available at the Main Booster Pump Station. The clear wells are no longer available for storage in 2032 when two of the three pumps at the Main Booster Pump Station are needed for normal demands and the third pump becomes the redundant pump. The calculations also assume that the fire flow storage in the 1050 and 1077 Zones is available to the 996 Zone through PRV stations. As shown in **Table 7-11**, the Town will have approximately a 0.15 MG storage surplus in 2018 and a 0.66 MG storage deficit in 2032. The 1050 Zone has a storage deficiency in 2018 and 2032 and the 996 Zone has a storage deficiency in 2032. Both deficiencies could be resolved by an additional storage reservoir in the 1050 Zone.

Future storage requirements of the system were also computed based on the scenario that the proposed storage and booster pump station improvements described in **Chapter 9** are completed by 2032, shown in **Table 7-12**. The calculations assume the storage capacity of the clear wells is available to the 996 Zone in 2018, but the clear wells are no longer available for storage in 2032. The calculations also assume that the fire flow storage in the 1050 and 1077 Zones is available to the 996 Zone through PRV stations. As shown in **Table 7-12**, the Town will have approximately a 0.15 MG storage surplus in 2018 and a 0.02 MG storage surplus in 2032.

Table 7-11
Future Storage Projections with Proposed Pressure Zone Improvements

Description	2018 Supply Area				2032 Supply Area			
	996 Zone	1050 Zone	1077 Zone	Totals	996 Zone	1050 Zone	1077 Zone	Totals
Available/Usable Storage (MG)								
Maximum Storage Capacity	0.51	0.22	0.50	1.23	0.28	0.22	0.50	1.00
Dead (Non-usable Storage)	0.00	-0.02	0.00	-0.02	0.00	-0.02	0.00	-0.02
Total Available Storage	0.51	0.20	0.50	1.21	0.28	0.20	0.50	0.98
Required Storage (MG)								
Operational Storage	0.12	0.01	0.03	0.16	0.03	0.01	0.03	0.07
Equalizing Storage	0.05	0.00	0.00	0.05	0.20	0.06	0.00	0.26
Standby Storage	0.24	0.10	0.06	0.40	0.34	0.42	0.10	0.85
Fire Flow Storage	0.00	0.18	0.27	0.45	0.00	0.18	0.27	0.45
Totals	0.40	0.29	0.37	1.06	0.56	0.67	0.40	1.64
Surplus or Deficient Storage (MG)								
Surplus or Deficient Amt.	0.11	-0.09	0.13	0.15	-0.28	-0.47	0.10	-0.66

Note: Fire flow for the 996 Zone is provided by the 1050 and 1077 Zones through various PRVs.

Table 7-12
Future Storage Projections with Proposed Improvements

Description	2018 Supply Area				2032 Supply Area			
	996 Zone	1050 Zone	1077 Zone	Totals	996 Zone	1050 Zone	1077 Zone	Totals
Available/Usable Storage (MG)								
Maximum Storage Capacity	0.51	0.22	0.50	1.23	0.28	0.97	0.50	1.75
Dead (Non-usable Storage)	0.00	-0.02	0.00	-0.02	0.00	-0.10	0.00	-0.10
Total Available Storage	0.51	0.20	0.50	1.21	0.28	0.87	0.50	1.65
Required Storage (MG)								
Operational Storage	0.12	0.01	0.03	0.16	0.03	0.05	0.03	0.11
Equalizing Storage	0.05	0.00	0.00	0.05	0.20	0.02	0.00	0.22
Standby Storage	0.24	0.10	0.06	0.40	0.34	0.42	0.10	0.85
Fire Flow Storage	0.00	0.18	0.27	0.45	0.00	0.18	0.27	0.45
Totals	0.40	0.29	0.37	1.06	0.56	0.66	0.40	1.63
Surplus or Deficient Storage (MG)								
Surplus or Deficient Amt.	0.11	-0.09	0.13	0.15	-0.28	0.21	0.10	0.02

Note: Fire flow for the 996 Zone is provided by the 1050 and 1077 Zones through various PRVs.

Facility Deficiencies

The Town's 1050 and 1077 Zone Reservoirs are steel tanks that are in good to excellent condition and do not have any noticeable deficiencies. Although the paint coatings are in excellent condition, a qualified coating inspector will be retained to inspect the integrity of the coating on a 5-year time schedule, or more frequently, if visible signs of coating deterioration appear.

The 996 Zone Reservoir is in good condition per a recent sanitary survey, but the aging concrete reservoir has a deteriorating roof and is difficult to take offline for maintenance since it is the primary storage facility for the water treatment plant. The Main Booster Pump Station was designed to operate with the reservoir offline and to recirculate the pumped flow that exceeds the demand. However, the operational scheme has not been tested. Furthermore, the Town may have several services near the 996 Zone Reservoir that could lose service if the tank is taken offline. The conversion of these services to a higher pressure zone must be completed before the 996 Zone Reservoir is taken offline for service. The pressure zone improvements as well as improvements to pumping at the Hilltop Booster Pump Station to facilitate taking the 996 Zone Reservoir offline are presented in **Chapter 9**.

All three reservoir sites are devoid of frontage and stormwater improvements and are located in relatively remote locations. When improvements are completed at the individual facilities, the necessity for frontage improvements will be evaluated. If the amount of impervious surfaces on the sites increases above the threshold requirement when improvements are performed, stormwater improvements will be required.

DISTRIBUTION AND TRANSMISSION SYSTEM

This section evaluates the Town's existing distribution and transmission system (i.e., water mains) to determine if they are sized and looped adequately to provide the necessary flow rates and pressures to meet the existing and future requirements of the system. This section also identifies deficiencies that are not related to the capacity of the water mains.

Analysis Criteria

Distribution and transmission water mains must be capable of adequately and reliably conveying water throughout the system at acceptable flow rates and pressures. The criteria used to evaluate the Town's distribution and transmission system is the state mandated requirements for Group A water systems contained in WAC 246-290-230 Distribution Systems. The pressure analysis criteria states that the distribution system "…shall be designed with the capacity to deliver the design PHD quantity of water at 30 psi under PHD flow conditions measured at all existing and proposed service water meters." It also states that if fire flow is to be provided, "… the distribution system shall also provide maximum day demand (MDD or PDD) plus the required fire flow at a pressure of at least 20 psi at all points throughout the distribution system."

Hydraulic analyses of the existing system were performed under existing PHD conditions to evaluate its current pressure capabilities and to identify existing system deficiencies. The existing system was also analyzed under existing PDD conditions to evaluate the current fire flow capabilities and to identify additional existing system deficiencies. Additional hydraulic analyses were then performed with the same hydraulic model, but under future PDD conditions and with proposed improvements to demonstrate that the identified improvements will eliminate the deficiencies and

meet the requirements far into the future. Following is a description of the hydraulic model and the operational conditions and facility settings used in the analyses.

Hydraulic Model

Description

A computer-based hydraulic model of the existing water system was updated using version V8i (SELECTseries 3) of the WaterGEMS program, developed by Haestad Methods. All water mains in the Town's water system, including dead-end mains, were modeled. The Town's existing hydraulic model contained a majority of the systems water mains. The model was updated with additional water system improvement information provided by the Town. The junction node elevation data was extracted from Pierce County topographic, United States Geographical Survey (USGS) data and Puget Sound LiDAR Consortium. A hydraulic model node diagram that provides a graphical representation of the model of the water system is contained in **Appendix S**.

Demand Data

The hydraulic model of the existing system contains 2011 master meter supply data. Supply data from the 2011 master meter supply was distributed throughout the junction nodes of the model, based on allocation levels that reflect the proportionate share of total supply to each pressure zone. The master meter supply is less than the average day demand because the average day demand also takes into account water usage for treatment purposes and potential leakage between the sources of supply and the master meter. A further discussion of the difference between the master meter supply and average day demand is provided in **Chapter 4**. The peaking factors calculated in **Chapter 4** were used to analyze the system under PHD and PDD conditions.

The hydraulic model of the proposed system contains 6-year and 20-year demand levels that are projected for the year 2018 and 2032 respectively. The distribution of demands is based on estimated future demand levels in each pressure zone.

Facilities

The hydraulic model of the existing system for the pressure analysis contains all active existing system facilities. For the proposed system analyses in the year 2018 and 2032, the hydraulic model contained all active existing system facilities and proposed system improvements identified in **Chapter 9** for the 6-year and 20-year planning period, respectively.

The facility settings for the pressure analyses correspond to a PHD event in the water system. All sources of supply that are currently available to the system, or will be available in the future for the year 2018 and 2032 analyses, during a peak period were operating at their normal summertime pumping rates. The reservoir levels were modeled to reflect full utilization of operational and equalization storage. The operational conditions for the pressure analyses are summarized in **Table 7-13**.

Table 7-13
Hydraulic Analyses Operational Conditions

Description	PHD Pressure Analysis			Fire Flow Analysis		
	2011	2018	2032	2011	2018	2032
Demand	2011 PHD	2018 PHD	2032 PHD	2008 PDD	2018 PDD	2032 PDD
996 Zone Reservoir (HGL) (ft)	992.0	988.1	971.9	992.0	988.1	971.9
1050 Zone Reservoir HGL (ft)	1,048.0	1,048.0	1,047.2	1,014.1	1,014.1	1,039.4
Hilltop Reservoir HGL (ft)	1,074.5	1,074.5	1,074.5	1,054.5	1,054.5	1,054.5
Hilligoss Lane PRV HGL (ft)	918	918	918	918	918	918
Emerald Drive PRV HGL (ft)	914	914	914	914	914	914
Lower Hamner Springs PRV HGL (ft) - Large Valve	937	937	937	937	937	937
Lower Hamner Springs PRV HGL (ft) - Small Valve	995	995	995	995	995	995
Center Street PRV HGL (ft)	926	926	926	926	926	926
Ridge Road PRV HGL (ft)	926	926	926	926	926	926
Orchard Avenue PRV HGL (ft) - Large Valve	987	987	987	987	987	987
Orchard Avenue PRV HGL (ft) - Small Valve	1,028	1,028	1,028	1,028	1,028	1,028
Main Booster Pump Station - 750 gpm pump	ON	ON	ON	ON	ON	ON
Main Booster Pump Station - 750 gpm pump	OFF	OFF	ON	OFF	OFF	ON
Main Booster Pump Station - 750 gpm pump	OFF	OFF	OFF	OFF	OFF	OFF
Center Street Booster Pump Station - 75 gpm pump	ON	ON	---	ON	ON	---
Center Street Booster Pump Station - 125 gpm pump	ON	ON	---	OFF	OFF	---
Center Street Booster Pump Station - 50 gpm pump	ON	ON	---	ON	ON	---
Proposed Center Street Booster Pump Station - 175 gpm pump	---	---	ON	---	---	ON
Proposed Center Street Booster Pump Station - 175 gpm pump	---	---	ON	---	---	ON
Proposed Center Street Booster Pump Station - 175 gpm pump	---	---	OFF	---	---	OFF
Hilltop Booster Pump Station - 75 gpm pump	ON	ON	---	ON	ON	---
Hilltop Booster Pump Station - 100 gpm pump	ON	ON	---	OFF	OFF	---
Proposed Hilltop Booster Pump Station - 80 gpm pump	---	---	ON	---	---	ON
Proposed Hilltop Booster Pump Station - 80 gpm pump	---	---	ON	---	---	OFF

Separate fire flow analyses were performed on the system to size distribution system improvements and calculate fire flow availability. The hydraulic model for the fire flow analyses contained settings that correspond to PDD events. All sources of supply that are currently available to the system during a peak period were operating at their normal pumping rates with the largest pump at each facility offline, and the reservoir levels were modeled to reflect full utilization of operational, equalizing, and fire flow storage based on the maximum planning level fire flow requirement. **Table 7-13** summarizes the operational conditions for the fire flow analyses for the existing, year 2018, and year 2032 systems.

Calibration

Initial Hazen-Williams roughness coefficients were entered in the model based on computed estimates of the coefficients from available pipe age and material data. For example, older water mains were assigned lower roughness coefficients than new water mains; thereby assuming that the internal surface of water pipe becomes rougher as it gets older. Additional calibration of the model was achieved using field flow and pressure data, which was collected throughout the system for this purpose. Hydraulic model calibration was achieved by adjusting the roughness coefficients of the water mains and elevations of the junction nodes in the model so the resulting flows and pressures from the hydraulic analyses more closely matched the flows and pressures from actual field tests under similar demand and operating conditions. The average accuracy of the calibrated hydraulic model for static pressures is at approximately 99 percent. However, the calibration results achieved for hydrant flow tests were not as accurate. An acceptable level of accuracy is achieved when all

hydrant flow tests can be predicted by the model to an accuracy of at least 90 percent. The 90 percent level of accuracy was only achieved at three of the eight test locations. Additional calibration of the water model is needed to confirm if there are additional closed valves in the water system, actual PRV sizes and settings, and water main diameters and configurations. Additional calibration of the hydraulic model is recommended, as described in **Chapter 9**, when the Town has the staffing and funding resources available.

Hydraulic Analysis Results

Several hydraulic analyses were performed to determine the capability of the system to meet the pressure and flow requirements identified in **Chapter 5** and contained in WAC 246-290-230. The first analysis was performed to determine the pressures throughout the system under existing (i.e., 2011) PHD conditions. The results of this analysis were used to identify locations of low and high pressures. To satisfy the minimum pressure requirements, the pressure at all water service locations must be at least 30 psi during these demand conditions. In addition, the system should not have widespread areas with high pressures, (generally considered to be more than 100 psi).

A summary of the pressure deficiencies identified from the results of the analysis is contained in **Table 7-14**. One area of low pressure is located near the 996 Zone Reservoir and Orchard Avenue PRV. Future 1077 Zone improvements, as identified in **Chapter 9**, will improve the pressure to above 30 psi as shown in **Table 7-14**. The low pressures in the 1050 Zone can be found at higher elevations heat the 1050 Zone Reservoir. The existing service near the 1050 Zone Reservoir has an individual booster pump station. This house will continue to need an individual booster pump station to maintain adequate pressure. The low pressures in the 1077 Zone can be found at the higher elevations near the 1077 Zone Reservoir. Existing services above 985 feet have individual booster pumps. When a significant development is proposed above 985 feet, an 1140 Zone Booster Pump Station is required as identified in **Chapter 9**. The Town does not have any service pressures greater than 100 psi. Several areas have pressures greater than 80 psi, but pressure regulators are required at these services. Thus, pressure zone improvements were not proposed for high pressure areas identified in **Table 7-14**.

Table 7-14
Pressure Analysis Summary

Description	Approx. Location	Existing Pressure Zone	Node Number	Pressure (psi) Existing System	Future (~2018) w/Improvements	Future (~2032) w/Improvements
Low Pressure Areas						
Single-family Area	Orchard Ave. S. & Larson St. E.	996	J-378	26	61	59
Single-family Area	Larson St. W. North of the 996 Zone Reservoir	996	J-379	26	62	60
Single-family Area	Near the 996 Zone Reservoir (Individual Booster Pump Installed)	996	J-165	5	41	40
Single-family Area	Near the 1050 Zone Reservoir (Individual Booster Pump Installed)	1050	J-8	27	27	27
Single-family Area	Dow Ridge Dr. N. & Center St. W.	1050	J-27	44	44	43
Single-family Area	Near the 1077 Zone Reservoir (Individual Booster Pump Installed)	1077	J-253	15	15	49
High Pressure Areas						
Commercial Area	Center St. E. & Mashell Ave. N.	996	J-52	81	79	77
Airport	Lynch Creek Rd. E. & Jet Ct. E.	996	J-131	84	83	80
Eatonville Middle School	North of Mill Village Ct. E.	996	J-246	89	88	85
Commercial Area	North end of Washington Ave.	996	J-22	92	90	88
Commercial Area	Glacier Ave. N. & Center St. E.	996	J-55	92	91	88
Single-family Area	Prospect St. E. & Washington Ave. S.	996	J-71	92	91	88
Wastewater Treatment Plant	Mashell Ave. S. & Alder St. E.	996	J-223	96	95	92
Eatonville Elementary School	South of Lynch Creek Rd.	996	J-249	96	95	92
Single-family Area	Erin Ln.	1050	J-178	81	81	80
Single-family Area	Gracie Ln. W. & Alivia Ct.	1050	J-261	86	86	85
Single-family Area	Center St. W. & Conant Dr. N.	1050	J-88	98	98	98
Single-family Area	East end of Joy St.	1077	J-293	81	81	81
Single-family Area	Near the Lower Hamner Springs PRV	1077	J-391	98	98	97

The second set of analyses was performed to determine the capability of the existing water system to provide fire flow throughout the existing water system under PDD conditions. A separate fire flow analysis was performed for each node in the model to determine the available fire flow at a minimum residual pressure of 20 psi and a maximum velocity of 10 feet per second in the pipes in the water model. More than 200 fire flow analyses were performed to comprehensively evaluate the water system. For each node analyzed, the resulting fire flow was compared to its general fire flow requirement, which was assigned according to the land use classification that it is provided in **Chapter 3**. A summary of the results of the analyses is presented in **Table 7-15**.

Table 4-8 (Chapter 4 – Water Demands) lists the general fire flow requirements for each land use classification. Since the fire flow requirement varies for buildings within each land use classification, the land use based fire flow requirements are only used as a general target for the primary purpose of the comprehensive system-wide analyses that were performed for this Comprehensive Water System Plan (WSP). The fire flow requirements for some of the largest buildings in the Town, as determined by the Eatonville Fire Department, were also used to determine the adequacy of the existing water system. The results of the fire flow analyses were used to identify undersized water mains and proposed water main improvements. A summary of the fire flow deficiencies from these analyses is contained near the end of this section.

Table 7-15 is a summary of the fire flow analyses performed. Most of the fire flow deficiencies within the system are due to undersized water mains in the downtown area, especially near schools and commercial areas. In addition, fire flow requirements can not be met in the 1050 Zone due to pressure deficiencies when the 1050 Zone Reservoir is drawn down through its operational,

equalizing and fire flow storage. Locations near the 1077 Reservoir also have deficient fire flow due to low pressures when the tank is drawn down through the necessary storage components as well. Many areas do meet the fire flow requirements, including the residential areas within the 996 Zone. Several areas have experienced an improvement in available fire flow since the analyses performed for the previous WSP due to water main improvements in Town.

Table 7-15
Fire Flow Analysis Summary

Description	Approx. Location	Existing Pressure Zone	Node Number	Available Fire Flow (gpm)			Target Fire Flow (gpm)
				Existing System	Future (~2018) with Improvements	Future (~2032) with Improvements	
Mill Village	Mill Village Ct. E.	996	J-244	820	819	4,392	2,500
Eatonville Elementary School	South of Lynch Creek Rd.	996	J-318	822	821	3,822	2,500
Airport	Swanson Airport Runway	996	J-388	824	819	4,330	2,500
Single-family Area	Ridge Rd. W. & Maple Dr. N.	996	J-4	1,379	1,387	3,282	1,000
Emerald Ridge	North of Eatonville Hwy W.	996	J-269	1,439	1,432	1,424	1,000
Eatonville Middle School	North of Mill Village Ct. E.	996	J-246	1,447	1,444	2,695	2,500
Multi-family Area	Eatonville Hwy W. & Erin Ln. W.	996	J-111	1,450	1,447	3,880	2,500
Hamner Springs	South of Eatonville Hwy W.	996	J-284	1,450	1,449	1,448	1,000
Commercial Area	Eatonville Hwy W. & Larson St. W.	996	J-25	1,463	1,453	2,580	1,000
Commercial Area	Madison Ave. S. & Main St.	996	J-94	1,724	1,722	4,335	2,500
Commercial Area	Center St. E. & Madison Ave. S.	996	J-242	1,954	1,957	4,365	2,500
Eatonville High School	Lynch Creek Rd. W. & Rainier Ave. N.	996	J-337	2,068	2,067	4,753	2,500
Commercial Area	Adams Ave. S. & Main St.	996	J-229	2,129	2,127	4,348	2,500
Airport	Lynch Creek Rd. E. & Airport Rd. E.	996	J-321	2,155	2,151	3,545	2,500
Single-family Area	Kelsey Ln. E.	996	J-230	2,226	2,192	3,346	1,000
Commercial Area	Orchard Ave. N. & Carter St. W.	996	J-359	2,217	2,216	4,673	2,500
Baptist Church	South of Eatonville Hwy W.	996	J-275	2,693	2,671	3,050	1,000
Mixed Use Area	Oak St. E. & Madison Ave. S.	996	J-76	2,882	2,880	4,293	2,500
Airport	Jet Ct. E. and Super Cub Dr. N.	996	J-132	3,222	3,116	4,066	2,500
Multi-family Area	Larson St. W. & Mashell Ave. S.	996	J-120	3,322	3,141	4,149	2,500
Commercial Area	Center St. E. & Rainier Ave. N.	996	J-49	3,335	3,153	4,422	2,500
Mill Village Motel	Center St. E. & Washington Ave.	996	J-54	3,367	3,183	4,362	2,500
Commercial Area	Carter St. W. & Orchard Ave. N.	996	J-36	3,443	3,249	5,000	2,500
Baptist Church[1]	Kaitlyn St. W. & Emerald Ridge Dr.	996	J-274	2,861	2,844	3,258	2,250
Single-family Area	Carter St. W. & Antonie Ave. N.	996	J-31	3,657	3,436	3,655	1,000
Single-family Area	Eatonville Hwy W. & 106th Ave. E.	1050	J-168	861	855	1,435	1,000
Single-family Area	Dow Ridge Dr. N.	1050	J-183	924	902	1,594	1,500
Single-family Area	Erin Lane W. & Aspen Ct. N.	1050	J-176	952	929	1,565	1,000
Mormon Church	Erin Lane W.	1050	J-188	954	931	1,657	1,500
Single-family Area	North of Eatonville Hwy W.	1050	J-260	980	956	1,688	1,000
Single-family Area	Dow Ridge Dr. N. & View Crest Dr.	1050	J-184	1,163	1,136	1,904	1,500
Single-family Area[2]	636 Joy St.	1077	J-295	0	0	2,515	1,500
Single-family Area	206 Orchard Ave. S.	1077	J-394	3,493	3,339	1,702	1,500
Hamner Springs	South of Eatonville Hwy W.	1077	J-290	1,998	1,972	1,846	1,000
Single-family Area	Orchard Ave. S. & Prospect St. W.	1077	J-255	3,430	3,331	1,702	1,000
Single-family Area	399 Prospect St. W.	1077	J-381	3,395	3,324	2,770	1,500

(1) Fire flow requirement for the Baptist Church is from the previous Comprehensive Water System Plan.

(2) No existing fire hydrants at this location.

Once all deficiencies were identified, proposed water main improvements were included in the model and pressure and fire flow analyses were performed throughout the system to demonstrate that the improvements will eliminate the deficiencies and meet the flow and pressure requirements.

These analyses were modeled under projected year 2018 and 2032 PDD conditions to ensure that the improvements are sized sufficiently to meet the needs of the future. A summary of the results of these analyses is shown in **Table 7-15** for the same areas that were summarized from the existing water system analyses. The results of the analyses indicate that all fire flow deficiencies are resolved with the proposed improvements by 2032. A description of these improvements and a figure that shows their locations are presented in **Chapter 9**. A description of the deficiencies identified from the hydraulic analyses is presented in the following section.

Deficiencies

This section presents a summary of the distribution and transmission system deficiencies that were identified from the results of the hydraulic analyses of the existing water system and also includes deficiencies not related to the capacity of the mains. These deficiencies will be eliminated upon completion of the proposed improvements that are presented in **Chapter 9**.

Pressure Deficiencies

The following areas have pressures that are lower than the acceptable pressure levels.

- Low pressures in the 996 Zone near the intersection of Larson Street West and Orchard Avenue South and on Larson Street West north of the 996 Zone Reservoir.
- Low pressures in the 996 Zone on Pennsylvania Avenue South to the east of the 996 Zone Reservoir.
- Low pressures in the 1050 Zone near the 1050 Zone Reservoir.
- Low pressures in the 1077 Zone above elevation 985 feet. Currently, existing customer connections with low pressures in this area are required to install individual booster pumps as a temporary measure until a higher pressure zone is created in the future.

Fire Flow Deficiencies

The following areas have low fire flows that do not meet either the actual or target fire flow levels.

- Low fire flows in the commercial area on Center Street East and the surrounding commercial areas primarily due to the undersized existing 6-inch water mains.
- Low fire flow at Eatonville Elementary School and Eatonville Middle School due to undersized pipes at the schools and system-wide distribution deficiencies.
- Slightly low fire flow at Eatonville High School due to undersized pipes at the school.
- Low fire flow at Mill Village due to undersized water mains and system-wide distribution deficiencies.
- Low fire flow in the commercial area along Madison Avenue South due to undersized water mains, system-wide distribution deficiencies and the difficulty with maintaining pressures at the higher elevations of the 996 Zone.

- Moderately low fire flows at the north end of the airport primarily due to dead-end water mains, system-wide distribution deficiencies, and the difficulty with maintaining pressures at the higher elevations of the 996 Zone.
- Low fire flow in the 1050 Zone primarily due to the inability to provide adequate pressure to the zone when the 1050 Zone Reservoir is drawn down.
- Low fire flow in the 1077 Zone near the 1077 Zone Reservoir due to the inability to provide adequate pressure to the zone when the 1077 Zone Reservoir is drawn down.

Other Deficiencies

Several areas throughout the system have sufficient fire flow; but high water velocities are experienced in the system because the water mains are undersized to carry the fire flows at acceptable water velocities. Operating the system with high water velocities can potentially damage the system, due to the high surge pressures that commonly occurs with high water velocities.

Approximately 15 percent of the Town's water main is asbestos cement (AC) pipe and another 15 percent of the Town's water main is leaded joint cast iron (CI) pipe. The AC and CI pipe is the oldest pipe in the system and requires replacement. Several important water mains are AC pipe, including a portion of the water main along Center Street between Antonie Avenue North and the Center Street Booster Pump Station. The Town is planning to replace these in the future, as shown in the schedule of planned improvements in **Chapter 9**. All new water main installations are required to use PVC or ductile iron water main in accordance with the Town's Water System Standards, a copy of which is included in **Appendix H**.

PRESSURE REDUCING STATIONS

This section evaluates the Town's existing PRV stations to identify deficiencies related to their current condition and operation capability.

Evaluation and Deficiencies

The Town has a total of six operational PRV stations. Four of the PRV stations transfer water from the 1050 Zone to the 996 Zone during a fire flow event or other drop in pressure within the lower zone. Two of the PRV stations transfer water from the 1077 Zone to the 996 Zone during a fire flow event or other drop in pressure in the 996 Zone. The two PRV stations between the 1077 Zone and the 996 Zone are also each equipped with smaller regularly open pressure reducing valves to facilitate water turnover in the 1077 Zone Reservoir. All of the PRV stations are functioning properly, although the Ridge Road pressure reducing station is beyond its design life and is not accessible for maintenance. Some of the stations have drainage problems, which interferes with access to the valves and piping. Each station should also have its settings verified and adjusted on an annual basis.

Proposed improvements for replacement of the Ridge Road pressure reducing station and general maintenance of the existing PRV stations is addressed in **Chapter 9**.

TELEMETRY AND SUPERVISORY CONTROL SYSTEM

This section evaluates the Town's existing telemetry and supervisory control system to identify deficiencies related to its condition and current operational capability.

Evaluation and Deficiencies

In 2006, the Town installed a master telemetry unit (MTU) as part of the upgrade to the Town's water treatment plant to monitor and control the water treatment plant and the 996 Zone Reservoir. While the system has proven to be reliable, the Town does not currently have a back-up system and the program's software is dated. Town should be prepared with spare equipment and upgrade the software system.

Control of the 1050 and 1077 Zones is not connected to the MTU at the water treatment plant. The level data information is communicated from the 1050 Zone Reservoir to the Center Street Booster Pump Station through buried cable. For the Hilltop Booster Pump Station, the level data is transmitted by an analog signal from the Hilltop Reservoir to the station's pump controller. The Town is considering converting the telemetry units at the 1050 Zone Reservoir and Center Street Booster Pump Station to a radio system or other more reliable system and proposed improvements to the Town's telemetry and supervisory control system are contained in **Chapter 9**.

SYSTEM CAPACITY

This section evaluates the capacity of the Town's existing and future water system components (supply, treatment, storage, transmission, and water rights) to determine the maximum number of ERUs it can serve. Once determined, system capacity becomes useful in determining how much capacity is available in the water system to support new customers that apply for water service through the building permit process. The system capacity information, together with the projected growth of the system expressed in ERUs, as shown in **Chart 4-8** of **Chapter 4**, also provides the Town with a schedule of when additional system capacity is needed.

Analysis Criteria

The capacity of the Town's system was determined from the limiting capacity of water rights, supply, treatment, storage, and transmission facilities. The ERU-based demand data was derived from the average day demand of the system and the demand peaking factors from **Chapter 4**.

- The supply capacity analysis was based on the limiting capacity of the supply facilities and the system's PDD per ERU.
- The treatment capacity analysis includes the existing size of the filtration plant as compared to the system's PDD per ERU.
- The storage capacity analysis was based on the storage capacity for equalizing and standby storage and the computed storage requirement per ERU. Operational and fire flow storage capacity were excluded from the storage analysis because these components are not directly determined by water demands or ERUs. For the analyses, a reserve amount equivalent to the existing operational and fire flow storage requirement was deducted from the total available storage capacity to determine the storage capacity available for equalizing and standby

storage. This storage capacity available for equalizing and standby storage was divided by the existing number of ERUs presented in **Chapter 4** to determine the storage requirement per ERU.

- The transmission capacity analysis was based on the total capacity of the 12-inch transmission main from the Main Booster Pump Station and the system's PDD per ERU.
- The annual water rights capacity evaluation was based on the existing annual water rights, as summarized in **Chapter 6**, and the system's average day demand per ERU.
- The instantaneous water rights capacity evaluation was based on the existing instantaneous water rights, as summarized in **Chapter 6**, and the system's PDD per ERU.
- Since the amount of water obtainable from the Mashel River is substantially less than the instantaneous river water right and the amount of water obtainable from the wells is greater than the instantaneous well water rights, another capacity evaluation was completed that compares the capacity of the river source and the well water rights to the system's PDD per ERU.

Existing Capacity Analysis Results

A summary of the results of the existing system capacity analysis is shown in **Table 7-16**. The results of the existing system capacity analysis indicate that the limiting capacity of the system is the water treatment plant, which can support up to a maximum of approximately 1,383 ERUs. The existing water system has a surplus of approximately 124 ERUs.

Future Capacity Analysis Results

A summary of the results of the 6-year projected system capacity analysis including the proposed pressure zone improvements described in **Chapter 9** is shown in **Table 7-17**. The system capacity analysis shown in the table does not include any other system improvements that are planned for the 6-year planning period. The pressure zone improvements decrease the amount of dead storage in the 996 Zone Reservoir and increase the storage capacity available. The results of the 2018 system capacity analysis indicate that the water treatment plant will remain the limiting capacity component. As shown in the table, the system will have a system capacity deficiency of 75 ERUs.

The Town will need to expand the existing water treatment plant to support the expected number of ERUs in 2018, if the leak at the water treatment plant is not repaired. The system's ERU capacity will increase when the treatment plant is expanded to a capacity of 1.5 MGD. A summary of the results of the 6-year projected system capacity analysis with the proposed pressure zone improvements and the water treatment plant expansion to 1.5 MGD is shown in **Table 7-18**. With a 1.5 MGD capacity water treatment plant, the water treatment plant capacity will increase from 1,383 ERUs to 2,075 ERUs. The limiting capacity of the system will be the Town's annual water rights, which can support 1,619 ERUs. The projected 1,459ERUs of the water system in 2018 is less than the 1,619 ERUs of the annual water rights. Thus, the water system is projected to have a surplus capacity if the treatment plant is expanded to 1.5 MGD and the proposed pressure zone improvements are implemented. To further increase the system capacity, additional annual water rights will be necessary.

Table 7-16
2012 Existing System Capacity Analysis

Demands Per ERU Basis	
Average Day Demand Per ERU (gal/day)	289
Peak Day Demand Per ERU (gal/day)	723
Peak Hour Demand Per ERU (gal/day)	1,301
Supply	
Limiting Supply Rate - Main BPS Capacity (gal/day)	3,240,000
Peak Day Demand Per ERU (gal/day)	723
Maximum Supply Capacity (ERUs)	4,481
Water Treatment Plant	
Limiting Supply Rate - 1.0 MGD Facility (gal/day)	1,000,000
Peak Day Demand Per ERU (gal/day)	723
Maximum Supply Capacity (ERUs)	1,383
Storage Capacity	
Maximum Available Equalizing & Standby Storage Capacity (gal)	444,044
Existing ES & SB Storage Requirements (gal)	319,800
ES & SB Storage Requirement Per ERU (gal)	254
Maximum Storage Capacity (ERUs)	1,748
Transmission Capacity	
Limiting Transmission Capacity (gal/day)	2,538,100
Peak Day Demand Per ERU (gal/day)	723
Maximum Transmission Capacity (ERUs)	3,511
Annual Water Rights Capacity	
Annual Water Right Capacity (gal/day)	468,000
Average Day Demand Per ERU (gal/day)	289
Maximum Annual Water Right Capacity (ERUs)	1,619
Instantaneous Water Rights Capacity	
Instantaneous Water Right Capacity (gal/day)	2,364,480
Peak Day Demand Per ERU (gal/day)	723
Maximum Instantaneous Capacity (ERUs)	3,270
Instantaneous Water Rights Capacity with Limited Maximum River Supply	
Instantaneous Water Right Capacity (gal/day)	1,454,400
Peak Day Demand Per ERU (gal/day)	723
Maximum Instantaneous Capacity (ERUs)	2,012
Maximum System Capacity	
Based on Limiting Facility - Water Treatment Plant	1,383
Unused Available System Capacity	
Maximum System Capacity (ERUs)	1,383
Existing (2012) ERUs	1,259
Surplus Capacity (ERUs)	124

Table 7-17
2018 Future System Capacity Analysis with Proposed Pressure Zone Improvements

Demands Per ERU Basis	
Average Day Demand Per ERU (gal/day)	289
Peak Day Demand Per ERU (gal/day)	723
Peak Hour Demand Per ERU (gal/day)	1,301
Supply	
Limiting Supply Rate - Main BPS Capacity (gal/day)	3,240,000
Peak Day Demand Per ERU (gal/day)	723
Maximum Supply Capacity (ERUs)	4,481
Water Treatment Plant	
Limiting Supply Rate - 1.0 MGD Facility (gal/day)	1,000,000
Peak Day Demand Per ERU (gal/day)	723
Maximum Supply Capacity (ERUs)	1,383
Storage Capacity	
Maximum Available Equalizing & Standby Storage Capacity (gal)	598,166
2018 ES & SB Storage Requirements (gal)	443,408
ES & SB Storage Requirement Per ERU (gal)	304
Maximum Storage Capacity (ERUs)	1,968
Transmission Capacity	
Limiting Transmission Capacity (gal/day)	2,538,100
Peak Day Demand Per ERU (gal/day)	723
Maximum Transmission Capacity (ERUs)	3,511
Annual Water Rights Capacity	
Annual Water Right Capacity (gal/day)	468,000
Average Day Demand Per ERU (gal/day)	289
Maximum Annual Water Right Capacity (ERUs)	1,619
Instantaneous Water Rights Capacity	
Instantaneous Water Right Capacity (gal/day)	2,364,480
Peak Day Demand Per ERU (gal/day)	723
Maximum Instantaneous Capacity (ERUs)	3,270
Instantaneous Water Rights Capacity with Limited Maximum River Supply	
Instantaneous Water Right Capacity (gal/day)	1,454,400
Peak Day Demand Per ERU (gal/day)	723
Maximum Instantaneous Capacity (ERUs)	2,012
Maximum System Capacity	
Based on Limiting Facility - Water Treatment Plant	1,383
Unused Available System Capacity	
Maximum System Capacity (ERUs)	1,383
Projected (2018) ERUs	1,459
Deficient Capacity (ERUs)	-75

Table 7-18
2018 Future System Capacity Analysis with Proposed Pressure Zone Improvements and Expanded Water Treatment Plant

Demands Per ERU Basis	
Average Day Demand Per ERU (gal/day)	289
Peak Day Demand Per ERU (gal/day)	723
Peak Hour Demand Per ERU (gal/day)	1,301
Supply	
Limiting Supply Rate - Main BPS Capacity (gal/day)	3,240,000
Peak Day Demand Per ERU (gal/day)	723
Maximum Supply Capacity (ERUs)	4,481
Water Treatment Plant	
Limiting Supply Rate - 1.5 MGD Facility (gal/day)	1,500,000
Peak Day Demand Per ERU (gal/day)	723
Maximum Supply Capacity (ERUs)	2,075
Storage Capacity	
Maximum Available Equalizing & Standby Storage Capacity (gal)	598,166
2018 ES & SB Storage Requirements (gal)	443,408
ES & SB Storage Requirement Per ERU (gal)	304
Maximum Storage Capacity (ERUs)	1,968
Transmission Capacity	
Limiting Transmission Capacity (gal/day)	2,538,100
Peak Day Demand Per ERU (gal/day)	723
Maximum Transmission Capacity (ERU's)	3,511
Annual Water Rights Capacity	
Annual Water Right Capacity (gal/day)	468,000
Average Day Demand Per ERU (gal/day)	289
Maximum Annual Water Right Capacity (ERU's)	1,619
Instantaneous Water Rights Capacity	
Instantaneous Water Right Capacity (gal/day)	2,364,480
Peak Day Demand Per ERU (gal/day)	723
Maximum Instantaneous Capacity (ERU's)	3,270
Instantaneous Water Rights Capacity with Limited Maximum River Supply	
Instantaneous Water Right Capacity (gal/day)	1,454,400
Peak Day Demand Per ERU (gal/day)	723
Maximum Instantaneous Capacity (ERU's)	2,012
Maximum System Capacity	
Based on Limiting Facility - Annual Water Rights	1,619
Unused Available System Capacity	
Maximum System Capacity (ERU's)	1,619
Projected (2018) ERU's	1,459
Deficient Capacity (ERU's)	161

Operations and Maintenance 8

INTRODUCTION

The Town of Eatonville's (Town) water operations and maintenance program consists of the following four elements.

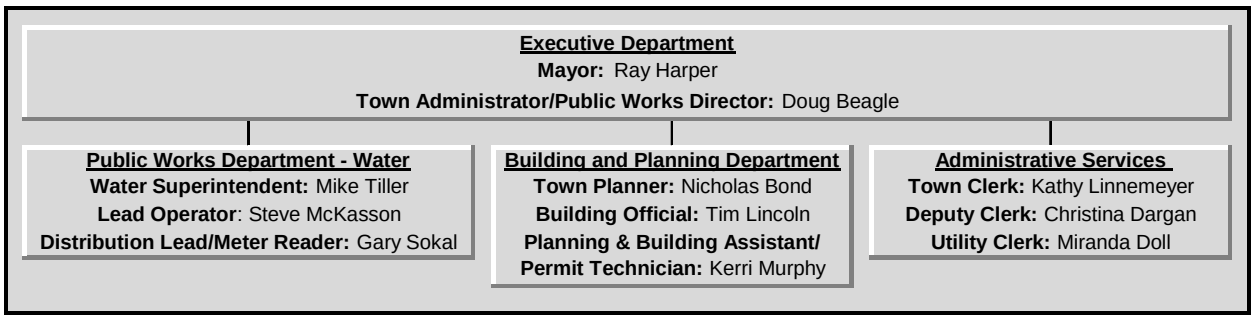
1. Normal Operations
2. Emergency Operations
3. Preventive Maintenance
4. Cross-Connection Control

NORMAL OPERATIONS

Town Personnel

The Town's Public Works Department functions under the direction of the Town Administrator/Public Works Director, Mr. Doug Beagle. The water division of the Public Works Department is led by the Water Superintendent, Mr. Mike Tiller, who supervises the daily operations of the water department. The Lead Operator, Mr. Steve McKasson, the Distribution Lead and Meter Reader, Mr. Gary Sokal, as well as Mr. Mike Tiller report to Mr. Beagle, as shown in **Table 8-1**. Other departments that support the water system include the Building and Planning Department and Administrative Services, as indicated in **Table 8-**1.

Table 8-1
Water Department Organization Chart



The current water division of the public works department consists of two maintenance personnel that function under the Water Superintendent, as shown in **Table 8-1**. The water system tasks that are performed by the operations and maintenance staff include inspection, testing, installation and repair of system facilities, routine operation and preventive maintenance, water quality sampling, regulatory compliance monitoring, meter reading, record keeping, and corrective or breakdown

maintenance required in response to emergencies. The Building and Planning Department and Administrative Services are responsible for water system administration.

Washington State Law (WAC 246-292) requires that the Town's water system is operated by one or more certified operators. In addition, specialty certification is required for backflow device testing and cross-connection control program activities and management. **Table 8-2** shows the current certifications of the Town's water operations and maintenance staff. It is Town policy to maintain a well-qualified, technically trained staff. The Town annually allocates funds for personnel training, certification, and membership in professional organizations, such as the American Water Works Association (AWWA). The Town believes that the time and money invested in training, certification, and professional organizations are repaid many times in improved safety, skills, and confidence.

Table 8-2
Personnel Certification

Name	Position	Certification
Mike Tiller	Water Superintendent	WWTPO III, WTPO II, WDM II, CCS I
Steve McKasson	Lead Operator	WWTPO II, WTPO II, WDM II, CCS I
Gary Sokal	Distribution Lead and Meter Reader	None

Certification Definitions
WDM - Water Distribution Manager
WTPO - Water Treatment Plant Operator
WWTPO - Waste Water Treatment Plant Operator
CCS - Cross Connection Control Specialist

Personnel Responsibilities

The key responsibilities of the water operations and maintenance staff are summarized below.

Town Administrator/Public Works Director – Supervises and organizes activities related to the general operation and maintenance of the water and wastewater system.

Water Superintendent – Under the general direction of the Town Administrator/Public Works Director, operates, maintains, keeps records for, and monitors performance of the Town's water sources, treatment plant, pump stations, storage tanks, and water distribution system.

Lead Operator – Assists the Water Superintendent in fulfilling their duties, and performs work under the guidance of the Water Superintendent. The Lead Operator assists with operation, maintenance, repairs, record keeping, lab tests, and monitoring of the water treatment plant and other water system components.

Distribution Lead and Meter Reader – Under the general direction of the Water Superintendent, reads water and power meters monthly. The Meter Reader also serves as an inspector of any oddities in the meters, customer abuses, condition of meters, and general groundskeeping duties for the Town's facilities.

Planning and Building Department - The Planning and Building Department maintains the Towns Comprehensive Plan and updates the water system related elements on a regular basis. The process includes preparing capital improvement plans and ensuring that water system improvements are considered in the annual budgeting process. The Planning and Building Department is also responsible for supervising the mandatory Comprehensive Water System Plan update. In addition, the department serves as the primary liaison between the water utility and developers in the Town. Coordination efforts include developer agreements, water system connections, meter sales, verification of water code compliance, water availability letters, confirmation of available fire flow amounts, and facilitation of water system expansion planning when system improvements are required for proposed developments. The department combined with the Administrative Services Department serves as the liaison between the water department staff and the Town's elected officials.

Administrative Services Department – The Administrative Services Department manages all issues related to water system administration including personnel, finance and budgeting, legal, and utility billing. The department combined with the Planning and Building Department serves as the liaison between the water department staff and the Town's elected officials.

Available Equipment

The water department has several types of equipment available for daily routine operation and maintenance of the water system. The equipment is stored at the Town's water treatment plant. If additional equipment is required for specific projects, the Town will rent or contract with a local contractor for the services needed. A stock of supplies in sufficient quantities for normal system operation and maintenance and short-term emergencies is stored at the water treatment plant. A list of major equipment and chemicals used in the normal operation of the water system is shown in **Table 8-3**.

Table 8-3
Water Department Equipment List

Water/Sewer Department Equipment
1 - Backhoe
1 - Small Excavator
1 - 70 kW Emergency Generator
1 - 5 kW Emergency Generator
2 - Utility Trailers
2 - 1/2 Ton Trucks
2 - 3/4 Ton Trucks
4 - Portable Pumps
1 - Portable Video Camera System
1 - 5/8" Roto Rooter
1 - Landa Portable Pressure Washer
Miscellaneous small tools, etc.
Equipment Available from Other Departments
1 - 5yd Dump Truck
1 - Welder
1 - Tractor with Loaders
1 - 5 kW Generators
Numerous Light Trucks and Passenger Vehicles
1 - Small Backhoe
1 - Snow Plow
1 - Sander
1 - Sweeper
Miscellaneous small tools, etc.
Chemical Inventory
Soda Ash
Sodium Hypochlorite (0.8%)
Phosphoric Acid
Citric Acid
Aluminum Chlorohydrate (ACH) Coagulant
Communications Equipment
Cellular Phones

The following representatives typically provide the supplies and chemicals to the Town.

1. Supplies: H.D. Fowler, 1417 Thornton Avenue SW, Pacific, WA 98047, (253) 863-8600
2. Supplies: HD Supply, 10708 Golden Given Road E, Tacoma, WA 98445-1852, (253) 531-1144
3. Chemical Supplier: Orca Pacific, Inc., 280 44th Street NW, Auburn, WA 98001, (253) 867-0303

4. Telemetry/PLC Programming: QCC, 5015 208th Street SW, Suite 1B, Lynnwood, WA 98036, (425) 778-8280
5. Chemical Pumps: TMG Services, 3216 Portland Avenue, Tacoma, WA 98404, 1-888-562-2310
6. Pump Repair: Center Electric, Inc., 30th & M Street, Tacoma, WA 98409, 1-800-521-9338
7. Pumps: Beckwith and Kuffel, 5930 1st Avenue S, Seattle, WA 98108, 1-800-767-6700

The water department utilizes communication equipment to ensure a reliable and redundant means of communication within the department. All employees are equipped with cell phones that are capable of communicating with Town Hall, the water treatment plant and other employees.

Routine Operations

Routine operations involve the analysis, formulation, and implementation of procedures to ensure that the facilities are functioning efficiently and meeting pressure and water quality requirements and other demands of the system. The utility's maintenance procedures are good, with repairs being made promptly so customers receive high-quality water service.

Continuity of Service

As a municipality, the Town has the structure, stability, authority, and responsibility to assure that water service will be continuous. For example, changes in the Town Council or staff would not have a pronounced effect on the Town's customers or quality of service.

Routine Water Quality Sampling

The Washington State Department of Health (DOH) has adopted federal regulations that specify minimum monitoring requirements for water systems. The sampling requirements depend on the population served, source type, and treatment provided. The specific requirements are contained in WAC 246-290-300 and the minimum monthly routine coliform sampling requirements are summarized in Table 2 (page 69) of the DOH April 1999 "Drinking Water Regulations". The Town currently performs all routine coliform sampling throughout the distribution system. A total of four or five samples are taken each month. A further discussion of the water quality monitoring program is contained in **Chapter 6** and **Appendix K** of this plan.

Cross-Connection Control

The Town drafted a cross-connection control program in 1992 to comply with WAC 246-290-490 pertaining to contamination of potable water due to cross-connections. Currently, the Town's Water Department identifies cross-connection control requirements. Backflow prevention devices are required at service connections where a potential for contamination exists. The Cross-Connection Control Plan was updated with this Plan and is included in **Appendix G**. Mike Tiller and Steve McKasson are the Town's certified Cross-Connection Control Specialists, as shown in **Table 8-2**.

Recordkeeping and Reporting

DOH has enacted regulations for recordkeeping and reporting that may be found in WAC 246-290-480. The regulations identify recordkeeping and reporting procedures for operations and water quality testing.

Recordkeeping

Records shall be kept for chlorine residual and other information as specified by DOH. DOH requires retention of critical records dealing with facilities and water quality issues as summarized below:

- Bacteriological analysis results: 5 years
- Chemical analysis results: life of the facility
- Daily source meter readings: 10 years
- Other records of operation and analyses as may be required by DOH: 3 years
- Documentation of actions to correct violations of primary drinking water standards: 3 years after last corrective action
- Records of sanitary surveys: 10 years
- Project reports, construction documents and drawings, inspection reports, and approvals: life of the facility
- Where applicable, daily records of chlorine residual, water treatment plant performance, and turbidity: 3 years

The Town's recordkeeping procedure is as follows:

1. Data is recorded daily at all sites and monthly logs are kept in a folder at the water treatment plant.
2. Source flow data is entered into a spreadsheet.

Reporting

1. The Town must report the following to DOH:
    - Within 48 hours: A failure to comply with the primary standards or treatment technique requirements specified in WAC 246-290.
    - Within 48 hours: A failure to comply with the monitoring requirements specified in WAC 246-290.
    - Within 48 hours: A violation of a primary maximum contaminant level (MCL).
    - Within one business day: A backflow incident, per WAC 246-290-490 (8)f.
    - Within one business day: Turbidity of the combined filter effluent exceeds 5.0 nephelometric turbidity units (NTU).

- Within one business day: Residual disinfection concentration falls below 0.2 milligrams/Liter (mg/L) at the entry point to the system.
- Within one business day: Treatment plant failure.

2. The Town must submit to DOH all applicable reports required by WAC 246-290. Monthly reports are due by the tenth day of the following month, unless otherwise specified.
3. Daily source meter readings must be made available to DOH on request.
4. Records regarding the status of monitoring waivers must be submitted during each monitoring cycle.
5. Total annual water production records for each source must be made available to DOH upon request.
6. Water facilities inventory and report form (WFI) must be submitted to DOH within 30 days of any change in name, category, ownership, or responsibility for management of the water system.
7. The Town must notify DOH of the presence of:
   - Coliform in a sample within 10 days of notification by the testing laboratory.
   - Fecal coliform or E. coli in a sample by the end of the business day in which the Town is notified by the testing laboratory.
8. When a coliform MCL violation is determined, the Town must:
   - Notify DOH within 24 hours of determining acute coliform MCL violations.
   - Notify DOH before the end of the next business day when a non-acute coliform MCL is determined.
   - Notify water customers in accordance with WAC 246-290-495 and EPA's Public Notification Rule.
9. If VOC monitoring is required, a copy of the results of the monitoring and any public notice must be sent to DOH within 30 days of receipt of the test results.

Other Reports

Several other reports are required for state agencies, including the Department of Revenue, Department of Labor and Industries, Department of Social and Health Services, Department of Ecology, and the Employment Security Department. All these reports are completed according to their instructions.

Operations and Maintenance Records

Facilities Operations and Maintenance Manuals

Operations and maintenance manuals are available for staff members' reference. These manuals are kept on file at the water treatment plant and/or Town Hall. The Town intends to maintain its policies of requiring complete operation and maintenance manuals for all new equipment and facilities.

Mapping and As-Built Drawing Records

Maintenance of drawings is essential to maintenance crews, town planners, developers and anyone else needing to know how the water system is laid out throughout the Town. The drawing records are stored in an organized file at the Public Works office and are maintained by the Public Works Department.

Operations and Maintenance Records

Records are stored at the water treatment plant for the following items:

- Backflow and cross-connections
- Confined spaces
- Hydrant repairs
- Hydrant databases
- Pump motor tests
- Well sounding and static water levels
- Precipitation
- Water usage
- Water consumable inventory
- Water maintenance
- Water main notes
- Water worksheets
- Water main flushing
- Bacteriological tests
- Inorganic chemical tests
- Volatile organic compound tests
- Synthetic organic compound tests
- Water samples from new developments
- Lead and copper tests
- Chlorination levels
- Customer complaints
- Vandalism forms

Town Hall maintains the following records:

- Hydrant meter forms
- Water used for construction

Safety Procedures and Equipment

Safety is the concern and responsibility of all water operations and maintenance staff. To maintain the highest level of safety, the Town has taken steps toward educating its staff and providing resources to ensure a safe working environment. Quarterly professional safety classes are taken and in-house safety meetings are held every Friday. The Town will strive to improve its safety program on an on-going basis. The AWWA publishes a manual entitled, *Safety Practices for Water Utilities (M3)*, that describes safety programs and provides guidelines for safe work practices and techniques for a variety of water utility work situations.

The following identifies procedures to be followed for operations and maintenance tasks that involve the most common potential work place hazards in the Town's water system.

Use of Chlorine or Chlorine Products

Standard Procedure - Handle with care, provide adequate ventilation, and wear safety glasses and rubber gloves.

Use of Water Treatment Chemicals

Standard Procedure - Follow Material Safety Data Sheet (MSDS) and facility standard operation procedures contained in the operations and maintenance manuals for the water treatment plant.

Working in Confined Spaces

Standard Procedure - Follow state requirements for confined space entry.

Working around Heavy Equipment

Standard Procedure - Obtain proper training and follow all safety procedures. Use noise protection equipment.

Working in Traffic Areas

Standard Procedure - Wear proper clothing and provide adequate signage and flagging for work area.

Working on or Around Water Reservoirs

Standard Procedure - Follow proper safety harness procedures for working on tall structures.

Working in or Around Pump Stations

Standard Procedure – Obtain proper training and follow all safety procedures for working on pumps and electrical equipment. Use noise protection equipment.

Working on Asbestos Cement (AC) Water Main

Standard Procedure – Obtain proper training and follow all safety procedures for working with asbestos materials.

The water department follows all appropriate OSHA and WISHA regulations in its day-to-day operations and complies with the following state requirements:

- WAC 296-62-145 to 14529 Part M - Entry into confined spaces.
- WAC 296-155-650 to 66411 Part N - Shoring of open ditches.
- WAC 296-155-429 - Lockout-tagout for work on energized or de-energized equipment or circuits.
- WAC 296-155 Part C1 - Fall restraint for access to the top of the Town's water reservoirs.
- MUTCD - Traffic control for work in the public right-of-way.

EMERGENCY OPERATIONS

Capabilities

The Town is well equipped to accommodate short-term system failures and abnormalities in accordance with the system reliability requirements of WAC 246-290-420. Its capabilities are as follows.

Multiple Supply Capability

The Town could lose the operation of one of its groundwater wells or one of the treatment trains at the water treatment plant without adversely impacting its ability to meet normal demands of its customers. The Town currently has four operational wells and one surface water source that could be used to provide customers with water in an emergency.

Multiple Reservoirs

Water storage is provided by three active reservoirs that are located at three different sites. The Town's 996 Zone Reservoir serves the 996 Zone, and the Town's 1050 Zone Reservoir serves the 1050 Zone. In addition, the Town's Hilltop Reservoir, which was constructed in 2005, serves the 1077 Zone. Pump stations and pressure reducing stations allow water to be transmitted through different zones if a reservoir is out of service.

Distribution System

The Town has attempted to loop water mains wherever possible to improve water circulation (i.e. water quality) and minimize impacts to the system in the event that a portion of the distribution system must be taken out of service for maintenance or repairs.

Emergency Equipment

The Town is equipped with the necessary tools to deal with common emergencies. If a more serious emergency should develop, the Town will hire a local contractor who has a stock of spare parts necessary to make repairs to alleviate the emergency condition.

Emergency Telephone

The water department has a published emergency cell phone number for the public to directly contact water department personnel. The police or other Town departments can reach the water department via cell phones or home contact numbers. Emergency contact information, including cell phone and home phone numbers, is provided to each Town department.

On-Call Personnel

Although the Town does not have an official on-call person, the lead water division personnel are equipped with service vehicles and can generally respond to a call within an hour. A list of emergency telephone numbers is provided to each employee.

Material Readiness

Some critical repair parts, tools, and equipment are on-hand and kept in fully operational condition. As repair parts are used, they are re-ordered. Inventories are kept current and are adequate for most common emergencies that can reasonably be anticipated. The Town has ready access to an inventory of repair parts, including parts required for repair of each type and size of pipe within the service area. Additionally, the Town has been provided with after-hours emergency contact phone numbers for key material suppliers, which gives the Town 24-hour access to parts not kept in inventory.

Emergency Response Program

An Emergency Response Plan was prepared for the 2005 Comprehensive Water System Plan. The Emergency Response Plan contains a vulnerability assessment of the Town's water system facilities, a contingency operation plan for responding to emergency events, a list of water personnel responsible for making decisions in emergency situations, and other elements. To ensure the prompt restoration of service in accordance with WAC 246-290-420, contingency operating plans are specified in the Emergency Response Plan.

The Emergency Response Plan contains detailed action plans and other information that is not subject to public disclosure. It is available for review by authorized personnel on a need-to-know basis. The Water Superintendent can be contacted for additional details.

Public Notification

The federal Safe Drinking Water Act (SDWA), WAC 246-290-495 and the EPA Public Notification Rule require purveyors to notify their customers if any of the following conditions occur.

- Failure to comply with a primary MCL described under WAC 246-290-310.
- Failure to comply with a surface water treatment technique.
- Failure to comply with monitoring requirements under WAC 246-290.
- Failure to comply with testing requirements.
- Failure to comply with a DOH order.
- Failure to comply with a variance or exemption schedule from DOH.
- If the system is identified as a source of waterborne disease outbreak.
- If DOH issues the system a category red operating permit.
- If DOH issues an order.
- If the system is operating under a variance or exemption.

Specific notice content, distribution channels, and time limit requirements as specified in WAC 246-290-495 and EPA's Public Notification Rule must be in compliance when notification is required.

PREVENTIVE MAINTENANCE

Maintenance schedules that meet or exceed manufacturer's recommendations have been established for all critical components in the water system. The following schedule is used as a minimum for preventive maintenance and manufacturer's recommendations should be followed where conflict exists.

Storage Facilities

Daily	Visual and audio inspections. Check security and inspect facilities for proper operation.
Annually	Inspect screens, overflows, and vents. Drain, inspect, clean reservoir. Exercise reservoir drain valves to ensure good working order.
As Needed	Repaint interior and exterior as needed on tanks (estimated 10 to 20 year frequency).

Distribution System

Water Mains	
Annually or As Needed	Leak survey.
Annually	Flush.

Wells	
Daily	Log and record volume delivered and current supply rate. Visual and audio inspections. Check security.
Annually	Check all valves and screens. Check control valve settings.
As Needed	Maintain electrical and mechanical equipment. Paint structures and piping.
Intake Facility	
Daily	Check intake air facility for proper operation. Record run time for the three compressed air lines. Visual and audio inspection. Check security.
Weekly	Inspect facility for proper operation.
Monthly	Perform preventive maintenance on the compressor as suggested by the manufacturer.
Membrane Filtration Plant	
Daily	Record raw and finished water turbidity. Record water temperature and pH. Log and record run hours, motor starts, chemicals used, chemicals added, chlorine solution generated, backwash volumes, volume delivered and current supply rate. Check all equipment for proper function and operation. Visual and audio inspection. Check security.
Annually	Drain, clean and inspect clear wells.
As Needed	Maintain electrical and mechanical equipment. Paint structures and piping. Indoor and outdoor facility maintenance and repairs. Equipment calibration.
Main Booster Pump Stations	
Daily	Visual and audio inspection. Check pump motors for excessive heat and vibration. Inspect and adjust chlorination equipment. Log and record chemicals used, chemicals added and chlorine solution generated. Record disinfection residuals at system entry. Record master meter reading. Check security.
Monthly	Perform any necessary routine maintenance.
Annually	Change motor oil. Inspect packing and mechanical seals for wear. Record pump maintenance information.

As Needed	Maintain electrical and mechanical equipment. Paint structures and piping. Replace mechanical seals. Calibrate meters. Indoor and outdoor facility maintenance and repairs.
Booster Pump Stations	
Daily	Visual and audio inspection. Check security. Check pump motors for excessive heat and vibration.
Monthly	Perform any necessary routine maintenance.
Annually	Change motor oil. Inspect packing and mechanical seals for wear. Record pump maintenance information.
As Needed	Maintain electrical and mechanical equipment. Paint structures and piping. Replace mechanical seals. Calibrate meters. Indoor and outdoor facility maintenance and repairs.
Engine Generator Sets	
Weekly	Operate to achieve normal operating temperatures. Observe output.
As Needed	Replace fluids and filters in accordance with manufacturer's recommendations (or more frequently depending on amount of use). Perform tune-up. Replace parts as necessary.
Pressure Reducing Stations	
Annually	Flush and check all valves and screens. Check pressure settings. Rebuild and paint every five years, or as necessary.
Isolation Valves	
Annually	Operate full open/closed. Uncover where buried. Clean out valve boxes and repair as necessary. Repair and/or install valve marker posts as necessary.
Hydrants	
Annually	Check for leakage and visual damage. Operate and flush. Check drain rate. Lubricate as necessary. Measure pressure. Paint as necessary. Check nozzle and cap threads, clean and lubricate per manufacturer's recommendations. Replace lost and damaged gaskets. Check and operate auxiliary valve in accordance with the valve maintenance schedule. Leave in open position. Inspect drain system to ensure proper drainage and protection from freezing weather.
Meters	
2-20 Year Intervals	Time and measure volume of meter-delivered flow. Dismantle, clean, and inspect all parts, replace worn or defective parts. Retest meter for

	accuracy. Frequency varies based on meter size. Customer meters shall be replaced when reading problems are encountered. Customer meters are currently being changed out with Automatic Meter Reading (AMR) water meters.
As needed.	Calibrate.
Air and Vacuum Release Valve Assemblies	
Annually	Flush and inspect, repair as needed.
Blowoff Assemblies	
Annually	Flush and inspect, repair as needed.
Telemetry and Control System	
Daily	Backup program and data.
Monthly	Visually inspect cabinets and panels for damage, dust, and debris.
Semi-Annually	Inspect inside of cabinets and panels for damage, dust, and debris. Vacuum and clean all modules. Test alarm indicator units. Clean and flush all pressure sensitive devices. Visually inspect all meters to coordinate remote stations.
Annually	Check master and RTU's for proper operation. Repair as necessary.

Tools and Equipment

Rolling Stock	
Weekly	Check all fluid levels and brakes. Fluid levels and brakes are checked each time the equipment is used if less than weekly.
As Needed	Replace fluids and filters in accordance with manufacturer's recommendations (or more frequently depending on type of use). Preventive maintenance per manufacturer's recommendation.
Tools	
As Needed	Clean after each use. Lubricate and maintain as necessary. Inspected for damage and wear before each use. Preventive maintenance performed per manufacturer's recommendation.

STAFFING

The preventive maintenance procedures, as well as the normal and emergency operations of the utility, are described in the previous sections. The hours of labor and supervisory activity required to

effectively carry out the work of these on-going maintenance and operations schedules form the basis for determining adequate staffing levels.

Current Staff

The current staff includes management personnel, supervisory personnel, operators, maintenance workers, and administrative staff engaged in operating and maintaining the water system. There are currently two supervisory personnel and two field crew in the operations and maintenance organization which support the Town's water system. Various other personnel, including planners, assistants and clerks, also support the water system in an administrative capacity. The Town Administrator/Public Works Director supports the Town's water, wastewater, and electrical utilities in addition to his Town Administrator responsibilities; thus, only a small portion of his time is available for the water utility. The Water Superintendent and Lead Operator support both the water and wastewater utilities, with approximately 40 percent of their time available to the water system. The Distribution Lead and Meter Reader also has responsibilities to the other utilities and approximately 23 percent of his time is available to the water utility. Other administrative staff is available to the water utility as indicated in **Table 8-4**. Therefore, the water utility is currently supported by approximately 2.0 full-time staff equivalents, as shown in **Table 8-4**.

Table 8-4
Staff Available to the Water Department

Time Available to Water Department per Staff Member

Title	*% Available to Water Dept*	*# of FTE*	*Hours per Year*
Town Administrator/Public Works Director	15%	0.15	231
Water Superintendent	40%	0.40	616
Lead Operator	40%	0.40	616
Distribution Lead and Meter Reader	23%	0.23	347
Town Planner	15%	0.15	231
Building Official	8%	0.08	123
Planning and Building Assistant	8%	0.08	123
Town Clerk	15%	0.15	231
Deputy Clerk	18%	0.18	277
Utility Clerk	18%	0.18	270
Total Available FTE and Hours Available to Water Department		**2.0**	**3,065**

Recommended Staff Level

A water system is a complex assortment of equipment and parts that require both operation and maintenance. The estimated level of effort required to provide effective operation and maintenance in this document is based on a compilation of national standards, such as those provided by the AWWA, and the pro-forma standards provided by similar water systems in the Pacific Northwest.

The available hours of a person during a year are not the total hours worked. There are many hours spent in training, non-work status, and other activities that deduct from the 2,080 hours in pay status during a year. The total available hours are typically reduced to 1,540, as shown in **Table 8-5.**

Table 8-5
Available Hours per Person

Time Available Per Year Per Person	
Beginning Hours Available	2,080
Less average vacation of 3 weeks per year	-120
Less average sick leave of 2 weeks per year	-80
Less holidays of 10 days per year	-80
Less average training of 40 hours per year	-40
Less average small tasks other than above of 1 hour per day	-220
Net Total Available Hours Per Year Per Person	1,540

Preventive maintenance is the work performed to keep the water system in the condition necessary to provide the expected service. Preventative maintenance needs are based on the physical composition of the water system. Each component has a preventive maintenance need that ranges from minor to significant. **Table 8-6** provides the detail of the recommended staffing level for the water system's preventive maintenance program. The largest single activity is the membrane filtration plant, which is comprised of many mechanical devices that require routine maintenance. As shown in **Table 8-6**, approximately 1.3 full-time employees are recommended for water system preventive maintenance.

Table 8-6
Preventive Maintenance Staff Needed

Description	Total Units In System	Frequency (Times/Year)	Time/Unit (Hours)	Time/Year (Hours)
Preventive Maintenance				
Hydrants	144	1	0.5	72
Isolation Valves, Hydrant Valves	440	1	0.25	110
Air and Vacuum Release Valves	10	1	0.5	5
Blowoff Assemblies	10	1	0.25	3
Meters	1,036	0.1	2	207
Leak Survey of Water Mains	19 miles	1	0.5	10
Flushing Water Mains	19 miles	1	5	97
Booster Pump Stations	3	1	40	120
Pressure Reducing Stations	6	1	6	36
Sources	5	1	60	300
pH and Chlorination Systems	1	1	195	195
Membrane Filtration Plant	1	1	832	832
Reservoirs	3	1	30	90
Telemetry and Control System	1	1	40	40
Total Hours Required				2,116
Total Full Time Staff Required	**(based on 1,540 hours per year per person)**			**1.3**

The other component of operations and maintenance staffing is operations. Operations include all activities other than preventive maintenance, such as water meter reading and repair of broken water mains. As a system ages, many of these activities can be expected to increase. Some operations staff demands can be reduced by replacing infrastructure with more efficient technology, such as using an AMR system instead of manually reading water meters on a periodic basis. The Town is slowly changing over to an AMR system. Each technology or equipment upgrade should be analyzed for cost effectiveness. **Table 8-7** provides the recommended staffing level for the water system's operations program. As shown in **Table 8-7** approximately 3.0 full-time employees are recommended for the operations program.

Table 8-7
Operations Staff Needed

Description	Total Units In System	Frequency (Times/Year)	Time/Unit (Hours)	Time/Year (Hours)
Operations				
Monitor System	10	260	0.3	780
False Alarm Response	1	12	2	24
Meter Reading	1,036	6	0.1	622
Groundskeeping	6	12	6	432
Inventory	1	1	40	40
Meter Repair/Replace	52	1	4	207
Main Breaks	1	4	8	32
System Failures	1	4	8	32
Hydrant Repairs	5	1	8	40
Service Connections	25	1	8	200
Main Connections	2	1	5	10
Water Quality Sampling	10	12	0.5	60
Administration	1	260	8	2,080
Total Requirements				
Total Hours Required with Existing Slow Sand Filter Treatment Plant				4,559
Total Full Time Staff Required	**(based on 1,540 hours per year per person)**			**3.0**

To achieve the level of operations and maintenance shown in **Table 8-8,** approximately 4.3 full-time personnel are required for the water system alone. The Town's current staff that is available to the water system is inadequate to meet the optimum operations and maintenance recommendations. At the current staffing level, the Town is capable of adequately operating the water system, complying with the preventive maintenance program for the membrane filtration plant, and complying with the minimum requirement of DOH. However, the preventive maintenance tasks for other system components listed in **Table 8-6** have not been accomplished at the desired frequency shown in the table due to the staff shortage. Certain operations tasks, including administration and groundskeeping, are also not completed at the recommended level as indicated in **Table 8-7**. To meet the optimum recommended staffing requirements, the Town needs to hire additional staff in the water department or hire additional staff in other departments to allow the water staff to spend more time on water operations and maintenance activities.

Table 8-8
Total Staffing Recommendation

Total Staff Available	
Total Available Hours	3,065
Total Full Time Staff Available (based on 1,540 hours per year per person)	**2.0**
Total Staff Recommended	
Preventive Maintenance Hours	2,116
Operations Hours	4,559
Total Hours	6,675
Total Full Time Staff Required (based on 1,540 hours per year per person)	**4.3**
Surplus or Deficient Staffing	
Surplus or Deficient Staff	**-2.3**

The Town's Water Superintendent plans to retire at the end of 2012, but will continue working part-time in 2013. The Town hired an additional person in late 2012 to maintain the existing level of operations and maintenance. The existing Lead Operator is certified to operate the water treatment plant and may be the Town's best option for the succeeding Water Superintendent. If that change is administered, the new staff member will need to fill the Lead Operator position. A Lead Operator with water treatment plant and sewer treatment plant operator certification is recommended.

At this time, funding is not available to hire additional staff to meet the staffing deficiency. As the water system expands in the future, the need for additional staff will become even greater. The Town plans to add staff to optimize preventive maintenance and meet the additional requirements from system expansion, as the budget allows.

Water System Improvements 9

INTRODUCTION

This chapter presents proposed improvements to the Town of Eatonville's (Town) water system that are necessary to resolve existing system deficiencies and accommodate the projected growth of water customers. The water system improvements were identified from an evaluation of the results of the water system analyses presented in **Chapter 7**. The water system improvements were sized to meet both the existing and future demand conditions of the system.

A Capital Improvement Program number, herein referred to as a CIP number, has been assigned to each improvement. Numbers were assigned to the improvements starting at the north end of the system and, in general, incrementally increase to the south, as shown in **Figure 9-1**, a plan view of the improvements. The improvements are also illustrated in the hydraulic profile of the future water system that is shown in **Figure 9-2**. The improvements are organized and presented in this chapter according to the following categories:

- Water System Improvements Since Last Water System Plan
- Water Main Improvements
- Pressure Zone Improvements
- Pressure Reducing Valve Station Improvements
- Facility Improvements
- Miscellaneous Improvements
- Staffing Improvements
- Developer Funded Improvements
- Future Developer Funded Improvements

The remainder of this chapter presents a brief description of each group of improvements, the criteria for prioritizing, the basis for the cost estimates, and the implementation schedule.

DESCRIPTION OF IMPROVEMENTS

This section provides a general description of each group of improvements and an overview of the deficiencies that they will resolve. Most of the improvements are necessary to resolve existing system deficiencies. However, improvements have also been identified for some undeveloped areas to illustrate the major facilities that will be required when future development occurs in those areas. The costs associated with these improvements shall be borne by the developers, rather than the existing water customers. The locations of improvements in the undeveloped areas that are most likely to develop within the 20-year planning horizon are shown schematically in **Figure 9-1**. The CIP numbers for the developer-funded improvements have a "DF" prefix (example: DF1). Additional developer funded projects that will potentially occur beyond the 20-year planning horizon are identified as future developer funded projects and shown as "FDF" projects in

Figure 9-3. The DF and FDF projects will most likely be altered to fit the layout of the future developments as necessary.

Water System Improvements Since Last Water System Plan

The water system has undergone several changes since 2005, when the Town last updated its Comprehensive Water System Plan (WSP). The Town has implemented several of the recommended projects from the 2005 CIP. Four of the nine recommended 6-year CIP projects for major pressure zone, pressure reducing valve station, and facility improvements, as well as various annual water main replacements and miscellaneous improvements, have been constructed since the last WSP. **Table 9-1** lists the CIP projects that have been completed since the Town's 2005 WSP. In addition to these major projects, the Town has also implemented several other projects, including water extension improvements for new developments.

Table 9-1
Improvements Completed Since Last Water System Plan

CIP No.	Project Description	Description
WM6	8-inch Eatonville High School Water Main Loop	1,500 LF
WM14	10-inch Mashel Avenue North Water Main (Lynch to Center)	1,300 LF
WM28	10-inch Mashel Avenue South Water Main (Center to Larson)	600 LF
WM36	10-inch Orchard Avenue South Water Main (Center to Larson)	650 LF
DF7	12-inch Weyerhaeuser Road Water Main (Transmission Main for WTP)	1,600 LF
PZ1	1077 Zone Improvements - 12-inch Water Main (Partially Completed)	1,500 LF
PRV2	1077 Zone/996 Zone Pressure Reducing Station	PRV
F5	Water Treatment Facility and Main BPS Improvements - Phase 1	-
M4	Conservation Program and Leak Testing	-
M5	Cross-Connection Control Program	-
M7	Comprehensive Water System Plan Update	-

Water Main Improvements

The following water main improvements were identified from the results of the distribution and transmission system analyses discussed in **Chapter 7**. The water main improvements involve replacing existing distribution water main and are grouped in the Annual Water Main Replacement Program project (CIP WM1). The individual water main improvement projects within this group are numbered 1 through 64, as shown in **Figure 9-1**.

CIP WM1: Annual Water Main Replacement Program

Deficiency: The water main improvements shown in **Figure 9-1** are required to resolve existing system fire flow deficiencies caused primarily by undersized water mains. Many areas also contain non-standard water main materials.

Improvement: Replace existing water main with new PVC or ductile iron water main in accordance with the Town's construction standards. The individual water main improvements grouped under this project are numbered 1, 2, 3, etc., as shown in **Figure 9-1**. The selection of specific projects will be accomplished annually during the Town's budget development process and will be guided by the prioritization presented in the Prioritizing Improvements section in this chapter. This method for selecting projects provides the Town with the flexibility to coordinate these projects with other projects that may occur within the same area. For the 6-years of the planning period, the Town will be focusing on source and treatment improvements. An allowance of $200,000 per year has been established for the annual replacement of water mains following the initial 6-year planning period.

Future Water Main Extensions and Replacements

All new water main extensions and replacements shall be installed in accordance with the Town's Water System Standards, which are included in **Appendix H**. All new water mains must be PVC or ductile iron pipe and sized by a hydraulic analysis to ensure that all pressure, flow, and velocity requirements, as stated in **Chapter 5**, are met. In general, new water mains that will carry fire flow in residential areas must be a minimum of 8 inches in diameter and looped for multi-family residential developments and single-family transmission purposes. New water mains in commercial, business park, industrial, and school areas will be a minimum of 12 inches in diameter and looped.

Pressure Zone Improvements

The following pressure zone improvement will increase pressures and fire flows to the connection in the 996 Zone that require transfer to the 1077 Zone. The following provides a brief description of the existing deficiency that the improvement will resolve and a description of the improvement itself.

CIP PZ1: 1077 Zone Improvements

Deficiency: The existing customers on Pennsylvania Avenue South to the east of the 996 Zone Reservoir are served by the 996 Zone and have low pressures that do not meet the minimum pressure requirements. An existing fire hydrant near the intersection of Orchard Avenue South and Larson Avenue West is also connected to a 996 Zone water main and has unacceptable pressure levels. The services and fire hydrants with low pressures impact the total storage available in the 996 Zone Reservoir. Approximately half of the available storage volume in the 996 Zone Reservoir is unusable dead storage due to the services and fire hydrants located in the upper elevations of the 996 Zone.

Improvement: Install 8-inch water main in Pennsylvania Avenue South from Prospect Street West to the end of the cul-de-sac. Connect the new water main to the 12-inch 1077 Zone water main in Prospect Street West near the intersection of Larson Street West and the alley west of Pennsylvania Avenue South, disconnect the 12-inch water main in Larson Street West from the 12-inch water main in the alley. Reconnect the 12-inch water main in Larson Street West to the downstream side of the Hilltop Booster Pump Station by installing additional 12-inch water main to the booster pump station. Near the intersection of Larson Street West and Orchard Avenue South downstream

of the Orchard Avenue pressure reducing valve (PRV) station, disconnect the 12-inch water main in Larson Street West to the 12-inch water main in Orchard Avenue South. Reconnect the 12-inch water main in Larson Street West with the 12-inch water main in Orchard Avenue South located upstream of the Orchard Avenue PRV station. Disconnect the existing fire hydrant located near the intersection of Larson Street West and Orchard Avenue South from the water main downstream of the Orchard Avenue PRV station and reconnect the fire hydrant to the water main in Orchard Avenue South located upstream of the Orchard Avenue PRV station.

Pressure Reducing Station Improvements

The following PRV station improvement was identified to resolve existing system deficiencies.

CIP PRV1: Ridge Road Pressure Reducing Station and Water Main Replacement

Deficiency: The existing Ridge Road PRV station has reached its design life and is in need of replacement.

Improvement: Replace the existing PRV station near the intersection of Ridge Road West and Antonie Avenue North. The PRV diameter will be 6 inches. The asbestos cement water main between the station and Antonie Avenue North will be replaced with 8-inch water main.

Facility Improvements

The following water system facility improvements were identified from the results of the water system analyses that are discussed in **Chapter 7**. The improvements are primarily necessary to resolve existing system deficiencies, but have also been sized to accommodate projected growth.

CIP F1: Water Treatment Plant Replacement Membranes

Deficiency: The membrane filters at the water treatment plant require replacement every 5 to 10 years and have a 7-year warranty. The original membranes were installed in 2006.

Improvement: Schedule an inspection of the existing membrane filters with a Siemens representative to determine the recommended timing for replacement of the filters. Replace the existing membranes as recommended, or approximately every 7 years.

CIP F2: Water Treatment Facility Third Skid

Deficiency: The existing membrane filtration skids at the water treatment plant have a maximum treatment capacity of 1.0 million gallons per day (MGD). Prior to 2017, additional treatment capacity will be required to meet system demands for 2017 and beyond. If the suspected leak at the water treatment plant site can be located and repaired, the improvement can potentially be delayed beyond the 6-year planning period.

Improvement: Install an additional 0.5 MGD filtration skid with appurtenances at the treatment facility. Upgrade the electrical and telemetry equipment to accommodate the new filter skid.

CIP F3: Water Treatment Facility Expansion

Deficiency: The existing water treatment facility has an ultimate capacity of 1.5 MG with the third treatment skid installed (i.e., CIP F2). Prior to 2026, additional treatment will be required to meet the system demands for 2026 and beyond.

Improvement: Investigate the ability to expand the existing water treatment plant to meet projected 20-year demands. Twenty-year demands at the time of this WSP would require an additional 0.4 MG of treatment capacity. Projected 20-year demands should be revaluated during the pre-design of the water treatment plant expansion for sizing purposes. The expansion of the water treatment plant is only necessary if additional supply can be obtained from the existing or new sources as indicated in CIP F7 and F8. Prior to 2025, the projected demands will exceed the maximum capacity of the existing sources based on well water rights and the maximum diversion rate from the Mashel River.

CIP F4: Water Right Claim Investigation

Deficiency: The Town has limited annual water rights for its existing sources of supply. Prior to 2020, the Town's projected average day demand will exceed the available annual water rights. The Town has a water right claim (S2-004455CL) that claims quantities of 4.0 cubic feet per second (cfs) and 1,000 acre-feet per year (afy) with a June 1908 priority date. At the time of filing, the claim stated that 2.3 cfs and 588 afy were used. The claimed quantities and the reported quantities are greater than the annual water rights listed on the state-issued water rights certificates, which are utilized as the basis for the water rights analyses in **Chapter 6**.

Improvement: Pursue discussions with the Washington State Department of Ecology (Ecology) regarding how the Town should view the quantification of the vested water right claim under the Municipal Water Law. Utilize a water rights attorney or other water right expert to facilitate the discussions. Determine if the Town is capable of utilizing the claim to increase the available annual water rights.

CIP F5: Increased Monitoring of Existing Sources of Supply

Deficiency: The Town currently relies on the well sources for a majority of the year and supplements the well supply with river supply in the summer months. Use of the river source at other times of the year is limited due to high turbidity levels. The river source is utilized when the river turbidity is lowest, which coincides with the lowest river discharge and the highest concern for fish habitat. The Town is considering altering the supply scheme to limit the impact on the river level in the summer. Limited information regarding river turbidity and well water level at various times of the year is available to facilitate the design of the supply scheme modifications.

Improvement: Install continuous monitoring equipment near the Mashel River intake. Collect and store river turbidity data. Collect and store well water level data. Perform hydrogeological analyses of the resulting data.

CIP F6: River Diversion Improvements

Deficiency: The Town can only obtain approximately 400 gallons per minute (gpm) of the 1,032 gpm instantaneous water right for the Mashel River due to limited intake capabilities. With the limited surface water intake capability, the Town will have an instantaneous supply deficiency by 2025.

Improvement: Perform a study to determine if the Mashel River intake can be improved to increase flow to the Town. Consideration shall be given to the flow rates in the river and the impact on threatened species. Modify the intake as necessary to increase the instantaneous supply. In addition, perform a study to determine if it is feasible to transfer a portion of the river's instantaneous water rights to the Town's wells. The study shall include pre-application discussions with Ecology and pump testing of the existing well sources.

CIP F7: Alternative Water Source Feasibility Study

Deficiency: The Town has limited annual water rights for its existing sources of supply. Prior to 2020, the Town's projected average day demand will exceed the available annual water rights. The Town also has limited instantaneous water rights for its well sources (610 gpm) and limited physical intake capacity for its river source (400 gpm). At these limited supply rates, the Town will need additional supply and/or instantaneous water rights prior to 2025. Since water rights in the Mashel and Ohop basins of the watershed, which the Town is located within, are closed to new water rights, the Town is currently preparing an Alternative Water Source Investigation Report. The study includes preliminary investigations regarding the obtainment of additional annual water rights outside of the closed basin, incorporating aquifer storage and recovery, and altering the usage of existing supply sources to overcome the future water right and supply deficiencies. The preliminary report suggests that the Town proceed with additional feasibility studies regarding the Nisqually River diversion, Alder Lake diversion, and/or aquifer storage and recovery, depending on the Town's preferences and funding availability. The alternative source of supply was performed in coordination with the Nisqually Tribe in an effort to increase summer base flows in the Mashel River to benefit salmon survival and productivity.

Improvement: Perform a feasibility study that expands upon the Town's 2012 Alternative Water Source Investigation Report and address deficiencies in annual water rights and instantaneous water supply. Determine the next steps the Town should take to add additional annual water rights and supply capacity to the Town's water system. The study will is expected to focus on either the aquifer storage and recovery option or the obtainment of water from the Nisqually River or Alder Lake. Additional feasibility studies will likely be necessary depending on the chosen option.

CIP F8: Additional Water Rights and Source of Supply

Deficiency: The Town has limited annual water rights for its existing sources of supply and the physical capacity of its existing diversion does not allow for full utilization of its water right's instantaneous limit. Based on growth projections, the Town's projected average day demand will exceed the available annual water rights by 2020 and peak demand will require additional water to be diverted from the Mashel River by 2025.

Improvement: Implement the recommendations of CIP F7. The cost of improvements ranges from approximately $1.0 million for the aquifer storage and recovery option to $9.8 million dollars for the Nisqually diversion option. The Nisqually diversion cost estimate is included in the CIP cost estimates provided in **Table 9-6**, but additional feasibility studies are necessary to determine the chosen option and the associated cost estimates.

CIP F9: Well Nos. 1 and 2 Improvements

Deficiency: Well Nos. 1 and 2 are currently housed in aging buildings with limited access. In addition, the piping shows signs of corrosion and weakness. Upgrading the facilities is needed to improve access and reliability.

Improvement: Construct new structures to house Well Nos. 1 and 2. Replace the pump discharge piping with ductile iron piping and appurtenances.

CIP F10: Well No. 5 Abandonment

Deficiency: Well No. 5 is out of service as a supply source for the Town, but it has not been properly decommissioned. Abandoned wells that are not properly decommissioned pose a contamination threat to groundwater.

Improvement: Contract with a licensed well driller to decommission the abandoned well.

CIP F11: Clear Well No. 3 Construction

Deficiency: Clear Well No. 3 is not currently in use by the Town. The structure was used when the Town had a slow sand filter filtration plant. When the water treatment plant was upgraded to a membrane filtration plant, only two of the three sand filtration basins were converted to clear wells. The third basin, if improved, would provide the Town with additional storage during filter and treatment process repair downtime and would provide additional fire flow storage. This clear well construction must be completed before or simultaneously with CIP F3.

Improvement: Since the rehabilitated clear wells currently in use by the Town have leaking issues, it is assumed that full replacement of Clear Well No. 3 is necessary. Excavate and remove the existing clear well. Replace with a water-tight concrete clear well.

CIP F12: Clear Well Nos. 1 and 2 Rehabilitation

Deficiency: Clear Well Nos. 1 and 2 were converted from slow sand filtration basins to clear wells in 2006 when the water treatment plant was upgraded. The basins were structurally improved and existing cracks were repaired with epoxy injection. The clear wells appear to have significant leakage despite the repairs.

Improvement: Provide a liner or coating for the clear wells to prevent further leakage per the recommendations obtained during CIP M6.

CIP F13: Proposed 1050 Zone Reservoir

Deficiency: The 1050 Zone has an existing storage deficiency that will increase as further growth occurs. In addition, the dimensions of the existing tank and the associated hydraulic elevations of the various storage components have an impact on fire flow availability in the pressure zone. Additional storage volume per foot is necessary to improve fire flow availability. An additional reservoir in the 1050 Zone will also provide the zone with redundancy when the other tank is offline for maintenance. Furthermore, the 996 Zone will have a storage deficiency in the future that this tank will be designed to eliminate. The existing site does not have frontage or stormwater facilities.

Improvement: Locate and install a new reservoir in the upper elevations of the 1050 Zone to provide additional gravity storage for existing and future customers. Locating the reservoir at the existing 1050 Zone Reservoir site will be considered, but additional property will likely be necessary. The new reservoir will have an overflow elevation of approximately 1,050 feet to enable gravity supply to the 1050 Zone and 996 Zone. The new reservoir will be sized to provide approximately 0.6 to 0.7 MG of usable storage. The reservoir will be approximately 50 to 60 feet in diameter to improve the volume per foot available to the zone and consequently improve fire flow to meet the fire flow requirements throughout the 1050 Zone. Hydraulic analysis will be performed during the design phase to verify that all of the criteria are met. Evaluate the necessity for frontage and stormwater improvements during the design stage of the reservoir and install as necessary.

CIP F14: 996 Zone Reservoir Roof Repair

Deficiency: The existing roof of the 996 Zone Reservoir is deteriorating and needs replacement.

Improvement: Construct a roof repair or replacement to extend the lifetime of the existing 996 Zone Reservoir.

CIP F15: 996 Zone Reservoir Replacement

Deficiency: The 996 Zone Reservoir has existing structural weaknesses and appears to be approaching its design life. The existing site does not currently have frontage or stormwater improvements. The existing access road is located on private property.

Improvement: Size the reservoir to at least replace the existing available storage volume. Determine if storage deficiencies should be eliminated by this reservoir or another reservoir in a higher pressure zone. If a larger tank than the existing tank is desired, then additional property will be necessary. If the tank is situated on the existing site, demolition of the existing tank will be required and the 996 Zone will need to be operated as a closed pressure zone during construction. Evaluate the necessity for frontage and stormwater improvements during the design of the reservoir improvements and install as required. Relocate the access road for the reservoir or obtain proper easements. The cost estimate in the CIP assumes full replacement of the existing tank with a new 0.28 MG tank on the existing site.

CIP F16: Center Street Booster Pump Station Improvements

Deficiency: The Town currently has enough supply and back-up supply for the 1050 Zone, but prior to 2032 the Town will not have sufficient pump supply to meet the peak day demand of the pressure zone. In addition, the Town prefers for all of its supply stations to have a back-up power

supply and this station is not equipped with an engine generator. The Center Street Booster Pump Station is not currently fenced and does not have frontage improvements.

Improvement: Replace at least two pumps at the Center Street Booster Pump Station to ensure that the 1050 Zone's peak day demand can be met with the largest pump out of service. Upgrade the electrical equipment as necessary to support the upgraded pump(s). Install an engine generator for back-up supply purposes. Fence the site to improve security. Evaluate the need for frontage improvements and install as necessary.

CIP F17: Hilltop Booster Pump Station Improvements

Deficiency: Prior to 2032, the Town will not have sufficient backup pump supply to ensure non-interrupted service in the event that the largest pump is out of service at the Hilltop Booster Pump Station. At the existing pumping rate, the 1077 Zone Reservoir fills very slowly. The aging building has limited clearances and exposed wiring. The interior piping has signs of corrosion and requires replacement. An earthquake could severely damage the Hilltop Booster Pump Station and the adjacent 996 Zone Reservoir. If this were to occur, the Town would not have the ability to supply water to the 1077 Zone Reservoir, which provides the Town with a majority of its fire flow and emergency storage. Furthermore, the existing site does not currently have frontage or stormwater improvements.

Improvement: Construct a new Hilltop Booster Pump Station facility including a new structure, larger pumps, and improved piping. The facility will be located on a different site than the existing 996 Zone Reservoir. To meet the 2032 peak day demand and provide redundancy, at least two 80 gpm pumps must be installed. However, larger pumps are recommended for improved filling of the reservoir and for operation when the 996 Zone Reservoir is offline for maintenance. A fire flow pump is also needed for providing fire flow when the 1077 Zone Reservoir is offline for maintenance. The facility shall include upgraded electrical equipment and an engine generator for back-up power supply. Evaluate the necessity for frontage and stormwater improvements at the proposed site during the design of the booster pump station improvements and install as required.

CIP F18: Telemetry and Supervisory Control Improvements

Deficiency: The Town's telemetry and supervisory control system does not have a programmable logic control (PLC) backup and is operating with 2003 software.

Improvement: Purchase spare PLC and telemetry panel equipment, including the following: PLC central processing unit (CPU) card, PLC input/output cards, PLC Ethernet card, PLC internal power supply, telemetry panel DC power supply, unintemptable power supply (UPS) Ethernet switch, relays, and fuses. Upgrade the human-machine interface (HMI) computer and backup system with Raid 0 mirrored drives running Windows Server 2008 R2, and an external universal serial bus (USB) connected backup drive system.

CIP F19: Telemetry and Supervisory Control Expansion

Deficiency: The Town's telemetry and supervisory control equipment has limited capabilities. The controls for the 1050 and 1077 Zones are not connected to the master telemetry unit (MTU) at the water treatment plant, although the MTU will have the ability to communicate with remote facilities in the future.

Improvement: Design the telemetry and control system to control all of the remote water facility sties. Install radio or other necessary equipment at all controlled facilities.

Miscellaneous Improvements

The following miscellaneous improvements are planning efforts and program elements that are required to comply with various Washington State water regulations. In addition, some recommended operational improvements are identified as miscellaneous improvements.

CIP M1: Annual PRV Testing and Inspection

Deficiency: The Town's existing PRV stations are not tested or inspected on a regular basis which ensures that the valves are operating as required. The setpoints for the several valves in the system are unknown.

Improvement: Retain a qualified control valve specialist to inspect and test the Town's PRVs on an annual basis. Simultaneously, the Town shall verify that all of the vaults are properly drained and no other problems are evident.

CIP M2: 1050 Zone Reservoir Level Reading Improvements

Deficiency: The water level probes at the 1050 Zone Reservoir break when the water level in the reservoir drops in the winter months.

Improvement: Replace the existing reservoir level probes with an ultrasonic level transmitter in the tank or level transducer on the inlet/outlet pipe of the tank for accurate level readings.

CIP M3: Update the Water Development and Construction Standards

Deficiency: The Town's development and construction standards were developed over 20 years ago and have not undergone an update. The Town's water department has developed specifications over the years that have not been incorporated into the official development and construction standards.

Improvement: Perform a comprehensive review of the Town's existing development and construction standards. Update the Town's water system development and construction standards, including standard specifications and details. Ensure consistency with all applicable laws and guidelines.

CIP M4: Update Water Sections of the Eatonville Municipal Code

Deficiency: Several water sections of the Eatonville Municipal Code (EMC) require updating to be consistent with current laws and regulations, including EMC 13.04, 13.06, 13.08, 13.10, and 13.11. In addition, the EMC does not provide information on procedures regarding certificates of water availability nor does it require hydraulic analyses for proposed developments.

Improvement: Perform a comprehensive review of the water sections of the Town's EMC. Update the EMC to be consistent with current laws and regulations. Add additional code language as necessary, including procedures regarding certificates of water availability and required hydraulic modeling at the time of development permit application. Hydraulic modeling will be funded by the developer and conducted by the Town's hydraulic modeling specialist. The results will determine the available pressure and fire flow at the site as well as improvements that are required for the proposed development.

CIP M5: Hydraulic Model Calibration

Deficiency: Optimum hydraulic model calibration results were not achieved for this WSP development due to limited staffing and financial resources.

Improvement: Perform additional field flow and pressure tests throughout the water system. Calibrate the model based on field flow and pressure data for use in steady-state analyses. Identify sources of inconsistencies between the field calibration data and the modeled results. Perform additional field testing and modeling to resolve inconsistencies.

CIP M6: Leak Identification at the Water Treatment Plant Site

Deficiency: Approximately 20 percent of the water supplied by the Town's sources is not pumped into the water system through the master meter and is therefore not accounted for by the treatment plant process.

Improvement: Perform a comprehensive tracking analysis of the supply water between the sources and the master meter. Verify calibration of the various supply meters. Leak test the clear wells. Have a coating specialist inspect the clear wells when empty. Identify other sources of leaks, including on-site piping and treatment.

CIP M7: Water Use Efficiency Program and System Leak Detection

Deficiency: The distribution system leakage rate of 16 percent in 2011 is higher than the required 10 percent distribution system leakage rate. Several Water Use Efficiency (WUE) measures must be carried out on an ongoing basis to comply with WUE requirements, including customer education. Although an inclined block rate structure is in place, a more aggressive conservation rate structure should be considered in a rate study.

Improvement: The Town will continue its water main replacement program to reduce the amount of older, and potentially leaking, water mains. The Town will also continue its comprehensive leak detection/water main repair program to further reduce the amount of distribution system leakage.

The Town will perform other ongoing conservation measures, including public education programs, as outlined in the Water Use Efficiency Program included in **Appendix F**. The Town will also have a detailed rate study performed that considers a more aggressive inclined block rate structure and an evaluation of seasonal rates to reduce peak summer water use.

CIP M8: Cross-Connection Control Program

Deficiency: The Town does not have an updated cross-connection control ordinance. The Town has not developed public education material regarding its cross-connection control program.

Improvement: The Town's municipal code will be updated to address the regulations in Washington Administrative Code (WAC) 246-290 and the current CCC program identified in the Cross-Connection Control Program included in **Appendix G**. The Town will carry out other program requirements as outlined in the Cross-Connection Control Program, including public education.

CIP M9: Watershed Control Program

Deficiency: The Town does not have a formal watershed control program that meets current state requirements.

Improvement: Within the 6-year planning period, the Town will obtain land within the sanitary control areas, improve water quality monitoring, and coordinate with local landowners regarding source protection. After these high priority recommendations are completed, as outlined in the Watershed Control Program included in **Appendix L**, the Town will develop and adopt a watershed control ordinance that addresses permitted uses and performance standards for properties located within designated watershed control areas. The Town will carry out other watershed control program requirements as outlined in the Watershed Control Program.

CIP M10: Billing System Modifications

Deficiency: The Town is unable to obtain specific water use information regarding several individual customer classes from its billing system. For example, the billing system groups together the multi-family, school, and commercial customer classes making it difficult to obtain valuable data about individual customer classes.

Improvement: Coordinate with the technical support available for the Town's billing program and update the program as necessary to separate information for each individual customer classes. Meter count and consumption information should be provided for each of the following individual classes: single-family, multi-family, commercial, schools, and other.

CIP M11: Comprehensive Water System Plan Addendum

Deficiency: If CIP M5 successful locates the source of leaking at the water treatment plant and the leak can be repaired by CIP F12 or similar improvements, the water use by the Town's sources will significantly decrease. The reduced water use directly impacts demand projections and the scheduling of proposed improvements.

Improvement: Upon completion of CIP F12 or a similar improvement that resolves the leaking issue at the water treatment plant, the Town will continue to collect source and master meter supply data. When ample data is available, the demand projections and system analyses will be updated to reflect the modified water usage by the supply sources. The results will impact the Town's capacity analyses and the scheduling of treatment and supply projects. A summary of the revised demand projections and system analyses will be summarized in a Comprehensive Water System Plan Addendum letter report.

CIP M12: Comprehensive Water System Plan Update

Deficiency: WAC 246-290-100 requires that the Town's Comprehensive WSP be updated every 6 years and submitted to the Washington Department of Health (DOH) for review and approval.

Improvement: The Town will update and submit its Comprehensive WSP to the DOH every 6 years to comply with state requirements.

Staffing Improvements

Per the staffing analyses in **Chapter 8**, the water system has an operations and maintenance staffing deficiency of at least two people. Although hiring additional staff is not a CIP project, the Town should budget for and hire at least one additional water maintenance personnel to operate and maintain the water system within the 6-year planning period.

Developer Funded Improvements

The following water system facility improvement costs shall be borne by the developers, rather than the existing water customers, unless over-sizing of the improvements provides benefit to the existing customers. Improvements have been identified for the areas mostly likely to develop within the Town's urban growth area (UGA) within the 20-year planning horizon. The improvements shown illustrate the major facilities that will be required to properly serve those areas. The locations of the facilities are shown schematically in **Figure 9-1**.

CIP DF1: 1140 Pressure Zone and Booster Pump Station

Deficiency: The 1077 Zone Reservoir can not provide adequate pressure to connections above an elevation of approximately 985 feet. Land is available for residential development between elevations of approximately 985 and 1040 feet.

Improvement: Install a closed 1140 Zone Booster Pump Station with a variable frequency drive (VFD). The recommended booster pump station arrangement includes four pumps. One pump shall be capable of providing the zone's average day demand. Two pumps shall each be capable of supplying the peak hour demand. The fourth pump shall be capable of providing the 1,500 gpm fire flow requirement plus peak hour demand. The booster pump station shall be equipped with an on-site engine generator and automatic transfer switch for back-up power supply. Install 12-inch water in Prospect Street West in the vicinity of the proposed 1140 Zone Booster Pump Station.

Install 8-inch water main within Prospect Street West between Pennsylvania Avenue South and approximately Joy Street. Install 8-inch water main in the vicinity of Prospect Street West between Pennsylvania Avenue South and approximately Joy Street to complete the loop.

CIP DF2: 1060 Pressure Zone and Booster Pump Station

Deficiency: Industrial development that occurs east of Swanson Airport will require 12-inch water main to provide adequate fire flow. The 996 Zone Reservoir cannot provide adequate pressure to all connections in this development. Land is available for industrial development between elevations of approximately 825 and 980 feet.

Improvement: Install a closed 1060 Zone Booster Pump Station with a VFD. The recommended booster pump station arrangement includes four pumps. One pump shall be capable of providing the zone's average day demand. Two pumps shall each be capable of supplying the peak hour demand. The fourth pump shall be capable of providing the 2,500 gpm fire flow requirement plus peak hour demand. The booster pump station shall be equipped with an on-site engine generator and automatic transfer switch for back-up power supply. Install 12-inch water main within Weyerhaeuser Road North between Baumgartner Place Northeast and approximately Berggren Road East. Install 12-inch water main along the railroad between approximately the north end of the Swanson Airport runway and approximately the Little Mashel River. Install 12-inch water main within Berggren Road East between the railroad and the eastern end of the development. Install 12-inch water main along the northern end of the development between the railroad and the eastern end of the development. Install 12-inch water main along the eastern end of the development between the northern end of the development and Berggren Road East and the railroad.

CIP DF3: Eatonville Highway West 8-inch Water Main

Deficiency: Resident development that occurs west of the Town's existing water system within the 1050 Zone will require an 8-inch water main to provide adequate fire flow.

Improvement: Install 8-inch water main within Eatonville Highway West between the west end of the Town's existing water system and the western end of the development at approximately 103rd Avenue East. Install 8-inch water main within Hilligoss Lane between Eatonville Highway West and south to approximately 435th Street Court East. Install 8-inch water main within approximately 108th Avenue East between 428th Street East and Eatonville Highway West. Install 8-inch water main within 106th Avenue East between 428th Street East and approximately 435th Street Court East. Install 8-inch water main within 428th Street East between Hilligoss Lane and approximately 105th Avenue East. Install 8-inch water main within approximately 435th Street Court East between Hilligoss Lane and 106th Avenue East. Install 8-inch water main within approximately 105th Avenue East between 428th Street East and 430th Street East. Install 8-inch water main within 430th Street East between approximately 105th Avenue East and approximately 103rd Avenue East. Install 8-inch water main within approximately 103rd Avenue East between 430th Street East and Eatonville Highway West.

Future Developer Funded Improvements

The following water system facility improvement costs shall also be borne by the developers, rather than the existing water customers, unless over-sizing of the improvements provides benefit to the existing customers. Improvements have been identified for the areas expected to develop within the Town's retail water service area beyond the 20-year planning horizon. The improvements shown illustrate the major facilities that will be required to properly serve those areas assuming that the Town has adequate supply and storage. To serve these areas, source of supply and storage deficiencies identified earlier in the chapter must be resolved. The approximate locations of the major facilities are shown schematically in **Figure 9-3**.

CIP FDF1: Ohop Valley North Water Main

Deficiency: Residential and commercial development that occurs north of SR 161 in the Ohop Valley will require 8-inch and 12-inch water main to provide adequate levels of fire flow service to the area.

Improvement: Install 12-inch water main in Ohop Creek Drive North between SR 161 and Wild Rose Street West. Install 12-inch water main in Wild Rose Street West between Ohop Creek Drive North and Ski Park Road East. Install 12-inch water main in Ski Park Road East between Wild Rose Street West and SR 161 to complete the loop. Install 8-inch water main in Ski Park Road East between Wild Rose Street West and 414th Street East. Install 8-inch water main in 414th Street East between Ski Park Road East and approximately 123rd Avenue Street East. Install 8-inch water main in approximately 123rd Avenue Street East between 414th Street East and SR 161 to complete the loop. Install 8-inch water main in Orville Road East between SR 161 and approximately 412th Street East. Install 8-inch water main near Lynch Creek between Orville Road East and approximately the end of 2 Creeks Drive North. Install 8-inch water main west of Ski Park Road East between approximately the end of 2 Creeks Drive North and Wild Rose Street West. Install 8-inch water main in Ohop Creek Drive North between Orville Road East and Wild Rose Street West.

Install a closed 1060 Zone Booster Pump Station with a VFD. The recommended booster pump station arrangement includes four pumps. One pump shall be capable of providing the zone's average day demand. Two pumps shall each be capable of supplying the peak hour demand. The fourth pump shall be capable of providing the maximum fire flow requirement plus peak hour demand. The booster pump station shall be equipped with an on-site engine generator and automatic transfer switch for back-up power supply. Install 8-inch water main in Ohop-Clear Lake Road East between Orville Road East and approximately 412th Street East. Install 8-inch water main in approximately 413th Street East between Orville Road East and approximately 112th Ave Court East. Install 8-inch water main in approximately 112th Ave Court East between approximately 413th Street East and approximately Wild Rose Street West.

CIP FDF2: Ohop Valley South Water Main

Deficiency: Residential and commercial development that occurs south of SR 161 in the Ohop Valley will require 8-inch and 12-inch water main to provide adequate levels of fire flow service to the area.

Improvement: Install a 12-inch water main in SR 161 between approximately 420th Street East and approximately 107th Avenue East. Install a 12-inch water main in approximately 107th Avenue East between SR 161 and Ohop Valley-Extension Road East. Install a 12-inch water main in Ohop Valley-Extension Road East between approximately 107th Avenue East and SR 161. Install a 12-inch water main in approximately Orville Road East between Ohop Valley-Extension Road East and SR 161 to complete the loops.

CIP FDF3: Ohop Valley 996 Zone Connection, 860 Zone PRV and 730 Zone PRV

Deficiency: Development in the Ohop Valley will need a water main extension from the Town's 996 Zone.

Improvement: Install a 12-inch water main in SR 161 from Eatonville High School near the intersection of Mashell Avenue North and Washington Avenue North to approximately the intersection of SR 161 and 420th Street East. Install a PRV station to reduce the pressures from the 996 Zone to a hydraulic elevation of approximately 860 feet and an additional PRV station to reduce the pressures from a hydraulic elevation of approximately 860 feet to approximately 730 feet.

CIP FDF4: Ohop Valley 1050 Zone Connection, 860 Zone PRV and 730 Zone PRV

Deficiency: The Ohop Valley will need more than one connection to the existing water system for reliability purposes.

Improvement: Install a 12-inch water main between the water main in Dow Ridge Drive North and Ohop Valley Extension Road North. Install a pressure reducing station to reduce the pressures from the 1050 Zone to a hydraulic elevation of approximately 860 feet and an additional pressure reducing station to reduce the pressures from a hydraulic elevation of approximately 860 feet to approximately 730 feet.

CIP FDF5: Northeast Quarry 12-inch Water Main

Deficiency: Industrial development that occurs northeast of approximately 418th Street East in the quarry area will require 12-inch water main to provide adequate fire flow.

Improvement: Install a 12-inch water main along the west end of the existing quarry between approximately 418th Street East and approximately 412th Street East. Install a 12-inch water main in approximately 412th Street East between the west end of the existing quarry and the east end of the existing quarry. Install a 12-inch water main in the east end of the existing quarry between approximately 412th Street East and approximately 414th Street East.

CIP FDF6: 1170 Pressure Zone and Booster Pump Station

Deficiency: Industrial development that occurs in the east part of existing quarry area will require 12-inch water main to provide adequate fire flow. The proposed 1060 Zone Booster Pump Station cannot provide adequate pressure to all connections in this development. Land is available for industrial development between elevations of approximately 940 and approximately 1080 feet in this area.

Improvement: Install a closed 1060 Zone Booster Pump Station with a VFD. The recommended booster pump station arrangement includes four pumps. One pump shall be capable of providing the zone's average day demand. Two pumps shall each be capable of supplying the peak hour demand. The fourth pump shall be capable of providing the maximum fire flow requirement plus peak hour demand. The booster pump station shall be equipped with an on-site engine generator and automatic transfer switch for back-up power supply. Install 12-inch water main within 419th Street Court East and Weyerhauser Road North Private between approximately Berggren Road East and the eastern end of the quarry area. Install 12-inch water main within Berggren Road East between 419th Street Court East and the eastern boundary of the 1060 Zone. Install 12-inch water main along the east end of the existing quarry area between approximately 414th Street East and the railroad. Install three pressure reducing stations to reduce the pressures from the 1170 Zone to a hydraulic elevation of approximately 1,060 feet.

CIP FDF7: North 915 Pressure Zone

Deficiency: Residential development that occurs west of Eatonville between approximately 429th Street Court East and approximately 428th Street East and between approximately 105th Avenue East and approximately 96th Avenue East will require 8-inch looped water main. The 1050 Zone Reservoir will over pressurize the connections in this development. Land is available for residential development between elevations of approximately 685 and approximately 845 feet in this area.

Improvement: Install three pressure reducing stations to reduce the pressures from the 1050 Zone to a hydraulic elevation of approximately 915 feet. Install 8-inch water main within approximately 428th Street East between approximately 105th Avenue East and approximately 96th Avenue East. Install 8-inch water main within approximately 103rd Avenue East between approximately 428th Street East and approximately 429th Street Court East.

CIP FDF8: 430th Street East Residential Water Main

Deficiency: Residential development that occurs west of Eatonville between approximately 432nd Street Court East and approximately 103rd Avenue East and between approximately 428th Street East and approximately 432nd Street East will require 8-inch looped water main.

Improvement: Install 8-inch water main within Eatonville Highway West between approximately 103rd Avenue East and 100th Avenue East. Install 8-inch water main within approximately 430th Street East between approximately 103rd Avenue East and approximately 432nd Street Court East. Install 8-inch water main within approximately 432nd Street Court East between approximately

428th Street East and approximately 431st Street East. Install 8-inch water main within approximately 428th Street East between approximately 432nd Street Court East and approximately 96th Avenue East. Install 8-inch water main within approximately 96th Avenue East between approximately 430th Street East and approximately 428th Street East. Install 8-inch water main within approximately 103rd Avenue East between Eatonville Highway West and approximately 429th Street Court East.

CIP FDF9: South 915 Pressure Zone

Deficiency: Residential development that occurs west of Eatonville between approximately 431st Street East and approximately 435th Street East and between approximately 100th Avenue East and approximately Mountain Highway East will require 8-inch looped water main. The 1050 Zone Reservoir will over pressurize connections in this development. Land is available for residential development between elevations of approximately 735 and approximately 845 feet in this area.

Improvement: Install two pressure reducing stations to reduce the pressures from the 1050 Zone to a hydraulic elevation of approximately 915 feet. Install 8-inch water main within Eatonville Highway West between approximately 100th Avenue East and Mountain Highway East. Install 8-inch water main within Mountain Highway East between approximately 432nd Street Court East and approximately 435th Street East. Install 8-inch water main within approximately 432nd Street Court East between Mountain Highway East and approximately 431st Street East. Install 8-inch water main within approximately 432nd Street East along Eatonville Highway West between Eatonville Highway West and Mountain Highway East. Install 8-inch water main within 435th Street Court East and 94th Avenue Court East between Eatonville Highway West and approximately the end of 435th Street Court East. Install 8-inch water main within approximately 435th Street East between Mountain Highway East and approximately 100th Avenue East. Install 8-inch water main within approximately 100h Avenue East between Eatonville Highway West and approximately the end of 435th Street Court East.

CIP FDF10: Southeast Eatonville 12-inch Water Main

Deficiency: Commerical and mixed use development that occurs in the area in southeast Eatonville between Madison Avenue South and Weyerhauser Road South and between Center Street East and 437th Street East will require 12-inch water main.

Improvement: Install a 12-inch water main within the plat and connect the water treatment plant discharge piping and the water main in Center Street East. Install 12-inch water main within the plat to also connect the water main in Madison Avenue South with water main in Weyerhauser Road South.

CIP FDF11: South Eatonville Subarea 12-inch and 8-inch Water Main

Deficiency: Residential development that occurs in the area south of Eatonville Lagrande Road and between Groe Relocation Road East and approximately Hilligoss Lane will require 8-inch water main. Mixed use development that occurs in the area in southeast Eatonville west of the water treatment plant will require 12-inch water main.

Improvement: Install 12-inch water main within approximately Madison Avenue South between Alder Street East and Mashell Avenue South. Install 8-inch water main within SR 161 between Mashell Avenue South and Groe Relocation Road East. Install 8-inch water main within the unnamed road south of Eatonville Lagrande Road and Groe Relocation Road East between Eatonville Lagrande Road and approximately Hilligoss Lane. Install 8-inch water main within approximately Hilligoss Lane between the unnamed road south of Eatonville Lagrande Road and Eatonville Lagrande Road.

CIP FDF12: 880 Zone/1077 Zone Connection and 880 Zone PRV

Deficiency: The 880 Pressure Zone will need an additional connection to the existing water system for reliability purposes.

Improvement: Install 8-inch water main within approximately Skylar Way between the water main in the Skylar Way cul-de-sac and approximately 437th Street East. Install a PRV station to reduce the pressures from the 1077 Zone to a hydraulic elevation of approximately 880 feet.

CIP FDF13: 880 Pressure Zone

Deficiency: Residential development that occurs south of Eatonville between 438th Street East and approximately Hilligoss Lane and between Eatonville Lagrande Road and approximately 437th Street East will require 8-inch water main. The 996 Zone Reservoir will over pressurize the connections in this development. Land is available for residential development between elevations of approximately 675 and approximately 790 feet in this area.

Improvement: Install two pressure reducing stations to reduce the pressures from the 996 Zone to a hydraulic elevation of approximately 880 feet. Install 8-inch water main within Eatonville Lagrande Road between approximately 438th Street East and approximately Hilligoss Lane. Install 8-inch water main within approximately Skylar Way between Eatonville Lagrande Road and approximately 437th Street East.

CIP FDF14: 437th Street East Residential Water Main

Deficiency: Residential development that occurs in the area southeast of the Town between 437th Street East and Alder Cutoff Road East and between approximately Groe Relocation Road East and approximately 129th Avenue East will require 8-inch water main. The 996 Zone Reservoir cannot provide adequate pressure to all connections in this development. Land is available for residential development between elevations of approximately 795 and approximately 1010 feet in this area.

Improvement: Install 8-inch water main within 437th Street East and Groe Relocation Road East between SR 161 and approximately 129th Avenue East. Install 8-inch water main within approximately 129th Avenue East between 437th Street East and Alder Cutoff Road East. Install a small closed 1077 Zone Booster Pump Station with a VFD. The booster pump station shall be equipped with an on-site engine generator and automatic transfer switch for back-up power supply.

ESTIMATING COSTS OF IMPROVEMENTS

Project costs for the proposed improvements were estimated based on costs of similar, recently constructed water projects around the Puget Sound area, and are presented in 2012 dollars. The cost estimates include the estimated construction cost of the improvement and indirect costs estimated at 35 percent of the construction cost for engineering preliminary design, final design and construction management services, permitting, legal, and administrative services. The construction cost estimates include a 10 percent contingency and sales tax of 7.9 percent.

Construction cost estimates for water main projects were determined from the water main unit costs (i.e., cost per foot length) shown in **Table 9-2** and the proposed diameter and approximate length of each improvement.

Table 9-2
Water Main Unit Costs

Water Main Diameter (inches)	Construction Cost Per Foot Length (2012 $/LF)
8	$148
10	$164
12	$165
16	$188

The unit costs for each water main size are based on estimates of all construction related improvements, such as materials and labor for the water main installation; water services; fire hydrants; fittings; valves; connections to the existing system; trench restoration; asphalt surface restoration; and other work for a complete installation. Additional costs were added to some water main improvements to cover anticipated, increased costs related to the project location and degree of difficulty.

PRIORITIZING IMPROVEMENTS

The water system improvements were prioritized from established criteria to formulate a schedule that identifies projects with the most deficiencies and greatest need for improvement to be completed prior to projects with fewer deficiencies. A description of the criteria and method for prioritizing each category of improvements are provided in this section.

Water Main Improvements

Table 9-3 lists criteria that were established for prioritizing the water main improvements. The criteria are based on the underlying deficiencies of the existing water main that will be replaced by the proposed water main improvements. The criteria are arranged in three different categories with a

weight factor assigned to each category. The criteria given the most weight is the Existing Water Main Fire Flow Capability category.

Table 9-3
Water Main Improvements Priority Ranking Criteria

Points	Category	Weight Factor	Weighted Points
	Existing Water Main Fire Flow Capability		
3	Available Fire Flow is 69% or Less of Required Fire Flow	4	12
2	Available Fire Flow is 70-89% of Required Fire Flow	4	8
1	Available Fire Flow is 90-100% or More of Required Fire Flow	4	4
	Existing Water Main Material		
3	Asbestos Cement	3	9
2	Cast Iron	3	6
1	Ductile Iron or PVC	3	3
	Existing Water Main Benefit Area		
3	Large Benefit Area (i.e. transmission main)	2	6
2	Medium Benefit Area	2	4
1	Small Benefit Area (i.e. localized area)	2	2

The Existing Water Main Fire Flow Capability category ranks the water main improvements based on the ability of the existing water mains to provide the required fire flow, as determined from the results of the hydraulic analyses addressed in **Chapter 7**. The Existing Water Main Material category ranks the water main improvements based on the material of the existing water main. The Existing Water Main Benefit Area category ranks the water main improvements based on the size of the area that will benefit from the water main replacement.

The water main priority ranking criteria was applied to the annual water main replacement projects, which are grouped under CIP WM1. CIP 1 to 64, as shown in **Figure 9-1**, are presented in **Table 9-4** with their priority ranking. **Table 9-5** lists the water main projects in order of priority.

Other Improvements

The pressure zone, PRV station, and facility improvements were prioritized based on existing deficiencies, safety concerns, maintenance requirements and capacity requirements. The miscellaneous improvements were prioritized based on regulatory requirements and assessment of

the water system needs. The priority order of these improvements is reflected in the schedule of improvements, which is presented in the next section.

Table 9-4
Annual Water Main Replacement Projects

** No.	Size Length	Size Diam	Description In	Description From	Description To	Estimated Cost	* Priority
1	1,130	8	Antonie Ave. N	Ridge Rd. W	Williams Ct. W	$225,000	M
2	1,270	8	Ridge Rd. W	Maple Dr.	Pennsylvania Ave. N	$252,000	H
		8	Maple Dr.	Ridge Rd. W	~225' S of Ridge Rd. W		
		8	Madrona Dr. N	Ridge Rd. W	~370' S of Ridge Rd. W		
3	550	8	Pennsylvania Ave. N	Ridge Rd. W	~548' S of Ridge Rd. W	$109,000	H
4	1,030	8	Lynch St. W	Antonie Ave. N	Fir Ave. N	$206,000	M
		8	Fir Ave. N	Lynch St. W	Carter St. W		
5	1,840	8	Pennsylvania Ave. N	Lynch St. W	Larson St. W	$367,000	L
7	680	12	Lynch Creek Rd. E	Mashel Ave. N	Eatonville Elementary School Entrance	$150,000	H
8	170	10	W of Airport Runway	Cessna Ct. E Dead End	~167' N of Cessna Ct. E Dead-end	$37,000	M
9	530	8	N Conant Dr.	Center St. W	End of Cul-de-sac	$105,000	M
10	450	8	Jensen Ln. N	Center St. W	End of Cul-de-sac	$89,000	M
11	1,620	8	Carter St. W	Antonie Ave. N	Rainier Ave. N	$323,000	L
12	670	8	Fir Ave. N	Carter St. W	Ash St. W	$133,000	L
		8	Ash St. W	Fir Ave. N	Cedar Ave. N		
13	1,670	12	Rainier Ave.	~300' S of Center St. W	Lynch St. W	$371,000	M
14	340	12	Mashel Ave. N	Lynch Creek Rd. E	Lynch St. W	$74,000	H
15	1,610	12	Washington Ave. N	Lynch Creek Rd. E	Center St. E	$357,000	L
16	1,920	12	Carter St. W	Rainier Ave. N	Eatonville Middle School	$426,000	L
17	890	12	Eatonville Elementary School	Lynch Creek Rd. E	Carter St. E	$198,000	M
18	580	12	Glacier Ave. N	Center St. E	Eatonville Middle School	$128,000	H
19	380	8	E of Mill Village	Mill Village Dead End	Airport Dead End	$75,000	H
20	1,110	8	Center St. W	Center St. BPS	Antonie Ave. N	$221,000	H
		8	Antonie Ave. N	Center St. W	Iron St. W		
21	880	8	Center St. W	Antonie Ave. N	Alley W of Pennsylvania Ave. N	$174,000	M
22	1,120	12	Center St. W	Alley W of Pennsylvania Ave. N	Mashel Ave. N	$248,000	M
23	1,430	12	Center St. E	Mashel Ave. S	Madison Ave. S	$318,000	H
24	1,190	12	Center St. E	Madison Ave. S	Weyerhauser Rd. S	$265,000	M
25	2,490	8	Hilligoss Ln.	428th St. E	Erin Ln. W	$497,000	H
		8	428th St. E	Hilligoss Ln.	Center St. W		
26	1,380	8	Eatonville Hwy.	Antonie Ave. N	Larson St. W	$275,000	M
		8	Larson St. W	Eatonville Hwy.	Alley W of Pennsylvania Ave.		
27	470	12	Alley W of Pennsylvania Ave.	Center St. W	Larson St. W	$104,000	H
29	780	12	Washington Ave. S	Center St. E	Larson St. E	$174,000	L
		12	Larson St. E	Mashel Ave. S	Washington Ave. S		
30	460	12	Adams Ave. S	Center St. E	Main St.	$103,000	M
31	2,040	8	Washington Ave. S	Larson St. E	Propsect St. E	$407,000	L
		8	Adams Ave. S	Main St.	Propsect St. E		
		8	Prospect St. E	Mashel Ave. S	Madison Ave. S		
32	1,070	12	Madison Ave. S	Center St. E	Alder St. E	$237,000	H
33	1,400	8	Eatonville Hwy. W	W End of System	Hilligoss Ln.	$280,000	M
34	1,030	8	~108th Ave. E	Eatonville Hwy. W	Dead-end	$204,000	H
35	1,250	12	Wastewater Treatment Plant	Mashel Ave. S	Dead-end	$277,000	H
37	1,010	8	Rainier Ave. S	Larson St. W	Propsect St. W	$200,000	L
		8	Propsect St. W	Rainier Ave. S	Mashel Ave. S		
38	150	8	Antonie Ave. N	Ridge Rd. W	End of Cul-de-sac	$30,000	L
39	510	8	Maple Dr.	Ridge Rd. W	End of Cul-de-sac	$100,000	L
40	710	8	Supercub Dr. N	Jet Ct. E	~142' S of Airport Rd. E	$140,000	L
41	1,450	12	Eatonville High School	Lynch Creek Rd. E	Lynch St. W	$322,000	M
42	430	8	Lynch St. W	Antonie Ave. N	Branch Ave. N	$85,000	L
		8	Branch Ave. N	Lynch St. W	Dead-end		
43	390	8	Williams Ct. W	Antonie Ave. N	End of Cul-de-sac	$77,000	L
44	650	8	Lynch St. W	Orchard Ave. N	Mashell Ave. N	$130,000	H
	30	12	Orchard Ave. N	Lynch St. W	~28' S of Lynch St. W	$6,000	
45	140	12	Eatonville Elementary School	~Glacier Ave. N	Dead-end	$30,000	H
46	300	12	Eatonville Elementary School	~Glacier Ave. N	Dead-end	$66,000	H
47	920	8	~Mill Village	~296' S of Cessna Ct. E	Eatonville Middle School	$184,000	H
48	1,510	10	Airport Runway	Cessna Ct. E Dead End	S End of Airport Runway	$333,000	M
49	890	8	Eatonville Middle School	Eatonville Middle School Entrance	~Mill Village	$177,000	H
50	560	8	View Crest Dr.	Dow Ridge Dr. N	Center St. W	$110,000	L
51	500	8	Center St. W	View Crest Dr.	428th St. E	$100,000	L
52	260	8	Alley S of Center St. W	Antonie Ave. N	~Fir Ave. N	$52,000	L
53	100	8	Eatonville Middle School	Glacier Ave. N	~96' E of Glacier Ave. N	$19,000	H
54	630	12	Mill Village Ct. N	Glacier Ave. N	~Mill Village	$139,000	M
55	200	8	~Mill Village	~Mill Village Ct. N	~519' N of Center St. E	$39,000	M
56	770	8	Weyerhauser Rd. N	~Kelsey Ln. E	Airport Entrance	$154,000	M
		8	~Kelsey Ln. E	Weyerhauser Rd. S	Baumgartner Pl. NE		
57	840	12	Eatonville Hwy. W	Emerald Ridge Dr.	Antonie Ave. N	$187,000	L
58	1,440	12	Eatonville Hwy. W	Hilligoss Ln.	Eatonville Baptist Church	$320,000	H
59	80	16	Orchard Ave. S	Orchard Ave. PRV	Larson St. W	$19,000	M
60	160	12	Weyerhauser Rd. N	Center St. E	~157' NE of Center St. E	$35,000	M
61	570	8	Center St. E	Weyerhauser Rd. N	Alder Cutoff Rd. E	$112,000	L
62	160	8	Skylar Way	Kaitlyn St. W	~157' S of Kaitlyn St. W	$32,000	M
63	20	16	1077 Zone Reservoir	1077 Zone Reservoir	Prospect St. W	$4,000	L
64	130	12	Mashel Ave. N	~125' N of Alder St. E	Alder St. E	$28,000	L
Total - Annual Water Main Replacement Projects						**$10,639,000**	

* Priority: H = High, M = Medium, L = Low, based on priority ranking criteria in Table 9-3.

** Annual water main replacement projects no. 6, 28, and 36 are not included because they were previously constructed.

Table 9-5
Prioritized Annual Water Main Replacement Projects

** No.	Size Length	Size Diam	Description In	Description From	Description To	Estimated Cost	* Priority
25	2,490	8	Hilligoss Ln.	428th St. E	Erin Ln. W	$497,000	H
		8	428th St. E	Hilligoss Ln.	Center St. W		
27	470	12	Alley W of Pennsylvania Ave.	Center St. W	Larson St. W	$104,000	H
34	1,030	8	~108th Ave. E	Eatonville Hwy. W	Dead-end	$204,000	H
14	340	12	Mashel Ave. N	Lynch Creek Rd. E	Lynch St. W	$74,000	H
32	1,070	12	Madison Ave. S	Center St. E	Alder St. E	$237,000	H
2	1,270	8	Ridge Rd. W	Maple Dr.	Pennsylvania Ave. N	$252,000	H
		8	Maple Dr.	Ridge Rd. W	~225' S of Ridge Rd. W		
		8	Madrona Dr. N	Ridge Rd. W	~370' S of Ridge Rd. W		
3	550	8	Pennsylvania Ave. N	Ridge Rd. W	~548' S of Ridge Rd. W	$109,000	H
44	650	8	Lynch St. W	Orchard Ave. N	Mashell Ave. N	$130,000	H
	30	12	Orchard Ave. N	Lynch St. W	~28' S of Lynch St. W	$6,000	
58	1,440	12	Eatonville Hwy. W	Hilligoss Ln.	Eatonville Baptist Church	$320,000	H
23	1,430	12	Center St. E	Mashel Ave. S	Madison Ave. S	$318,000	H
35	1,250	12	Wastewater Treatment Plant	Mashel Ave. S	Dead-end	$277,000	H
7	680	12	Lynch Creek Rd. E	Mashel Ave. N	Eatonville Elementary School Entrance	$150,000	H
18	580	12	Glacier Ave. N	Center St. E	Eatonville Middle School	$128,000	H
19	380	8	E of Mill Village	Mill Village Dead End	Airport Dead End	$75,000	H
20	1,110	8	Center St. W	Center St. BPS	Antonie Ave. N	$221,000	H
		8	Antonie Ave. N	Center St. W	Iron St. W		
45	140	12	Eatonville Elementary School	~Glacier Ave. N	Dead-end	$30,000	H
46	300	12	Eatonville Elementary School	~Glacier Ave. N	Dead-end	$66,000	H
47	920	8	~Mill Village	~296' S of Cessna Ct. E	Eatonville Middle School	$184,000	H
49	890	8	Eatonville Middle School	Eatonville Middle School Entrance	~Mill Village	$177,000	H
53	100	8	Eatonville Middle School	Glacier Ave. N	~96' E of Glacier Ave. N	$19,000	H
13	1,670	12	Rainier Ave.	~300' S of Center St. W	Lynch St. W	$371,000	M
30	460	12	Adams Ave. S	Center St. E	Main St.	$103,000	M
1	1,130	8	Antonie Ave. N	Ridge Rd. W	Williams Ct. W	$225,000	M
4	1,030	8	Lynch St. W	Antonie Ave. N	Fir Ave. N	$206,000	M
		8	Fir Ave. N	Lynch St. W	Carter St. W		
8	170	10	W of Airport Runway	Cessna Ct. E Dead End	~167' N of Cessna Ct. E Dead-end	$37,000	M
17	890	12	Eatonville Elementary School	Lynch Creek Rd. E	Carter St. E	$198,000	M
24	1,190	12	Center St. E	Madison Ave. S	Weyerhauser Rd. S	$265,000	M
26	1,380	8	Eatonville Hwy.	Antonie Ave. N	Larson St. W	$275,000	M
		8	Larson St. W	Eatonville Hwy.	Alley W of Pennsylvania Ave.		
48	1,510	10	Airport Runway	Cessna Ct. E Dead End	S End of Airport Runway	$333,000	M
54	630	12	Mill Village Ct. N	Glacier Ave. N	~Mill Village	$139,000	M
55	200	8	~Mill Village	~Mill Village Ct. N	~519' N of Center St. E	$39,000	M
60	160	12	Weyerhauser Rd. N	Center St. E	~157' NE of Center St. E	$35,000	M
62	160	8	Skylar Way	Kaitlyn St. W	~157' S of Kaitlyn St. W	$32,000	M
21	880	8	Center St. W	Antonie Ave. N	Alley W of Pennsylvania Ave. N	$174,000	M
22	1,120	12	Center St. W	Alley W of Pennsylvania Ave. N	Mashel Ave. N	$248,000	M
59	80	16	Orchard Ave. S	Orchard Ave. PRV	Larson St. W	$19,000	M
9	530	8	N Conant Dr.	Center St. W	End of Cul-de-sac	$105,000	M
10	450	8	Jensen Ln. N	Center St. W	End of Cul-de-sac	$89,000	M
33	1,400	8	Eatonville Hwy. W	W End of System	Hilligoss Ln.	$280,000	M
41	1,450	12	Eatonville High School	Lynch Creek Rd. E	Lynch St. W	$322,000	M
56	770	8	Weyerhauser Rd. N	~Kelsey Ln. E	Airport Entrance	$154,000	M
		8	~Kelsey Ln. E	Weyerhauser Rd. S	Baumgartner Pl. NE		
5	1,840	8	Pennsylvania Ave. N	Lynch St. W	Larson St. W	$367,000	L
11	1,620	8	Carter St. W	Antonie Ave. N	Rainier Ave. N	$323,000	L
15	1,610	12	Washington Ave. N	Lynch Creek Rd. E	Center St. E	$357,000	L
16	1,920	12	Carter St. W	Rainier Ave. N	Eatonville Middle School	$426,000	L
29	780	12	Washington Ave. S	Center St. E	Larson St. E	$174,000	L
		12	Larson St. E	Mashel Ave. S	Washington Ave. S		
31	2,040	8	Washington Ave. S	Larson St. E	Propsect St. E	$407,000	L
		8	Adams Ave. S	Main St.	Propsect St. E		
		8	Prospect St. E	Mashel Ave. S	Madison Ave. S		
38	150	8	Antonie Ave. N	Ridge Rd. W	End of Cul-de-sac	$30,000	L
39	510	8	Maple Dr.	Ridge Rd. W	End of Cul-de-sac	$100,000	L
40	710	8	Supercub Dr. N	Jet Ct. E	~142' S of Airport Rd. E	$140,000	L
42	430	8	Lynch St. W	Antonie Ave. N	Branch Ave. N	$85,000	L
		8	Branch Ave. N	Lynch St. W	Dead-end		
43	390	8	Williams Ct. W	Antonie Ave. N	End of Cul-de-sac	$77,000	L
52	260	8	Alley S of Center St. W	Antonie Ave. N	~Fir Ave. N	$52,000	L
57	840	12	Eatonville Hwy. W	Emerald Ridge Dr.	Antonie Ave. N	$187,000	L
61	570	8	Center St. E	Weyerhauser Rd. N	Alder Cutoff Rd. E	$112,000	L
63	20	16	1077 Zone Reservoir	1077 Zone Reservoir	Prospect St. W	$4,000	L
64	130	12	Mashel Ave. N	~125' N of Alder St. E	Alder St. E	$28,000	L
50	560	8	View Crest Dr.	Dow Ridge Dr. N	Center St. W	$110,000	L
51	500	8	Center St. W	View Crest Dr.	428th St. E	$100,000	L
12	670	8	Fir Ave. N	Carter St. W	Ash St. W	$133,000	L
		8	Ash St. W	Fir Ave. N	Cedar Ave. N		
37	1,010	8	Rainier Ave. S	Larson St. W	Propsect St. W	$200,000	L
		8	Propsect St. W	Rainier Ave. S	Mashel Ave. S		
Total - Annual Water Main Replacement Projects						**$10,639,000**	

* Priority: H = High, M = Medium, L = Low, based on priority ranking criteria in Table 9-3.
** Annual water main replacement projects no. 6, 28, and 36 are not included because they were already constructed.

SCHEDULE OF IMPROVEMENTS

The results of prioritizing the improvements were used to assist in establishing an implementation schedule that can be used by the Town for preparing its 6-year CIP and yearly water budget. The implementation schedule for the proposed improvements is shown in **Table 9-6**. Due to high priority facility and miscellaneous projects in the early years of the 6-year planning period, water main replacement projects are scheduled at $200,000 per year or more starting in 2018. The Town will identify and schedule the replacement of these smaller water mains during the annual budget process. This provides the Town with the flexibility to coordinate these projects with road or other projects within the same area. The developer funded improvement projects anticipated during the 20-year planning period and their associated cost estimates are shown in **Table 9-6**. However, the implementation dates for these improvements are not shown, due to the uncertainty of the timing of the future developments that will be responsible for these improvements.

The results of two CIP projects scheduled for 2013 (CIP M6 and F12), have the potential to significantly impact the scheduling of two water treatment plant CIP projects (CIP F2 and F11) identified in **Table 9-6** for the 6-year planning period. If CIP M6 and F12 substantially reduce the leakage on the water treatment plant site allowing for lower supply source usage, CIP F2 and F11 can likely be delayed as shown in **Table 9-7**. Supply and demand data must be reevaluated after the water treatment plant leakage is under control and ample data is available for the analyses described in CIP M11.

The future developer funded projects that are not anticipated until beyond the 20-year planning period and their associated cost estimates are shown in **Table 9-8**. The implementation dates for these improvements are not shown, due to the uncertainty of the timing of the future developments that will be responsible for these improvements.

Future Project Cost Adjustments

All cost estimates shown in the tables are presented in year 2012 dollars. Therefore, it is recommended that future costs be adjusted to account for the effects of inflation and changing construction market conditions at the actual time of project implementation. Future costs can be estimated using the Engineering News Record (ENR) Construction Cost Index for the Seattle area, or by applying an estimated rate of inflation that reflects the current and anticipated future market conditions.

Table 9-6
Proposed Improvements Implementation Schedule

No.	Description	Estimated Cost (2012 $$)	20-Year Schedule of Improvements Planned Year of Project and Estimated Cost in 2012 $$ 2013	2014	2015	2016	2017	2018	2019-24	2025-32
	Water Main Improvements									
WM1	Annual Water Main Replacement Program	$10,639,000	$0K	$0K	$0K	$0K	$0K	$200K	$1,200K	$9,239K
	Pressure Zone Improvements									
PZ1	1077 Zone Improvements	$135,000					$135K			
	Pressure Reducing Station Improvements									
PRV1	Ridge Road PRV and Water Main Replacement	$130,000							$130K	
	Facility Improvements									
F1	Water Treatment Plant Replacement Membranes	$405,000		$135K					$135K	$135K
F2	Water Treatment Facility Third Skid[1]	$966,000				**$966K**				
F3	Water Treatment Facility Expansion	$2,500,000								$2,500K
F4	Water Rights Claim Investigation	$20,000			$10K	$10K				
F5	Increase Monitoring of Existing Sources	$10,000	$5K		$5K					
F6	River Diversion Improvements	$125,000				$125K				
F7	Alternative Water Source Feasibility Study	$200,000			$14K	$14K	$172K			
F8	Additional Water Rights and Source of Supply	$9,800,000							$9,800K	
F9	Well Nos. 1 and 2 Improvements	$500,000							$500K	
F10	Well No. 5 Abandonment	$10,000					$10K			
F11	Clear Well No. 3 Construction[2]	$235,000			**$235K**					
F12	Clear Well No. 1 and No. 2 Rehabilitation	$133,000	$133K							
F13	1050 Zone Reservoir	$1,339,000								$1,339K
F14	996 Zone Reservoir Roof Repair	$65,000	$65K							
F15	996 Zone Reservoir Replacement	$984,000							$984K	
F16	Center Street Booster Pump Station Improvements	$354,000								$354K
F17	Hilltop Booster Pump Station Improvements	$572,000							$572K	
F18	Telemetry and Supervisory Control Improvements	$34,000	$34K							
F19	Telemetry and Supervisory Control Expansion	$237,000							$237K	
	Miscellaneous Improvements									
M1	Annual PRV Testing and Inspection	$40,000	$2K	$2K	$2K	$2K	$2K	$2K	$12K	$16K
M2	1050 Zone Reservoir Level Reading Improvement	$8,000			$8K					
M3	Update the Water Development and Construction Standards	$10,000					$10K			
M4	Update the Water Sections of the Eatonville Municipal Code	$8,000		$1K	$4K	$4K				
M5	Hydraulic Model Calibration	$13,000						$13K		
M6	Leak Identification at the Water Treatment Plant Site	$5,000	$5K							
M7	Water Use Efficiency Program and Leak Detection	$75,000	$2K	$2K	$2K	$5K	$5K	$39K	$12K	$8K
M8	Cross Connection Control Program	$20,000	$1K		$2K	$1K	$1K	$1K	$6K	$8K
M9	Watershed Control Program	$38,000	$1K	$1K	$2K	$8K	$8K	$5K	$6K	$8K
M10	Billing System Modificaitons[3]	$0								
M11	Comprehensive Water System Plan Addendum	$10,000		$10K						
M12	Comprehensive Water System Plan Update (Every 6 years)	$370,000	$10K						$120K	$240K
Total Estimated Project Costs of Town Funded Improvements		**$29,990,000**	**$258K**	**$151K**	**$284K**	**$1,134K**	**$343K**	**$260K**	**$13,714K**	**$13,847K**
	Developer Funded Improvements									
DF1	1140 Pressure Zone	$1,268,000	Timing of Project Based on Timing of Future Developments							
DF2	1060 Pressure Zone	$3,640,000	Timing of Project Based on Timing of Future Developments							
DF3	Eatonville Highway W 8-inch Water Main	$2,255,000	Timing of Project Based on Timing of Future Developments							
Total Estimated Project Costs of Developer Funded Improvements		**$7,163,000**								

1: Project may be postponed to approximately 2019 if CIP F12 and M7 are successful.
2: Project may be postponed to approximately 2019 if CIP F12 and M7 are successful.
3: Project completed in-house by the Town in 2012.

Table 9-7
Proposed Improvements Implementation Schedule with Successful Water Treatment Plant Leakage Improvements

No.	Description	Estimated Cost (2012 $$)	20-Year Schedule of Improvements Planned Year of Project and Estimated Cost in 2012 $$ 2013	2014	2015	2016	2017	2018	2019-24	2025-32
	Water Main Improvements									
WM1	Annual Water Main Replacement Program	$10,639,000	$0K	$0K	$0K	$0K	$0K	$200K	$1,200K	$9,239K
	Pressure Zone Improvements									
PZ1	1077 Zone Improvements	$135,000					$135K			
	Pressure Reducing Station Improvements									
PRV1	Ridge Road PRV and Water Main Replacement	$130,000							$130K	
	Facility Improvements									
F1	Water Treatment Plant Replacement Membranes	$405,000		$135K					$135K	$135K
F2	Water Treatment Facility Third Skid	$966,000							$966K	
F3	Water Treatment Facility Expansion	$2,500,000								$2,500K
F4	Water Rights Claim Investigation	$20,000			$10K	$10K				
F5	Increase Monitoring of Existing Sources	$10,000	$5K		$5K					
F6	River Diversion Improvements	$125,000				$125K				
F7	Alternative Water Source Feasibility Study	$200,000			$14K	$14K	$172K			
F8	Additional Water Rights and Source of Supply	$9,800,000							$9,800K	
F9	Well Nos. 1 and 2 Improvements	$500,000							$500K	
F10	Well No. 5 Abandonment	$10,000					$10K			
F11	Clear Well No. 3 Construction	$235,000							$235K	
F12	Clear Well No. 1 and No. 2 Rehabilitation	$133,000	$133K							
F13	1050 Zone Reservoir	$1,339,000								$1,339K
F14	996 Zone Reservoir Roof Repair	$65,000	$65K							
F15	996 Zone Reservoir Replacement	$984,000							$984K	
F16	Center Street Booster Pump Station Improvements	$354,000								$354K
F17	Hilltop Booster Pump Station Improvements	$572,000							$572K	
F18	Telemetry and Supervisory Control Improvements	$34,000	$34K							
F19	Telemetry and Supervisory Control Expansion	$237,000							$237K	
	Miscellaneous Improvements									
M1	Annual PRV Testing and Inspection	$40,000	$2K	$2K	$2K	$2K	$2K	$2K	$12K	$16K
M2	1050 Zone Reservoir Level Reading Improvement	$8,000			$8K					
M3	Update the Water Development and Construction Standards	$10,000					$10K			
M4	Update the Water Sections of the Eatonville Municipal Code	$8,000		$1K	$4K	$4K				
M5	Hydraulic Model Calibration	$13,000						$13K		
M6	Leak Identification at the Water Treatment Plant Site	$5,000	$5K							
M7	Water Use Efficiency Program and Leak Detection	$75,000	$2K	$2K	$2K	$5K	$5K	$39K	$12K	$8K
M8	Cross Connection Control Program	$20,000	$1K		$2K	$1K	$1K	$1K	$6K	$8K
M9	Watershed Control Program	$38,000	$1K	$1K	$2K	$8K	$8K	$5K	$6K	$8K
M10	Billing System Modificaitons[1]	$0								
M11	Comprehensive Water System Plan Addendum	$10,000		$10K						
M12	Comprehensive Water System Plan Update (Every 6 years)	$370,000	$10K						$120K	$240K
Total Estimated Project Costs of Town Funded Improvements		**$29,990,000**	**$258K**	**$151K**	**$49K**	**$168K**	**$343K**	**$260K**	**$14,915K**	**$13,847K**
	Developer Funded Improvements									
DF1	1140 Pressure Zone	$1,268,000	Timing of Project Based on Timing of Future Developments							
DF2	1060 Pressure Zone	$3,640,000	Timing of Project Based on Timing of Future Developments							
DF3	Eatonville Highway W 8-inch Water Main	$2,255,000	Timing of Project Based on Timing of Future Developments							
Total Estimated Project Costs of Developer Funded Improvements		**$7,163,000**								

1: Project completed in-house by the Town in 2012.

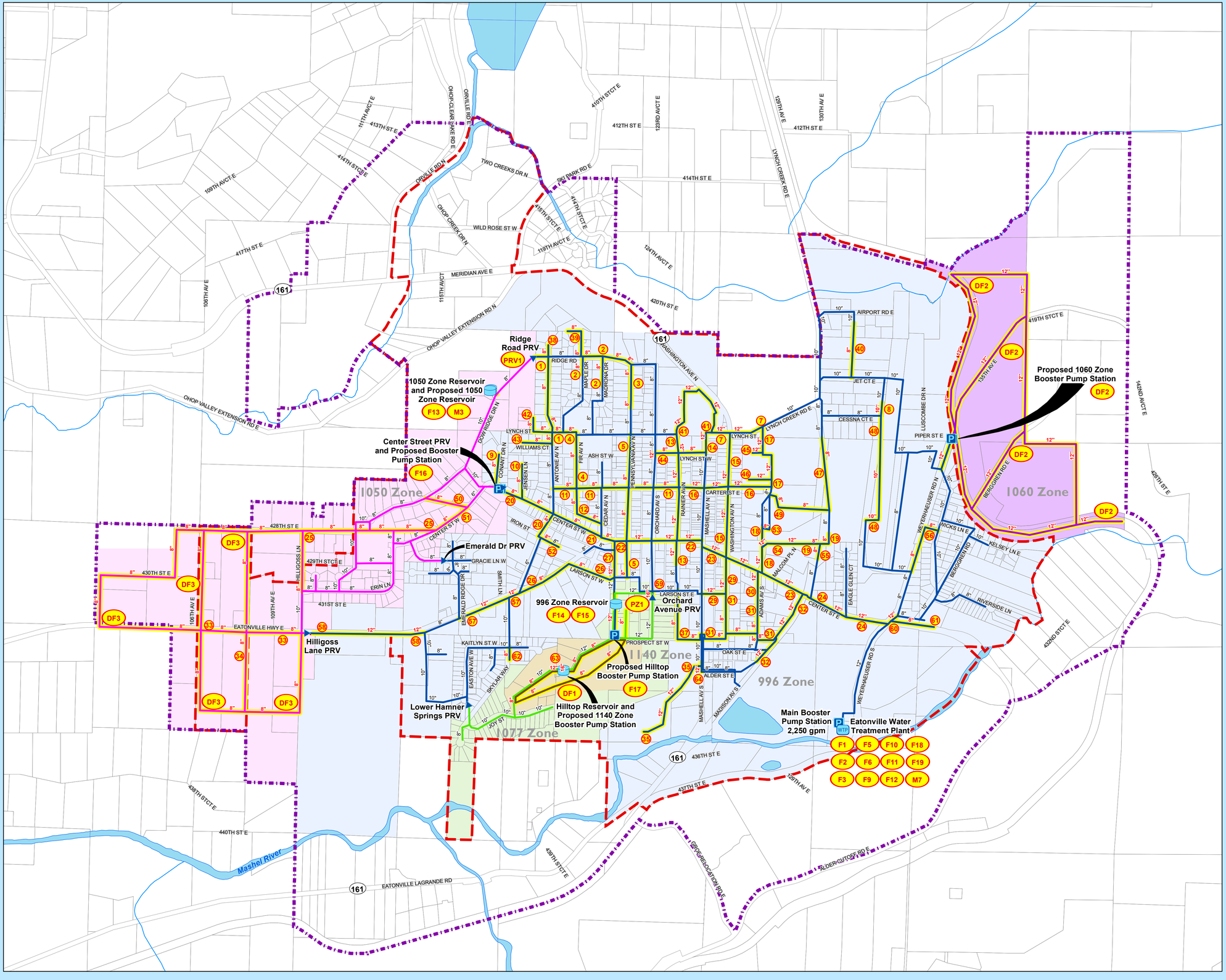
Table 9-8
Future Developer Funded Improvement Projects (Beyond 20-year)

No.	Description	Estimated Cost (2012 $$)	20-Year Schedule of Improvements Planned Year of Project and Estimated Cost in 2012 $$							
			2013	2014	2015	2016	2017	2018	2019-24	2025-32
Future Developer Funded Improvements										
FDF1	Ohop Valley North Water Main	$2,514,000	Timing of Project Based on Timing of Future Developments							
FDF2	Ohop Valley South Water Main	$2,531,000	Timing of Project Based on Timing of Future Developments							
FDF3	Ohop Valley 996 Zone Connection, 870 Zone PRV and 745 Zone PRV	$591,000	Timing of Project Based on Timing of Future Developments							
FDF4	Ohop Valley 1050 Zone Connection, 870 Zone PRV and 745 Zone PRV	$369,000	Timing of Project Based on Timing of Future Developments							
FDF5	Northeast Quarry 12-inch Water Main	$825,000	Timing of Project Based on Timing of Future Developments							
FDF6	1170 Pressure Zone	$3,385,250	Timing of Project Based on Timing of Future Developments							
FDF7	North 915 Pressure Zone	$939,000	Timing of Project Based on Timing of Future Developments							
FDF8	430th Street East Residential Water Main	$1,946,000	Timing of Project Based on Timing of Future Developments							
FDF9	South 915 Pressure Zone	$3,173,000	Timing of Project Based on Timing of Future Developments							
FDF10	Southeast Eatonville 12-inch Water Main	$561,000	Timing of Project Based on Timing of Future Developments							
FDF11	South Eatonville Subarea 12-inch and 8-inch Water Main	$1,709,000	Timing of Project Based on Timing of Future Developments							
FDF12	880 Pressure Zone 1077 Zone Connection and 880 Zone PRV	$251,000	Timing of Project Based on Timing of Future Developments							
FDF13	880 Pressure Zone	$1,245,000	Timing of Project Based on Timing of Future Developments							
FDF14	437th Street East Residential Water Main	$1,285,000	Timing of Project Based on Timing of Future Developments							
Total Estimated Project Costs of Developer Funded Improvements		**$21,324,250**								

Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

FIGURE 9-1
PROPOSED WATER SYSTEM IMPROVEMENTS



Legend

- Town Limits
- Eatonville Urban Growth Boundary

Water Infrastructure

- Water Treatment Plant
- Reservoir
- BPS
- PRV

Water Main

- 996 Zone
- 1050 Zone
- 1060 Zone
- 1077 Zone
- 1140 Zone
- Proposed Water Main

Pressure Zone

- 996 Zone
- 1050 Zone
- 1060 Zone
- 1077 Zone
- 1140 Zone

N

1 INCH = 600 FEET

0 600 1,200

DRAWING IS NOT TO SCALE IF BAR IS NOT 2" LONG

RH2 ENGINEERS PLANNERS SCIENTISTS

REV DATE: 10/17/2012

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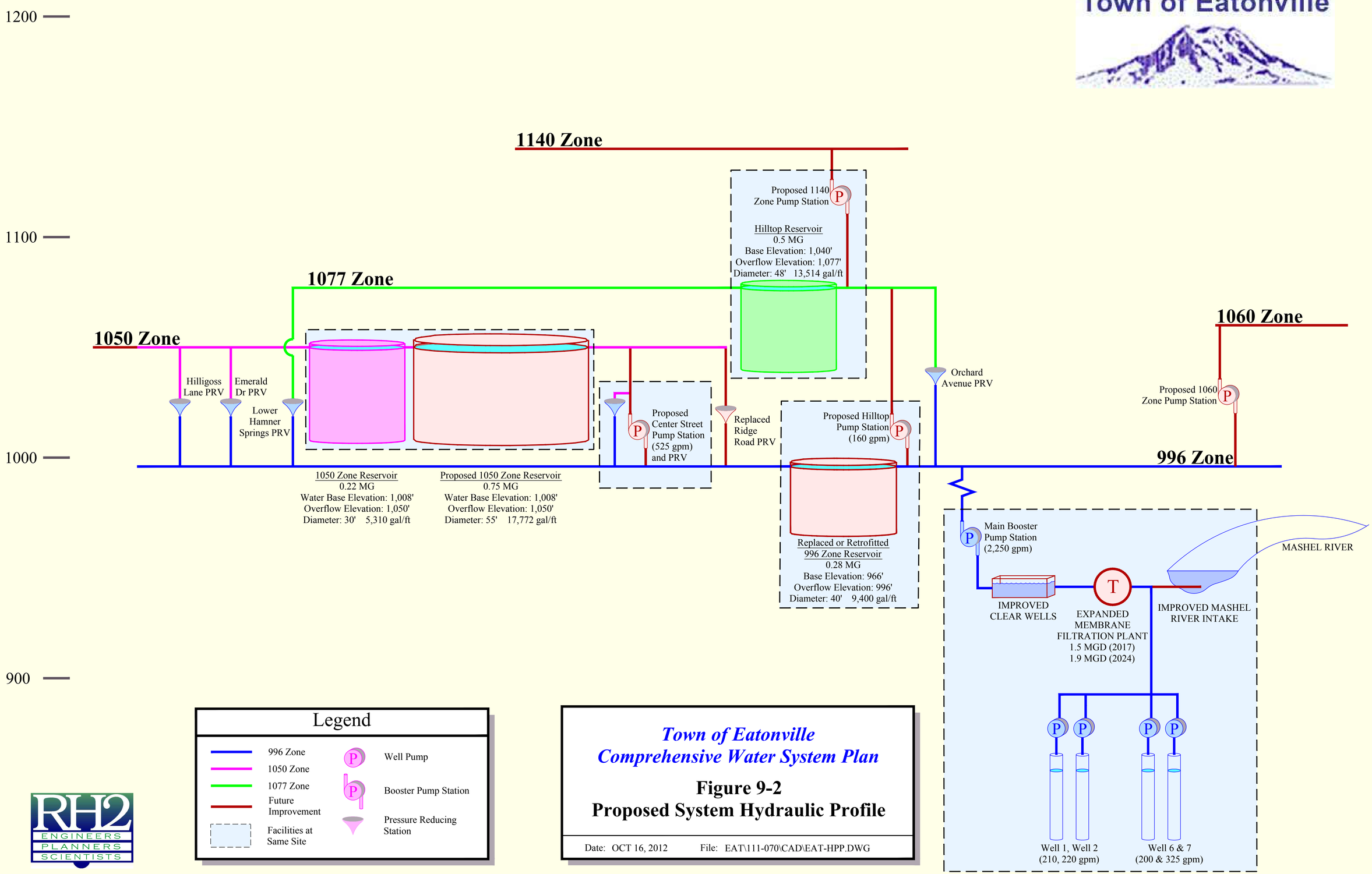
Town of Eatonville



RH2 ENGINEERS PLANNERS SCIENTISTS

Town of Eatonville
Comprehensive Water System Plan

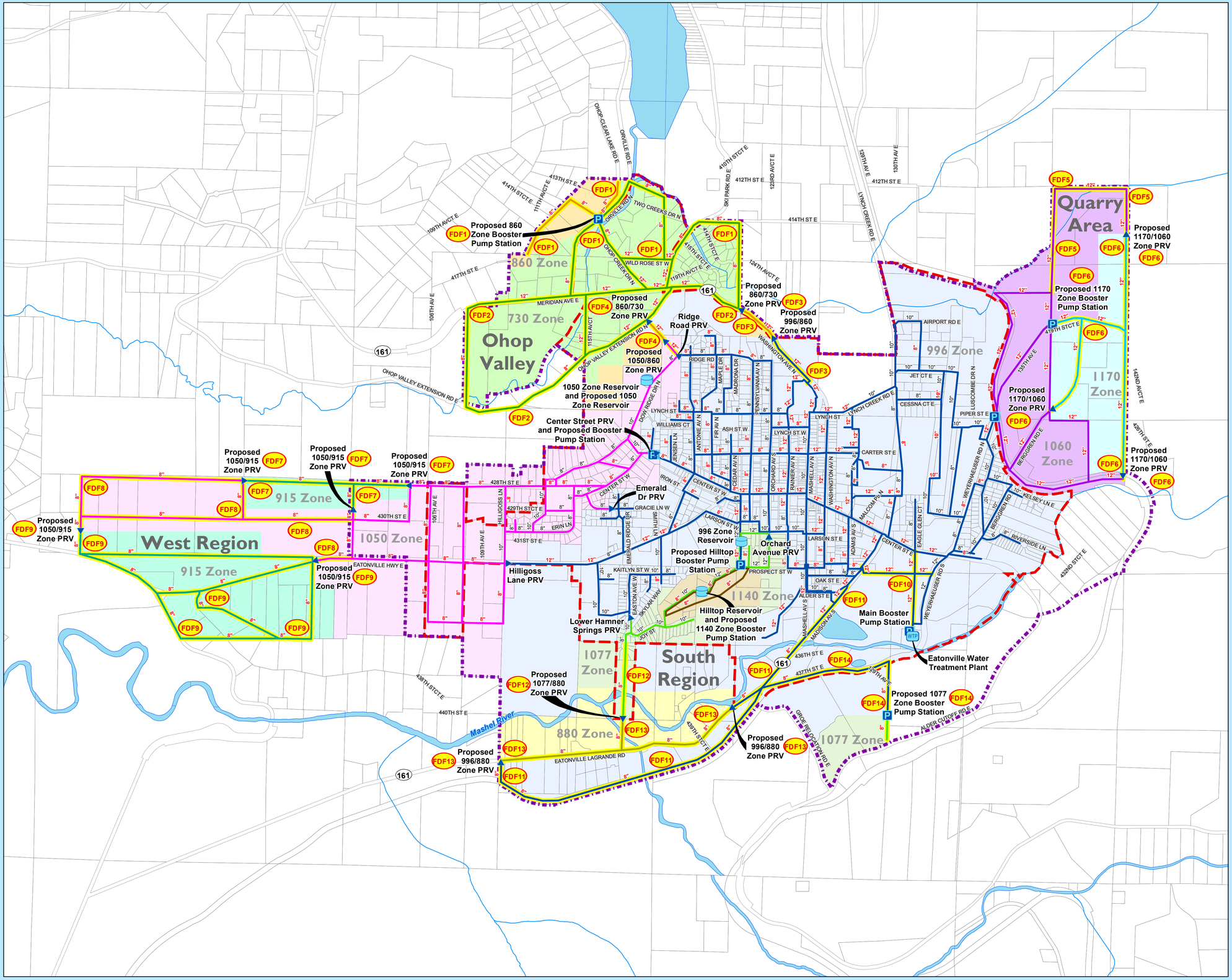
Figure 9-2
Proposed System Hydraulic Profile

Date: OCT 16, 2012 File: EAT\111-070\CAD\EAT-HPP.DWG

Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

FIGURE 9-3
PROPOSED BEYOND 20-YEAR WATER SYSTEM IMPROVEMENTS



Legend

- Town Limits
- Eatonville Urban Growth Boundary

Water Infrastructure

- Water Treatment Plant
- Reservoir
- BPS
- PRV

Water Main

- 730 Zone
- 860 Zone
- 880 Zone
- 915 Zone
- 996 Zone
- 1050 Zone
- 1060 Zone
- 1077 Zone
- 1140 Zone
- 1170 Zone
- Proposed Future Developer Funded Water Main

Pressure Zone

- 730 Zone
- 860 Zone
- 880 Zone
- 915 Zone
- 996 Zone
- 1050 Zone
- 1060 Zone
- 1077 Zone
- 1140 Zone
- 1170 Zone

1 INCH = 800 FEET

0 800 1,600

DRAWING IS NOT TO SCALE IF BAR IS NOT 2" LONG

RH2 ENGINEERS PLANNERS SCIENTISTS

REV DATE: 2/13/2013

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Financial Analysis

10

INTRODUCTION

The objective of a water system financial plan is to identify the total cost of providing water service, as well as provide a financial program that allows the water utility to remain financially viable during execution of its 6-year (2013-2018) and 20-year (2013-2032) Capital Improvement Program (CIP). This viability analysis considers the historical financial condition of the utility, the sufficiency of utility revenues to meet current and future financial and policy obligations, and the financial impact of executing the CIP. Furthermore, the financial plan provides a review of the utility's current rate structure with respect to rate adequacy, water conservation, and customer affordability.

PAST FINANCIAL PERFORMANCE

This section includes a historical summary of financial performance as reported by the Town of Eatonville (Town) on the Fund Resources and Uses Arising From Cash Transactions statement. The Town operates on a cash basis and does not track accruals, depreciation, assets or liabilities.

The Town's past financial performance is summarized as follows:

- Revenues from Water Charges have been going up to meet increasing expenses, additional staffing, and building working capital reserves.
- The Town continues payment on outstanding state loans and an interfund loan from the sewer utility.
- System Buy-In Fee revenue decreased significantly as growth slowed, with no revenue in 2011 and 2012.

Table 10-1 shows a summary of 2007 through 2011 annual cash performance, with 2012 preliminary, unaudited year-end performance.

Table 10-1
Water Fund Annual Cash Flow Summary

410 Water Fund	2007	2008	2009	2010	2011	2012
Beginning Cash	**$ 110,414**	**$ 43,330**	**$ 19,539**	**$ 19,592**	**$ 175,950**	**$ 294,924**
Permit Water	-	-	-	21,572	37,130	200
State Generated Revenues						
331 20 70 02 FEMA Reimbursement For Storm	-	-	4,192	10,974	-	3,989
336 34 10 01 Alternative Water Source Grant		-	-	-	-	5,636
337 34 01 00 Ecology Aquafir	-	-	-	42,319	-	-
Charges for Services						
343 40 00 00 Water Charges	568,356	627,575	736,045	781,773	845,598	871,047
343 40 00 01 System Buy-in Fees	49,380	56,369	7,100	30,150	-	-
343 40 00 02 Meter Installation	4,727	4,576	-	300	-	-
343 40 10 00 Late Penalties	6,566	2,172	7,588	8,075	11,254	10,371
343 90 10 00 Miscellaneous Revenues	21,872	1,540	622	15	4,394	1,216
Micellaneous Revenues						
361 11 04 10 Investment Interest	1,068	1,580	258	62	117	71
362 40 00 02 Rent (Verizon Tower)	7,015	5,831	6,004	5,954	6,077	6,231
369 90 00 00 Construction Fees/Miscellanceous Fees	150	4,583	1,673	286	4,368	22
Non Revenues						
381 10 00 00 Interfund Loan Recovery	200,000	-	-	-	-	-
382 20 34 01 Water Comp Plan	10,000	-	-	-	-	-
Total Revenue	**979,548**	**747,556**	**783,022**	**921,072**	**1,084,888**	**1,193,706**
Water Utilities						
534 10 40 00 Water Admin Professional	1,585	-	-	-	-	-
534 10 31 00 Water Operating Supplies	38,669	40,862	40,077	49,036	37,189	30,732
534 10 32 00 Water Fuel	5,455	5,614	1,914	2,642	3,070	6,470
534 10 41 00 Water Professional Services	5,408	21,205	9,239	10,166	28,386	12,505
534 10 42 00 Water Communications	5,627	7,083	6,617	7,350	7,892	8,086
534 10 44 00 Water Advertising	45	12	-	-	-	50
534 10 46 00 Water Insurance	15,500	13,050	15,000	15,000	17,246	25,210
534 10 49 00 Water Dues & Subscriptions	3,421	2,574	3,207	3,128	3,123	1,836
534 80 21 00 Water Uniforms	566	784	330	439	400	363
534 80 34 00 Water Inventory Purchases	21,112	8,344	1,687	1,751	3,785	2,921
534 80 35 00 Water Tools & Minor Equip	2,853	8,586	4,110	1,406	95	-
534 80 47 01 Water Utility Services	25,018	29,275	29,078	35,480	28,269	30,343
534 80 49 01 Water Miscellaneous	370	363	1,127	654	751	1,114
534 80 53 00 Water Utility Taxes	32,310	31,183	30,941	43,702	43,235	69,384
534 80 53 01 Water Excise Tax	67	6,722	2,904	-	-	-
534 40 43 00 Water Training	2,604	4,613	2,979	5,025	3,000	200
534 80 10 00 Water Operations Salary	63,973	50,356	55,032	71,953	108,856	161,196
534 80 20 00 Water Operations Benefits	23,658	15,366	19,104	25,498	35,730	63,574
534 80 48 00 Water Repairs & Maintenance	24,451	22,228	37,557	16,172	23,664	12,557
581 34 90 00 Interfund Loan From Sewer	-	64,139	64,000	64,000	64,000	64,000
Debt Service	311,205	308,767	306,933	284,850	268,465	265,991
Capital Expenditures						
594 34 61 00 Main Replacement	187,109			5,303		
594 34 61 00 Capital Construction			21,967			
594 34 62 00 Aquifer Recharge		1,545	28,831	13,488		
594 34 63 00 Water Filtration Plant	105,210					
594 34 63 01 Water Comp Plan Update	-	-	-	-	3,293	73,437
594 34 63 02 Rainier			3,099			
594 34 64 00 Remote Read Meter		10,595	2,694	10,477		
Interfund Transfers						
597 34 90 00 Admin Fees	60,000	74,750	75,000	85,000	109,516	-
Total Expenditures	**$ 936,218**	**$ 728,016**	**$ 763,429**	**$ 752,522**	**789,965**	**829,968**
Fund Ending Balance	**$ 43,330**	**$ 19,539**	**$ 19,592**	**$ 168,550**	**$ 294,924**	**$ 363,738**

FINANCIAL STRUCTURE

This section summarizes the current financial structure of the water utility, which is used as the baseline for the capital financing strategy and financial forecast developed for this financial plan.

Funds

The Town maintains Water Fund 410 which contains all utility-related cash-flow activity, including both operating and capital revenues, expenditures and debt payments.

FINANCIAL POLICIES

Minimum Fund Balance

An operating reserve is designed to provide a liquidity cushion to ensure that adequate cash working capital will be maintained to deal with significant cash balance fluctuations, such as seasonal fluctuations in billings and receipts, unanticipated cash expenses or lower than expected revenue collections.

A capital contingency reserve is an amount of cash set aside in case of an emergency should a piece of equipment or a portion of the utility's infrastructure fail unexpectedly. Additionally, the reserve could be used for other unanticipated capital needs, including capital project cost overruns.

In order to ensure sufficient cash management levels in each of the funds, separate minimum policies for each purpose are used in this analysis. Although the Town maintains a single Water Fund, the analysis will track capital and operating cash flow and reserve levels separately. The financial plan incorporates a minimum balance target of 60 days of operations and maintenance O&M) in the Operating Fund. Based on the $499,291 in operating expenses identified in 2013, the minimum operating reserve level is $82,075.

A minimum balance equal to 1% of system assets is targeted for the minimum Capital Reserve. Based on $4.2 million in assets (2011 year-end) and $327,847 of CIP through 2013, the minimum Capital Reserve is $45,436 in 2013.

System Reinvestment

The purpose of system reinvestment funding is to provide for the replacement of aging system facilities to ensure sustainability of the system for ongoing operation. Each year, the utility's assets lose value, and as they lose value they move toward eventual replacement. This accumulating loss in value and future liability is typically measured for reporting purposes through an annual depreciation expense, which is based on the original cost of the asset over its anticipated useful life. While this expense reflects the consumption of the existing asset and its original investment, the replacement of that asset will likely cost much more when factoring in inflation and construction conditions. Therefore, the added annual replacement liability is even greater than the annual depreciation expense.

One approach aimed at mitigating the accumulating asset replacement liability, as well as current rate impacts, is to fund an amount from rates equal to annual depreciation expense, net of annual debt principal repayment. Annual debt principal payments are one source of annual equity contribution to the system. Using annual depreciation expense as the measure of annual equity loss, and basis for a

system reinvestment policy, it is appropriate then, to reduce the annual depreciation expense by the annual equity contribution, as measured by debt principal repayment. The analysis provided herein incorporates system reinvestment funding using annual depreciation expense net of annual debt principal repayment.

The Town operates on a cash basis and does not track accruals or asset balances and depreciation. The Town does maintain limited asset records that allow an estimate of depreciation expense for the purpose of calculating an appropriate level of annual system reinvestment funding. At current levels, annual debt principal repayment significantly outweighs the estimated annual depreciation, resulting in no projected system reinvestment funding. Given the limited asset records, potentially understating the utility's estimated depreciation, and the degree to which the Town has relied on debt to finance the existing system, the Town will evaluate a minimum level of annual rate funded system reinvestment when completing the next water rate study.

Debt Management

The Town has five outstanding Public Works Trust Fund (PWTF) loans, one Drinking Water Revolving Fund loan and an interfund loan from the sewer utility. Annual debt repayment makes up 40 percent of the water revenue requirement in 2013.

The Town's outstanding water utility debt principal - $3.5 million - makes up 82 percent of the estimated total $4.2 million in water assets. The industry benchmark is to maintain debt at no greater than 60 percent of equity assets. Current asset records are potentially incomplete and might therefore overstate the percentage of the existing system that is debt financed.

AVAILABLE FUNDING ASSISTANCE AND FINANCING

Feasible long-term capital funding strategies must be defined to ensure adequate resources are available to fund the CIP. In addition to the utility's resources, such as accumulated cash reserves, rate-funded capital and connection charges, capital needs can be met from outside sources such as grants, low interest loans and bond financing.

Utility Resources

Utility resources appropriate for funding capital needs include accumulated cash above the operating reserve threshold; rate revenues designated for capital spending purposes; and capital related revenues, such as System Buy-In Fees (SBFs) and other connection fees.

Connection Charge

A connection charge (referred to as System Buy-In Fee by the Town), as provided for in RCW 35.92.025, refers to a one-time charge imposed on new customers as a condition of connecting to the utility system. The purpose of the connection charge is two-fold: 1) to promote equity between new and existing customers; and 2) to provide a source of revenue to fund capital projects. Connection charges provide a way for new customers to share in the capital costs incurred to support their addition to the system. Revenues from connection charges provide a source of cash flow that is used to support utility capital needs; however, the revenue can only be used to fund utility capital projects or pay debt service incurred to finance capital projects. In the absence of such

charges, growth-related capital costs would be borne in large part by existing customers. In addition, the net investment in the utility already collected from existing customers, whether through rates, charges and/or assessments, would be diluted by the addition of new customers, effectively subsidizing new customers with prior customers' payments. To establish equity, connection charges should recover a proportionate share of the existing and future infrastructure costs from a new customer. From a financial perspective, a new customer should become financially equivalent to an existing customer by paying the charge.

The Town currently imposes a connection charge (SBF) of $65 per lineal foot, not to exceed $5,000 for single family residential new water customers. In order to adopt a structure more consistent with industry practice and customer equity, the updated charge is based on a fee per equivalent residential unit (ERU) – as determined by relative meter size.

Based on current system investment, projected infrastructure needs identified in the 20-year CIP, and system capacity, an updated charge of $7,617 per ERU is calculated for 2013. The rate forecast assumes the charges would be updated as of January 1, 2014. The updated SBF calculation and schedule of charges are as follows:

Table 10-2a
System Buy-In Fee Calculation

Component	Cost Basis	Customer Base	Charge per Unit
Existing Facilities	$ 3,350,463	2,580	$1,299
Future Facilities	16,302,417	2,580	$6,319
Total	**$ 19,652,880**		**$7,617**

Table 10-2b
SBF Schedule of Charges

Meter Size	Meter Capacity Ratio	Proposed SBF
5/8 x 3/4-inch	1.00	$7,617
1-inch	2.50	$19,043
1 1/2-inch	5.00	$38,087
2-inch	8.00	$60,939
3-inch	16.00	$121,878
4-inch	25.00	$190,435
6-inch	50.00	$380,870
8-inch	80.00	$609,392

Local Facilities Charge

While a connection charge is the manner in which new customers pay their share of general facilities costs, local facilities funding is used to pay the costs of local facilities that connect each property to the system's infrastructure. Local facilities funding is often overlooked in a rate forecast since it is funded upfront by either connecting customers and developers or through an assessment to properties, but typically not from rates. Although these funding mechanisms do not provide a capital revenue source toward funding CIP costs, the discussion of these charges is included because they impact the new system customers.

There are a number of mechanisms that can be considered toward funding local facilities. One of the following scenarios typically occurs: a) the utility charges a connection fee based on the cost of the local facilities (under the same authority as the connection charge); b) a developer funds the extension of the system to their development and turns those facilities over to the utility (contributed capital); or c) a local assessment is set up called a Utility Local Improvement District (ULID/LID) that collects property assessments from benefited properties.

A Local Facilities Charge (LFC) is a variation of the connection charge authorized by RCW 35.92.025. It is a Utility-imposed charge to recover the cost related to extending service to local properties. Often called and applied as a front-footage charge imposed based on the length of water main footage "fronting" a particular property, it is usually implemented as a reimbursement mechanism to a utility for the cost of a local facility that directly serves a property. It is a form of connection charge and, as such, can accumulate up to ten years of interest. LFCs typically apply to instances where no developer-installed facilities are needed through developer extension due to the prior existence of available mains already serving the developing property.

A Developer Extension is a requirement that a developer install onsite and sometimes offsite improvements as a condition of extending service. These are in addition to the connection charge required and must be built to utility standards. Utilities are authorized to enter into developer extension agreements under RCW 35.91.020. Part of the developer extension agreement between a utility and developer might include a latecomer agreement, resulting in a latecomer charge to new connections to the developer extension.

Latecomer Charges are a variation of developer extensions whereby a new customer connecting to a developer-installed improvement makes a payment to a utility based on their share of the developer's cost (RCW 35.91.020). The utility passes this payment to the developer who installed the facilities. This is part of the developer extension process, and defines the allocation of costs and records latecomer obligations on the title of affected properties. No interest is allowed, and the reimbursement agreement cannot exceed 15 years in duration.

A LID/ULID is another mechanism for funding infrastructure that assesses benefited properties based on the special benefit received by the construction of specific facilities (RCW 35.43.042). Most often used for local facilities, some ULIDs also recover related general facilities costs. Substantial legal and procedural requirements can make this a relatively expensive process, and there are mechanisms by which a ULID can be rejected by a majority of property ownership within the assessment district boundary.

Outside Sources

Government Programs

Grants and low cost loans for Washington State utilities are available from the Departments of Ecology and the Department of Commerce. Each includes programs for which the Town might be eligible, but are primarily targeted at sewer programs or low income and/or rural communities.

Washington State Department of Ecology

The Department of Ecology (Ecology) Water Quality Program administers three major funding programs that provide low interest loans, grants or loans and grant combinations for projects that protect, preserve and enhance water quality in Washington State. These are primarily for wastewater projects and are not applicable to the Town's water CIP. Further detail is available in the Funding Guidelines found at http://www.ecy.wa.gov/programs/wq/funding/funding.html.

Washington State Department of Commerce

The Department of Commerce has four grant and loan programs that the Town could potentially be eligible for:

Community Development Block Grants General Purpose Grant;

Community Economic Revitalization Board Grant and Loan Program;

Public Works Trust Fund Loan Program; and

Drinking Water State Revolving Fund Loan Program.

Community Development Block Grants (CDBG) General Purpose Grants

CDBGs are made available to Washington State small cities, towns and counties in carrying out significant community and economic development projects that principally benefit low and moderate income persons. Eligible applicants are Washington State cities and towns with a population less than 50,000 and counties with a population less than 200,000 that are non-entitlement jurisdictions or are not participants in a HUD Urban County Entitlement Consortium. Eligible projects include public facilities for water, wastewater, storm sewer and streets. The application period is September through November annually.

Community Economic Revitalization Board (CERB)

CERB, a division of the Washington State Department of Commerce, primarily offers low cost loans; grants are made available only to the extent that a loan is not reasonably possible. The CERB targets public facility funding for economically disadvantaged communities, specifically for job creation and retention. Priority criteria include the unemployment rates, number of jobs created and/or retained, wage rates, projected private investment, and estimated state and local revenues generated by the project. Traditional construction projects are offered at a maximum dollar limit of $1 million per project. A local match of 25 percent is targeted.

Eligible applicants include cities, towns, port districts, special purpose districts, federally recognized Indian tribes and municipal corporations.

The CERB's policy is that all loans will be secured by a general obligation pledge of the taxing power of the borrowing entity. Terms do not exceed 20 years, including available payment deferral of interest and principal for up to 5 years. Interest rates match the most current rate of Washington State bonds (not to exceed 10 percent). Application deadlines are 45 days prior to a CERB meeting, which are scheduled 6 times per year. For more information, see www.commerce.wa.gov/commissions/CommunityEconomicRevitalizationBoard/Pages/CERB-Traditional-Programs.aspx.

Public Works Trust Fund (PWTF)

Cities, towns, counties and special purpose districts are eligible to receive loans from the Public Works Board, a division of the Washington State Department of Commerce. Water, sewer, storm, roads, bridges and solid waste/recycling infrastructure projects are eligible, as well as projects for some non-traditional systems that were added in the 2012 funding update.

The 2014 funding cycle makes available up to $400 million, with $15 million available per jurisdiction. The standard loan offer is for 1% interest over 20 years of repayment, though terms can vary by repayment term and can be reduced to recognize distressed financial status. Among revisions to the program in 2012 is the elimination of the required local funds match.

For more information, see: http://www.pwb.wa.gov/

Drinking Water State Revolving Loan Program (DWSRL)

The DWSRL is jointly administered by the Public Works Board and the Department of Health. The program is intended to improve drinking water systems and protect public health for publicly and privately owned systems.

There is no match required, terms are not to exceed 20 years and project completion time is 36 months after loan execution. The loan limit is $3 million, with a loan fee of 1 percent, and interest rates range from 0 to 1.5 percent depending upon the number of households at or below the county's median income. Applications are accepted annually in May.

For more information, see: http://www.doh.wa.gov/ehp/dw/our_main_pages/dwsrf.htm

Bond Financing

General Obligation Bonds

General obligation (GO) bonds are secured by the full faith and credit of the issuing agency, committing all available tax and revenue resources to debt repayment. With this high level of commitment, GO bonds have relatively low interest rates and few financial restrictions. However, the authority to issue GO bonds is restricted in terms of the amount and use of the funds, as defined by the Washington State Constitution and statute. Specifically, the amount of debt that can be issued is linked to assessed valuation.

RCW 39.36.020 states:

(ii) Counties, cities, and towns are limited to an indebtedness amount not exceeding one and one-half percent of the value of the taxable property in such counties, cities, or towns without the assent of three-fifths of the voters therein voting at an election held for that purpose.

(b) In cases requiring such assent counties, cities, towns, and public hospital districts are limited to a total indebtedness of two and one-half percent of the value of the taxable property therein.

While bonding capacity can limit availability of GO bonds for utility purposes, these can sometimes play a valuable role in project financing. A rate savings may be realized through two avenues: 1) the lower interest rate and related bond costs; and 2) the extension of repayment obligation to all tax-paying properties (not just developed properties) through the authorization of an ad valorem property tax levy.

Revenue Bonds

Revenue bonds are commonly used to fund utility capital improvements. The debt is secured by the revenues of the issuing utility and the debt obligation does not extend to a utility's other revenue sources. With this limited commitment, revenue bonds typically bear higher interest rates than GO bonds and also require security conditions related to the maintenance of dedicated reserves (a bond reserve) and financial performance (added bond debt service coverage). The utility agrees to satisfy these requirements by ordinance as a condition of the bond sale.

Revenue bonds can be issued in Washington State without a public vote. There is no bonding limit, except perhaps the practical limit of the utility's ability to generate sufficient revenue to repay the debt and provide coverage. In some cases, poor credit might make issuing bonds problematic.

Funding Options Summary

An ideal funding strategy would include the use of grants and low cost loans when debt issuance is required. However, these resources are very limited and competitive in nature and do not provide a reliable source of funding for planning purposes (unless already approved). It is recommended that the Town pursue these funding avenues but assume bond financing to meet needs above the utility's available cash resources. GO bonds may be useful for special circumstances; however, due to the bonding capacity, limits are most often reserved for other Town (non-utility) purposes. Revenue bonds are a more reliably available financing mechanism for utility needs. The capital financing strategy developed to fund the CIP assumes the following funding priority:

- Accumulated capital cash reserves
- Annual revenue collections from SBFs
- Annual transfers of rate-funded capital or excess cash (above minimum balance targets) from operating accounts
- Interest earnings on capital fund balances and other miscellaneous capital resources
- Revenue bond financing

FUNDING AND FINANCING THE CIP

The forecast of capital project funding is based on the 2013 through 2032 CIP. Costs are stated in 2012 dollars and escalated to the year of planned spending at an annual inflation rate of 3.0 percent, based on the change in the ENR index for the most recent 12 month period. The CIP identifies a 20-year total of $43.2 million ($37.2 million current dollars) of projects, net of expensed capital

outlay. The 6-year forecast includes $980,099 ($883,000 current dollars), net of expensed capital outlay.

Table 10-3
Capital Funding Projection

CAPITAL FUNDING PLAN	Six Year Forecast 2013	2014	2015	2016	2017	2018	6-Year Total	20-Year Total
CIP Projects	$ 265,740	$ 160,196	$ 51,905	$ 189,085	$ 397,051	$ 310,454	$ 1,374,431	$43,705,463
less: Expensed Capital Outlay	(11,330)	(6,365)	(43,163)	(48,397)	(228,957)	(56,120)	(394,332)	(507,358)
Total Capital Projects	$ 254,410	$ 153,831	$ 8,742	$ 140,689	$ 168,095	$ 254,333	$ 980,099	$43,198,106
Sources:								
Capital Reserves	$ 254,410	$ 65,210	$ 8,742	$ 123,552	$ 140,428	$ 24,959	$ 617,301	$ 5,880,451
Debt Issuance [1]	-	88,621	-	17,137	27,666	229,375	362,798	37,317,655
Total Sources	$ 254,410	$ 153,831	$ 8,742	$ 140,689	$ 168,095	$ 254,333	$ 980,099	$43,198,106

[1] Projected borrowing is assumed to be revenue bond issuance.

The 6-year forecast is projected to be 37 percent debt-funded. The 20-year projection shows 86.4 percent of the $43.2 million debt-financed. To move the funding mix toward a target of no more than 60 percent debt-funding, the Town will be evaluating a minimum system reinvestment funding policy with the next rate study.

Revenue Requirements Forecast

The revenue requirement analysis forecasts the amount of annual revenue that needs to be generated by rates. The analysis incorporates operating revenues, O&M expenses, debt service payments, rate funded capital needs, and any other identified revenues or expenses related to utility operations, and determines the sufficiency of the current level of rates. Revenue needs are also impacted by debt covenants (typically applicable to revenue bonds) and specific fiscal policies and financial goals of the utility.

Typically, two revenue sufficiency criteria are tested to determine the annual revenue need: 1) cash needs must be met; and 2) debt coverage requirements must be realized. In order to operate successfully with respect to these goals, both tests of revenue sufficiency must be met.

Cash Test

The cash flow test identifies all known cash requirements for the utility in each year of the 6-year forecast (2013 through 2018). Typically, these include O&M expenses, debt service payments, rate funded capital and any additions to specified reserve balances. The total annual cash needs of the utility are then compared to total operating revenues (under current rates) to forecast annual revenue surpluses or shortfalls.

Coverage Test

The coverage test is based on a commitment made by the Town when issuing revenue bonds and some other forms of long-term debt. As a security condition of issuance, the Town is required per covenant to agree that the revenue bond debt would have a higher priority for payment (a senior

lien) compared to most other utility expenditures; the only outlays with a higher lien are O&M expenses. Debt service coverage is expressed as a multiplier of the annual revenue bond debt service payment. For example, a 1.0 coverage factor would imply no additional cushion is required. A 1.25 coverage factor means revenues must be sufficient to pay O&M expenses and annual revenue bond debt service payments, plus an additional 25 percent of annual revenue bond debt service payments. The excess cash flow derived from the added coverage, if any, can be used for any utility purpose, including funding capital projects. The forecast includes a 1.25 coverage requirement for projected revenue bond issuances.

In determining the annual revenue requirement, both the cash and coverage sufficiency tests must be met. The test with the greatest deficiency drives the level of deficiency in a given year.

Financial Forecast

The financial forecast is developed from the Town's 2012 projected year-end performance, along with other key factors and assumptions, to develop a complete portrayal of the water utility's annual financial obligations. The following is a list of the key revenue and expense factors and assumptions used to develop the forecast.

- This financial plan assumes 0.24% percent annual growth to the customer base for the 6-year forecast, based on recent historical experience.
- Water rate revenues are forecasted incorporating annual customer growth and based on projected year-end 2012 water rate revenue.
- Interest earnings on cash balances are projected at 0.2 percent in 2013 phasing in to 2.0 percent by the end of the 6-year forecast.
- Operating costs are based on projected year-end 2012.
- O&M expenses are escalated at 2.5 percent per year for general cost inflation (based on 2012 CPI change). State taxes are calculated based on prevailing tax rates.
- Existing debt service schedules were provided by the Town and include five PWTF loans, a Drinking Water Revolving Fund loan and an interfund loan from Sewer.
- System reinvestment funding is based on annual depreciation net of debt principal. Since debt principal does not exceed estimated depreciation in the study period, no funding from this source is forecasted.

Although the capital funding plan is completed for the 20-year time horizon, the financial plan focuses on the 2013-2018 planning period.

Table 10-4
Revenue Requirement Forecast

REVENUE REQUIREMENTS SUMMARY	2013	2014	2015	2016	2017	2018
			Six Year Forecast			
Revenues						
Rate Revenue (with existing rates)	$ 873,122	$ 875,198	$ 877,273	$ 879,349	$ 881,424	$ 883,500
Other Revenue	200	201	201	202	202	203
Interest Earnings	223	252	648	1,412	2,191	2,723
Total Revenues	**$ 873,546**	**$ 875,650**	**$ 878,123**	**$ 880,962**	**$ 883,818**	**$ 886,426**
Expenses						
Cash Operating Expenses	$ 499,291	$ 498,095	$ 544,855	$ 559,406	$ 748,848	$ 585,217
Existing Debt Service	327,460	325,026	322,592	312,169	309,895	307,621
New Debt Service	-	6,817	6,817	8,136	10,264	27,283
Rate funded System Reinvestment	-	-	-	-	-	-
Total Expenses	**$ 826,751**	**$ 829,938**	**$ 874,265**	**$ 879,711**	**$ 1,069,006**	**$ 920,121**
Annual Net Cash Flow at Current Rate Levels	**$ 46,794**	**$ 45,713**	**$ 3,858**	**$ 1,252**	**$ (185,188)**	**$ (33,695)**
Annual Rate Adjustment	**-12.00%**	**16.48%**	**6.00%**	**6.00%**	**6.00%**	**2.50%**
Effective Annual Rate Increase	**0.00%**	**2.50%**	**6.00%**	**6.00%**	**6.00%**	**2.50%**
Cumulative Rate Adjustment	**-12.00%**	**2.50%**	**8.65%**	**15.17%**	**22.08%**	**25.13%**
Annual Net Cash Flow After Rate Adjustments	$ (27,565)	$ 65,179	$ 71,373	$ 119,929	$ (12,041)	$ 163,851
Use of Excess Reserves (Contribution to)	27,565	(65,179)	(71,373)	(119,929)	12,041	(163,851)
Net Resources to Requirements	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Days of O&M [target between 60 and 90]	*61*	*90*	*90*	*90*	*61*	*90*

Town policy states that rates are to be adjusted annually at a minimum level tied to inflation. The Town has adopted a one-time rate decrease of 12 percent in 2013 in order to off-set an adjustment to the utility tax. In 2014, it is projected that rates will return to the pre-2013 level, along with an inflationary 2.5 percent rate increase. The 16.48 percent rate increase is greater than the sum of a 12 percent and 2.5 percent combination due to a new lower rate revenue base in 2013 to which the rate increase would apply.

Beginning in 2015, three years of 6 percent rate increases are projected to fund new debt service, as well as the cost of expensed capital outlay identified in the CIP (funded directly from annual rate revenue as with other expenses of the utility).

Existing Rate Structure

The existing water rate structure consists of a base bi-monthly fee varying by size of meter, plus a two rate-block charge per 100 cubic feet (cf) for residential customers, and a single rate for all other customers. The current rate structure effectively promotes conservation.

The following table shows the existing Town water rate schedule, as well as the rate with the projected rate increases applied across-the-board to the existing rate structure components.

Table 10-5
Existing and Projected Water Rates

Meter Size	Existing 2012 Bi-Monthly Rates	Across-the-Board Rate Adjustment					
		2013 Rates -12.00%	2014 Rates 16.48%	2015 Rates 6.00%	2016 Rates 6.00%	2017 Rates 6.00%	2018 Rates 2.50%
5/8" or 3/4"	$33.10	$29.13	$33.93	$35.96	$38.12	$40.41	$41.42
1"	$52.49	$46.19	$53.80	$57.03	$60.45	$64.08	$65.68
1 1/2"	$82.94	$72.99	$85.01	$90.11	$95.52	$101.25	$103.78
2"	$118.66	$104.42	$121.63	$128.93	$136.66	$144.86	$148.48
3"	$215.48	$189.62	$220.87	$234.12	$248.17	$263.06	$269.63
4"	$320.24	$281.81	$328.25	$347.94	$368.82	$390.95	$400.72
6"	$600.56	$528.50	$615.58	$652.51	$691.66	$733.16	$751.49
Volume Charges per 100 gallons							
Single Family							
0-15,000 gallons	$0.30	$0.26	$0.31	$0.33	$0.35	$0.37	$0.38
> 15,000 gallons	$0.40	$0.35	$0.41	$0.43	$0.46	$0.49	$0.50
All Other Classes							
All Use	$0.30	$0.26	$0.31	$0.33	$0.35	$0.37	$0.38

Affordability

A common affordability benchmark for utility rates is to test the monthly median income equivalent against the existing and projected monthly utility rates. If monthly bills are less than 2.0 percent of the median household income for the demographic area, they are generally considered affordable (per PWTF and DWRF loan subsidy guidelines).

Table 10-6
Affordability Benchmark

	Current 2012	2013	2014	2015	2016	2017	2018
Annual Median Income [1]	$61,661	$62,895	$64,153	$65,436	$66,744	$68,079	$69,441
2.00% Monthly	$102.77	$104.82	$106.92	$109.06	$111.24	$113.47	$115.73
Current and Projected bi-monthly bill [2]	$69.10	$60.81	$70.83	$75.08	$79.58	$84.36	$86.47

[1] Per ACS Survey 2010 Eatonville $59,267, inflated at 2.0 percent annually per Town labor inflation rate.

[2] Assumes 12,000 gallons bi-monthly, does not include utility tax.

The forecast shows that the Town remains within the benchmark of affordability throughout the 6-year forecast period.

Conclusion

Based on the source data and assumptions used, the financial analysis indicates that the rate adjustment strategy provided herein would be sufficient to fund utility operations and the funding and financing of the CIP. This evaluation also finds that the water rates with projected rate increases would remain within the defined threshold of affordability.

APPENDIX A

Retail Water Service Area Agreement

Existing Signed Service Area Agreement

INTERLOCAL AGREEMENT
FOR ESTABLISHING WATER UTILITY SERVICE AREA BOUNDARIES
AS INDENTIFIED BY THE PIERCE COUNTY
COORDINATED WATER SYSTEM PLAN
(May 1990)

The authority for this Agreement is granted by the Public Water System Coordination Act of 1977, Chapter 70.116 RCW.

WHEREAS, Such an Agreement is required in WAC 248-56-730, Service Area Agreements-Requirements, of the Public Water System Coordination Act: and

WHEREAS, Designation of water service areas, together with the cooperation of utilities, will help assure that time, effort, and money are best used by avoiding unnecessary duplication of service; and

WHEREAS, Definite future service areas will facilitate efficient planning for, and provision of, water system improvements within Pierce County as growth occurs: and

WHEREAS, Definite water utility planning areas will help assure that water reserved for public water supply purposes within Pierce County will be utilized in the future in an efficiently planned manner,

NOW, THEREFORE, the undersigned party, having entered into this Agreement by their signature, concurs with and will abide by the following provisions:

Section 1. Lead Agency The lead agency for administrating the Pierce County Water Utility service area agreement shall be the Tacoma Pierce County Health Department unless otherwise established by the Pierce County Council.

Section 2. Service Area Boundaries. The undersigned utility acknowledges that the map(s) identifying their service area boundaries, dated 6-1-90 and included as Attachment A to this Agreement, identify the water system's future service area. The undersigned further acknowledges that there are no service area conflicts with adjacent water utilities, or where such conflict exist, agrees that no new water service will be extended within disputed areas except as stipulated in an adjudication by the Washington State Department of Social and Health Services. This interlocal agreement shall apply to service areas existing as of May 30, 1990, and to the service area boundaries identified in the above referenced maps, or to the current revisions thereof, provided that no revisions of service areas shown on these maps shall be made without prior written concurrence of the involved purveyors and such written concurrence is filed with Lead Agency.

Section 3. Common Service Area Transfer. It is understood that adjacent utilities may initially continue existing water service within the boundaries of neighboring utilities, as defined in Section 2 hereof. Such common service areas, if they exist, are described in Attachment B to this agreement. The undersigned party agrees that any water line for retail service extending outside of the service area boundary, as set forth in Section 2, shall be phased out and service transferred to the designated adjacent utility on an economic basis or by mutual agreement.

Economic basis considerations may include:

(a) A determination by the present owner of service lines that maintenance, repair, and/or replacement costs exceed attributable income.

(b) Planned or imminent major street improvements or major improvements to either or both water systems which include an opportunity to transfer service.

The terms of the transfer of service area described in this Section shall be established in a separate agreement among the adjacent utilities whose boundaries are affected. Unless otherwise set forth in said transfer agreement:

(a) The owner discontinuing service shall be responsible to provide the connection of service lines to the accepting water system, removal of existing meters, and any surface repairs as may be required by the transfer;

(b) The accepting purveyor shall install its meters and assume its meters and assume water service responsibility to the customer(s) on said water lines.

Section 4. Satellite Management Areas. This Agreement recognizes service area boundaries falling within areas designated as "interim satellite system management areas" on the maps referenced in Section 2. It is understood by the undersigned that within an interim satellite system management area the designated purveyor for new public water service shall be determined according to the priorities of service identified in WAC 248-54-620 (b) and as generally described in Attachment C to this Agreement. Prior to the adoption of the CWSP by the County and/or DSHS, the designation of service area boundaries shall be subject to the approval of the Department of Social and Health Services. It is further understood that all or part of an interim satellite management area may be designated for exclusive future service areas upon receipt by the Lead Agency of a written service area agreement signed by the utilities originally proposing future service in that area and written plans to extend future service from an existing water system; or the area may continue with the designation as a satellite system management area in

geographical areas where water service from an existing approved water system is not scheduled in the near future.

Section 5. Boundary Streets. Unless separate agreements are developed with adjacent utilities, this party agrees that the utility which is located to the north and/or west of boundary streets between this party and adjacent utilities will be entitled to provide future water service on both sides of those streets. Depth of service on boundary streets shall be limited to one platted lot or as otherwise agreed by the utilities. Existing services on boundary streets shall remain as connected unless transfer of service is agreed to by both parties.

Section 6. Boundary Adjustments. If, at some time in the future, it is in the best interest of the undersigned party to make service area boundary adjustments, such modifications must be by written concurrence of all involved utilities and the proper legislative authority(ies), and must be noted and filed with the designated Pierce County lead agency and DSHS. It is understood by the undersigned utility that it may decline to provide service within its designated service area boundary, but in that case, an applicant may be referred to other adjacent utilities or a new utility may be created and the original service area boundary will be adjusted accordingly.

Section 7. System Extension Policies. The undersigned utility agrees that in order to expand its water service area, other than by addition of retail customers to existing water mains, or to serve in the capacity of a prequalified satellite system management agency (SSMA), it shall have adopted design standards and extension policies.

The water utility or SSMA shall adopt design standards that meet or exceed the Pierce County Water System Minimum Standards and Specifications. A utility planning to extend service in unincorporated areas of Pierce County shall submit to the Lead Agency within sixty days of the approval of this agreement, a written statement of policies concerning extension of service to new properties. This statement shall identify an include the utility's method of determining cost of extensions, a current schedule of standard mining cost of extensions, a current schedule of standard rates and fees, easement requirements, and response time within which the utility will provide written notification of terms and conditions of service upon submittal of a completed bona fide application.

Municipalities further agree that if they identify a service area outside of their existing municipal corporate boundaries, the municipality will service that area to the best of their ability, reserving the right to withdraw from such water services if necessary in the best interest of the municipality.

This agreement by reference includes the following attachments:

A. Service Area Map(s) (Section 2)
B. Common Service Area Agreement (Section 3)
C. Satellite Management Service Referral Procedure (Section 4)

IN WITNESS WHEREOF, the undersigned party has executed this Agreement as of June 1, 1990.

Town of Eatonville
Water Utility

Representative

MAYOR
Title

Receipt Acknowledged:

Tacoma/Pierce County Health Department

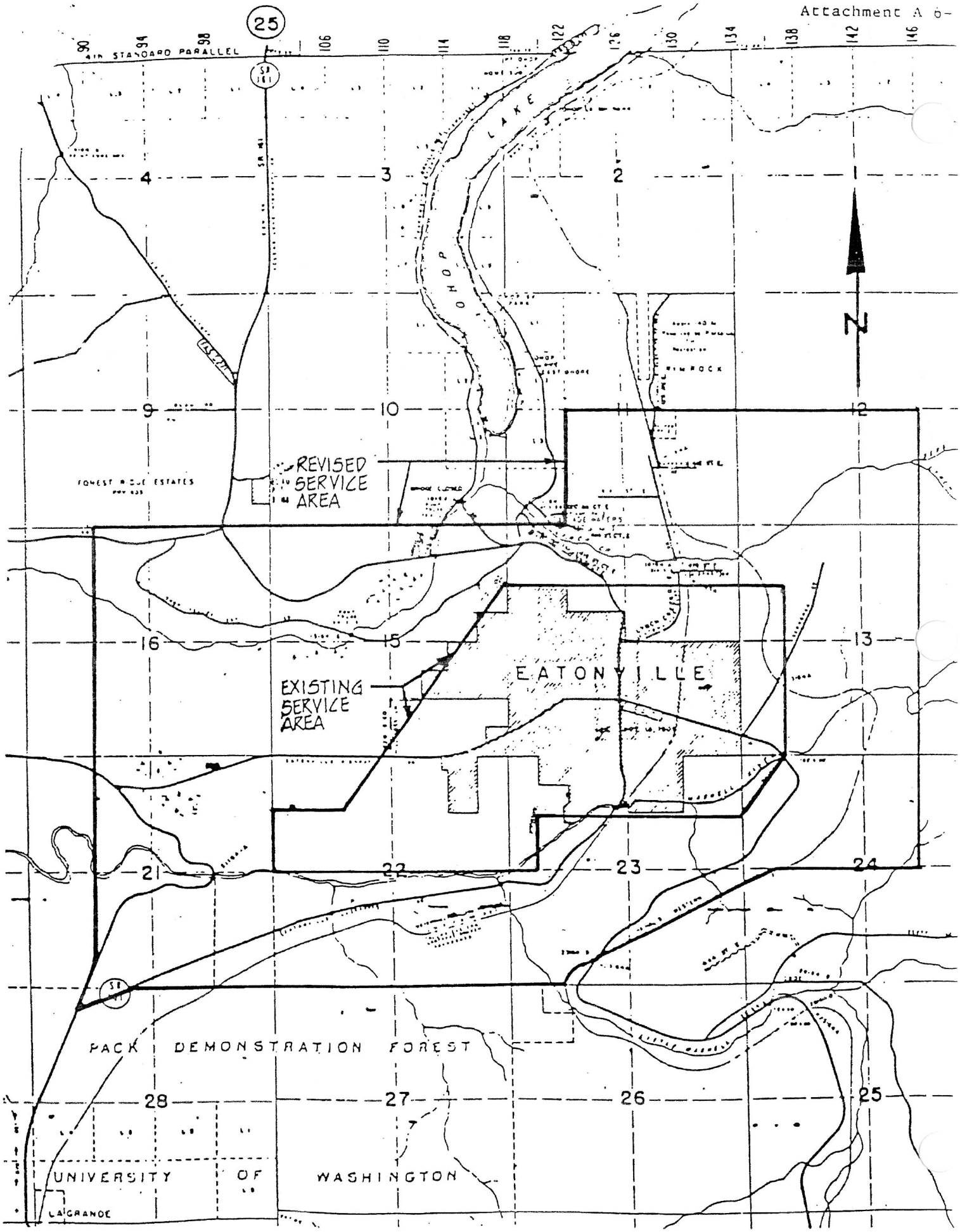
6/4/90
Date

TOWN OF EATONVILLE

SERVICE AREA OF INTERAGENCY AGREEMENT

THE FOLLOWING PROPERTIES ALL IN TWP 16, R4E, WM AS FOLLOWS:

ALL OF SECTIONS 14, 15, AND 22; EAST ½ SEC 16; EAST ½ OF THE WEST ½ SEC 16; EAST ½ SEC 21; EAST ½ OF THE WEST ½ SEC 21. THAT PROPERTY IN THE NW ¼ SEC 28 LYING NORTH OF HIGHWAY SR 161 AND EAST OF HIGHWAY SR 7. THE NORTH ½ SEC 23; AREA NORTH OF THE NORTH RIGHT-OF-WAY LINE OF THE CHEHALIS WESTERN RAILROAD IN THE SOUTH ½ OF SEC 23; NW ¼ SEC 24; WEST ½ OF THE NORTH ½ OF SEC 24; THE AREA NORTH OF THE NORTH RIGHT-OF-WAY LINE OF THE CHEHALIS WESTERN RAILROAD IN THE SW ¼ OF SEC 24; WEST ½ OF SEC 13; WEST ½ OF THE EAST ½ SEC 13, SW ¼ SEC 12; WEST ½ OF SE ¼ SEC 12; SE ¼ SEC 11, AND THE EAST ½ OF THE SW ¼ OF SEC 11.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4TH STANDARD PARALLEL
OHOP LAKE
N
REVISED SERVICE AREA
EXISTING SERVICE AREA
EATONVILLE
PACK DEMONSTRATION FOREST
UNIVERSITY OF WASHINGTON
LAGRANDE

Revised
Service Area Agreement

STANDARD SERVICE AGREEMENT
ESTABLISHING WATER UTILITY
SERVICE AREA BOUNDARIES

PREAMBLE

THIS AGREEMENT establishing water utility service area boundaries is entered into this day for purposes of identifying the external boundaries of the service area for which this water purveyor has assumed water service responsibility.

WHEREAS, service area agreements are required by WAC 246-293-250 to help assure that water reserved for public water supply purposes within Pierce County will be utilized in the future in an efficient and planned manner; and

WHEREAS, the designation of retail water service area and future service planning areas, together with the cooperation of other utilities, will help assure efficient planning to accommodate growth, avoid duplication of service, and facilitate the best use of resources; and

WHEREAS, The responsibilities applicable to water purveyors are outlined in the Pierce County Coordinated Water System Plan (CWSP) and by the adopted rules and regulations of the Washington State Department of Health (DOH); and

WHEREAS, It is not the intent of this Agreement to give new authority or responsibilities to the water purveyor or to the County or State regulatory agencies, in addition to those requirements imposed by law; and

NOW, THEREFORE, the undersigned party, having entered into this Agreement by its signature, concurs with and will abide by the following provisions:

Section 1. The terms used within the contract shall be as defined in the implementing regulations of Chapter 70.116 RCW, except as identified below.

A. Lead Agency shall mean the department or organization within Pierce County that has been designated by the Pierce County Executive as being administratively responsible for the coordination and filing of the Pierce County Water Service Area map, Standard Service Agreement Establishing Water Utility Service Area Boundaries, Agreements for Retail Service Areas, Utility Service Policies, and other administrative documents necessary for the implementation of the Pierce County CWSP.

B. Pierce County Coordinated Water System Plan (CWSP) shall mean the plan adopted by the Pierce County Council for public water systems within critical water supply service areas within Pierce County which identifies the present and future needs of the systems and sets forth means for meeting those needs in the most efficient manner possible.

C. Pierce County Water Service Area Map shall mean the map referenced in this Agreement for the retail service area signed by the water purveyor, except as amended in accordance with the CWSP procedures and with the concurrence of the affected water purveyors.

D. Retail Service Area shall mean the designated geographical area within Pierce County in which the undersigned water purveyor assumes full responsibility for providing water service to individual customers.

E. Utility Service Policies shall mean those policies and conditions of service that are attached to the provision of water service for individual customers. The identified policies and conditions of service are those conditions incorporated within the water purveyor's water system improvement and expansion plans required under the provisions of the Public Water Systems Coordination Act and DOH.

Section 2. Lead Agency. The lead agency for administering the Pierce County Water Utility service area agreements shall be the Pierce County Department of Public Works and Utilities unless otherwise established by the Pierce County Executive. The lead agency shall function only as a coordination center. The lead agency will maintain the original documents and will be responsible for updating the water system map and agreements as provided for in the CWSP.

Section 3. Authority The authority for this Agreement is granted by the Public Water Systems Coordination Act of 1977, Chapter 70.116 RCW.

Section 4. Service Area Boundaries. The undersigned Water Purveyor acknowledges that the Pierce County Water Service Area Maps identifying its retail service area boundaries, dated January 31, 2013 and included as Attachment A to this Agreement, identify the Water purveyor's present and future service area. The undersigned further acknowledges that there are no service area conflicts with an adjacent water utility or purveyor, or, if such a conflict exists, agrees that no new water service will be extended within disputed areas except as stipulated in an adjudication by DOH.

This agreement shall apply to service areas existing as of August, 1994, and to the service area boundaries identified in the above referenced maps, or as shown on current revisions thereof, provided that no revisions of service areas shown on these maps shall be made without prior written concurrence of the water utilities/purveyors involved and such written concurrence is filed with the Lead Agency. Revisions may also require an amendment to the purveyor's or utility's service plans.

Section 5. Boundary Adjustments. If, at some time in the future it is in the best interest of the undersigned parties to make service area boundary adjustments, such modifications must be by written concurrence of all involved utilities and the proper legislative authority(ies), and must be noted and filed with the designated Pierce County lead agency and DOH. It is understood by the undersigned utility that it may decline to provide service within its designated service area boundary, but in that case, an applicant may be referred to other adjacent purveyors or utilities or a new utility may be created and the original service area boundary will be adjusted accordingly.

Section 6. System Extension Policies. The undersigned utility agrees that in order to expand its existing water service area, (other than by addition of retail customers to existing water mains), or to serve in the capacity of a pre-qualified satellite system management agency (SSMA), it shall have adopted design standards and Utility Service extension policies. The

design standards shall meet or exceed the Pierce County Water System Minimum Standards and Specifications.

A water utility anticipating expansion of retail service in unincorporated areas of Pierce County, or intending to operate as an SSMA, shall identify utility service policies in its updated water system plan. The undersigned utility agrees to identify, for information, its utility service policies or provide a copy of the updated water system plan to the Lead Agency prior to application for extension of its existing water system into new service areas within the unincorporated areas of Pierce County.

Municipalities further agree that if they identify a service area outside of their existing municipal corporate boundaries, the municipality will assume full responsibility for providing water service equivalent to the level of service provided for their customers inside the city limits with similar service requirements, and must also meet or exceed Pierce County's minimum design standards.

Section 7. Special Working Agreements. Special working agreements, if they exist and are relevant, between this water purveyor and any adjacent water purveyor shall be attached to this Agreement as Attachment B and incorporated herein by this reference.

Section 8. Compliance with the CWSP. Nothing in this Agreement shall waive any requirement of the state, federal or local government regarding the provision of water service. This Agreement shall comply with the interlocal agreement requirement of the CWSP.

IN WITNESS WHEREOF, the undersigned party has executed this Agreement as of 2-11-13.

Date

Ray Harper

Water Purveyor

Ray Harper

Representative

Mayor

Title

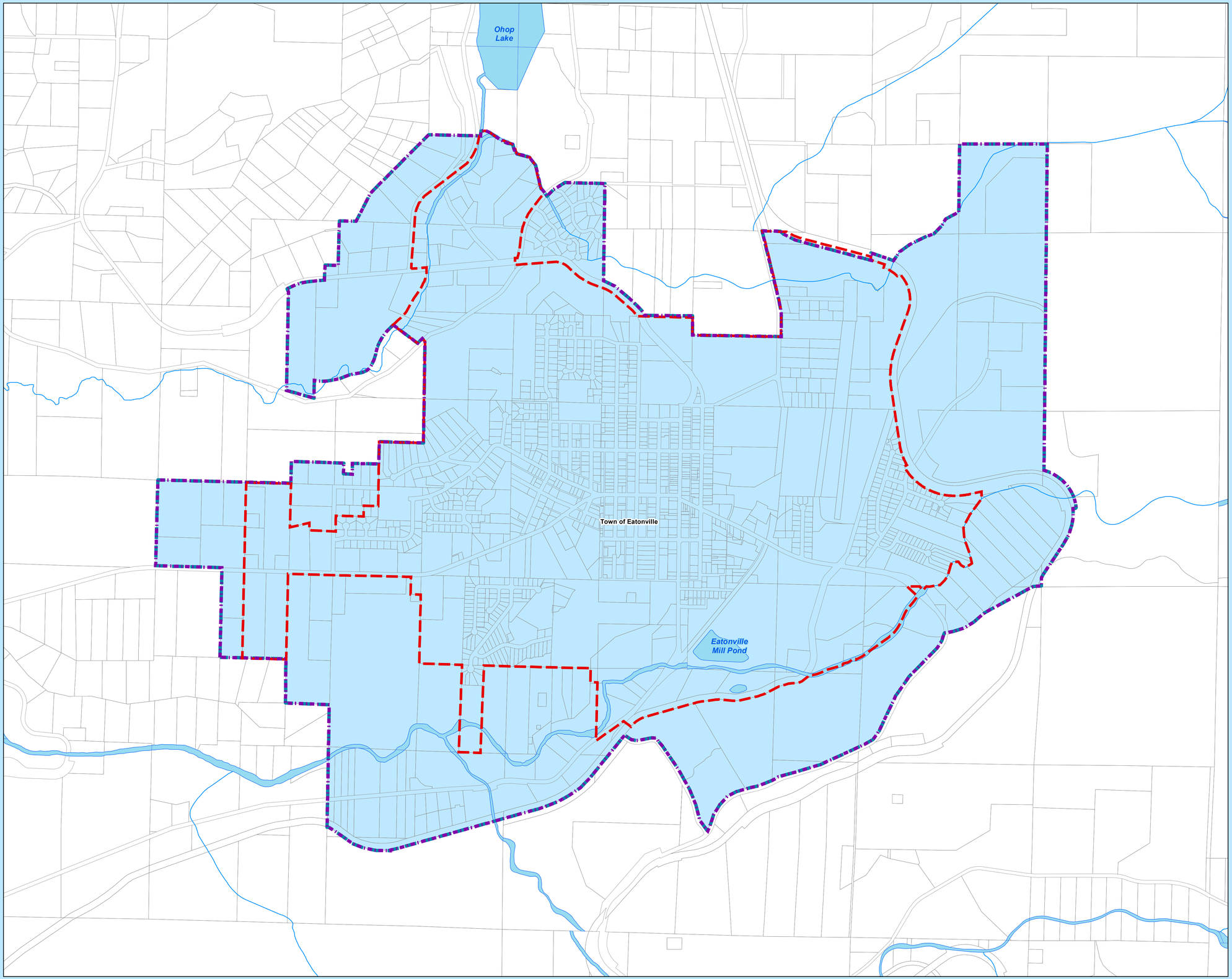
Receipt Acknowledged:

Pierce County Public Works and Utilities Department

Date

STANDARD SERVICE AGREEMENT
ATTACHMENT B

Utility shall include copies of separate agreements, relating to common service areas, transfer arrangements, special working agreements, and/or retail service agreements with adjacent utilities. These agreements will be included by reference in this Interlocal Agreement.



Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

ATTACHMENT A
SERVICE AREA BOUNDARY

Legend

- Town Limits
- Eatonville Urban Growth Boundary
- Retail Water Service Area / Future Water Service Area

N

1 INCH = 700 FEET

0 700 1,400

DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG

RH2 ENGINEERS PLANNERS SCIENTISTS

REV DATE: 2/13/2013

J:\Data\EAT\111-070\GIS\Maps\EAT-WSP-Attachemnt-A.mxd By: KDS

APPENDIX B

Water System Facilities Data

Town of Eatonville
Comprehensive Water System Plan
Well Facilities Data

Well Data

Well Name	Pressure Zone	Year Const.	Current Pumping Rate (gpm)	Max. Well Capacity (gpm)	Max Inst Water Right (gpm)	Casing Size (inches)	Well Depth (feet)	Well Screen Depth (feet)	Pump Intake Depth (feet)	Static Water Depth (feet)	Pumping Water Depth (feet)	Casing Elv (feet)
Well No. 1	996	1966	210	210	360	12	43	38		25	37	805.28
Well No. 2	996	1969	220	220	*250*	10	44	38	43	25		805.73
Well No. 5 (emergency)	996	1976	0	40	*250*	8	70	60	60			816.72
Well No. 6	996	2004	200	250	*250*	12	73.5	59.5	58	20	43	804.04
Well No. 7	996	2004	325	360	*360*	12	99	73.5	72	20	41	804
			955		*610*							

All wells pump to the clear well and water from the clear well is pumped to the 996 Zone.

Well Pump Data

Pump Name	Pump Manufacturer	Pump Model	Pump Type	Design Capacity (gpm)	Design Head (feet)	Motor Mfgr	Motor Size (HP)	Control Valve Size & Model	Have Standby Power	Have E.G. Set Receptacle
Well No. 1			Submersible				5		Yes	No
Well No. 2	Goulds	225H05 2	Submersible	220	105		5		Yes	No
Well No. 5 (emergency)			Submersible				5	3"	N	No
Well No. 6		7WALC007	Submersible				7.5		Yes	No
Well No. 7		7CHC015	Submersible				15		Yes	No

Well Pump Curve Data

Well Name	Point 1		Point 2		Point 3		Pump Serial Number	Pump Impeller Diameter
	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)		
Well No. 1								
Well No. 2								
Well No. 5 (emergency)								
Well No. 6								
Well No. 7								

Control Data

Well Name	Control Facility	Supplied Pressure Zone	Supply To Zone Priority	Well Have Telemetry
Well No. 1	Clear Well	WTP	Secondary	Yes
Well No. 2	Clear Well	WTP	Primary	Yes
Well No. 5 (emergency)	Clear Well	WTP	Emergency	No
Well No. 6	Clear Well	WTP	Secondary	Yes
Well No. 7	Clear Well	WTP	Primary	Yes

Town of Eatonville
Comprehensive Water System Plan
Pump Station Facilities Data

Pump Station Data

Name	Suction Pressure Zone	Discharge Pressure Zone	Year Const.	Above or Below Grade	Maximum Capacity (gpm)	Meter Size & Model	Have Standby Power	Have E.G. Set Receptacle	Have Surge Protection
Main Pump Station	Sources	996	2006	Above	2250	12"	Yes	No	Yes
Hilltop Pump Station	996	1077		Above	175		Yes	No	No
Center Street Pump Station	996	1050		Above	250	4"	No	No	No

Pump Data

Pump Name	Pump Manufacturer	Pump Model	Pump Type	Current Pump Rate (gpm)	Design Capacity (gpm)	Design Head (feet)	Motor Mfgr	Motor Size (HP)	Control Valve Size & Model
Main Pump Station - 1	Simflo	SR10C-5	Vertical Turbine	750	750	220	US Motors	60	8" BPCV
Main Pump Station - 2	Simflo	SR10C-5	Vertical Turbine	750	750	220	US Motors	60	8" BPCV
Main Pump Station - 3	Simflo	SR10C-5	Vertical Turbine	750	750	220	US Motors	60	8" BPCV
Hilltop Pump Station - 1	Burks	350G6-1-1/2	End Suction Cent.	120	75	120	Marathon	5	1" CV and GV
Hilltop Pump Station - 2	Goulds	SSV-4SVBK4	Vertical Multi-Stage	125	100	210	Baldor	7.5	1" CV and GV
Center Street Pump Station - 1	Goulds	SSV- 3SVBK5	Vertical Multi-Stage	75	75	160	Baldor	5	1" CV and GV
Center Street Pump Station - 2	Burks	350G6-1-1/2	End Suction Cent.	125	125	115	Magnetek	5	1.5" CV and GV
Center Street Pump Station - 3	Peerless	C-610A M - BP	End Suction Cent.	50	50	100	Baldor	3	2" CV and GV

Pump Curve Data

Pump Name	Point 1		Point 2		Point 3		Pump Serial Number	Pump Impeller Diameter
	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)		
Main Pump Station - 1	0	300	500	260	750	220	106370A 7-06	7.75"
Main Pump Station - 2	0	300	500	260	750	220	106370B 7-06	7.75"
Main Pump Station - 3	0	300	500	260	750	220	106370C 7-06	7.75"
Hilltop Pump Station - 1	0	150	100	130	160	80	291634	
Hilltop Pump Station - 2	0	300	50	285	100	210	D9914203	
Center Street Pump Station - 1	0	320	60	225	75	165	C9913489	
Center Street Pump Station - 2	0	150	100	130	160	80	716095	
Center Street Pump Station - 3	0	100	80	90	120	65	9359640	4.90"

Pump Control Data

Pump Name	Control Facility	Supplied Pressure Zone	Supply To Zone Priority	Pump Operation Priority	Station Have Telemetry
Main Pump Station - 1	996 Reservoir	996	Lead	Lead	Yes
Main Pump Station - 2	996 Reservoir	996	Lead	1st Lag	Yes
Main Pump Station - 3	996 Reservoir	996	Lead	2nd Lag	Yes
Hilltop Pump Station - 1	1077 Reservoir	1077	Lead	Lead	Limited
Hilltop Pump Station - 2	1077 Reservoir	1077	Lead	Lag	Limited
Center Street Pump Station - 2	1050 Reservoir	1050	Lead	Lead	Limited
Center Street Pump Station - 2	1050 Reservoir	1050	Lead	1st Lag	Limited
Center Street Pump Station - 3	1050 Reservoir	1050	Lead	2nd Lag	Limited

Town of Eatonville
Comprehensive Water System Plan
Storage Facilities Data

Reservoir Data

Reservoir Name	Pressure Zone	Year Const.	Material	Capacity (gallons)	Overall Height (feet)	Diameter (feet)	Water Base Elv (feet)	Overflow Elv (feet)	Ground Elv (feet)	Seismic Restraint (Y or N)
996 Reservoir	996		Concrete	282,000	32	40	966.0	996.0	966	N
1050 Reservoir	1050		Steel	223,000	49	30	1007.8	1050.0	1008	Y
Hilltop Reservoir	1077	2004	Steel	500,000	40	48	1040.0	1077.0	1040	Y

Storage Data

Reservoir Name	Max Water Height (feet)	Volume Per Foot (gallons)
996 Reservoir	996.0	9,400
1050 Reservoir	1050.0	5,310
Hilltop Reservoir	1077.0	13,514

Level Control Data

Reservoir Name	Controlled Supply Facility	Reservoir Have Telemetry
996 Reservoir	Main BPS	Yes
1050 Reservoir	Center St BPS	Limited
Hilltop Reservoir	Hilltop BPS	Yes

Town of Eatonville
Comprehensive Water System Plan
Pressure Reducing Station Data

Station Data

PRV Name	Upper Pressure Zone	Lower Pressure Zone	Year Const.	Ground Elv (feet)	Normal Pressure Inlet (psi)	Normal Pressure Outlet (psi)	Station Operation Status
Center Street	1050	996		822	98	45	Active
Hilligoss Lane	1050	996					Active
Ridge Road	1050	996		824	101	45	Active
Emerald Drive	1050	996	2004				Active
Lower Hamner Springs	1077	996	2004				Active
Orchard Avenue	1077	996	2007				Active

PRV Set Point Data

PRV Name	Description	Valve Size (inches)	Valve Mfgr	Valve Model	Valve Elv (feet)	Valve Set Point (psi)	Valve Set Point (feet H.E.)
Center Street	Above-grade	8	Cla-Val		822	45	926
Hilligoss Lane	Below-grade	8	Cla-Val		860	25	918
Ridge Road	Below-grade	8	Cla-Val		868	25	926
Emerald Drive	Below-grade	10	Cla-Val		849	28	914
Lower Hamner Springs	Below-grade	10	Cla-Val		844.5	40	937
	Below-grade	2	Cla-Val		844.5	60	983
Orchard Avenue	Below-grade	8	Cla-Val		905	25	963
	Below-grade	2	Cla-Val			60	

APPENDIX C

Water Facilities Inventory (WFI) Form

WATER FACILITIES INVENTORY (WFI) FORM

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

ONE FORM PER SYSTEM

Quarter: 1
Updated: 12/04/2012
Printed: 12/13/2012
WFI Printed For: On-Demand
Submission Reason: No Change

RETURN TO: Northwest Regional Office, 20425 72nd Ave S STE 310, Kent, WA, 98032

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
22300 K	EATONVILLE WATER DEPT	PIERCE	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. Owner Number 001666
MIKE TILLER [MANAGER] ATTN: MIKE TILLER PO BOX 309 EATONVILLE, WA 98328	EATONVILLE, TOWN OF MIKE TILLER PO BOX 309 EATONVILLE, WA 98328	TITLE: MANAGER
STREET ADDRESS IF DIFFERENT FROM ABOVE	STREET ADDRESS IF DIFFERENT FROM	
ATTN ATTN: MIKE TILLER ADDRESS 201 CENTER STREET WEST CITY EATONVILLE STATE WA ZIP 98328	ATTN ADDRESS 201 W CENTER ST CITY EATONVILLE STATE WA ZIP 98328	

9. 24 HOUR PRIMARY CONTACT INFORMATION	10. OWNER CONTACT INFORMATION
Primary Contact Daytime Phone: (360) 832-8524	Owner Daytime Phone: (360) 832-3361
Primary Contact Mobile/Cell Phone:	Owner Mobile/Cell Phone:
Primary Contact Evening Phone:	Owner Evening Phone: (xxx) xxx-xxxx
Fax: | E-mail: XXXXXX	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)

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

13. WATER SYSTEM OWNERSHIP (mark only one)				14. STORAGE CAPACITY (gallons)
[ ] Association	[ ] County	[ ] Investor	[ ] Special District	
[x] City / Town	[ ] Federal	[ ] Private	[ ] State	1,050,000

- SEE NEXT PAGE FOR A COMPLETE LIST OF SOURCES -

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
22300 K	EATONVILLE WATER DEPT	PIERCE	A	Comm

15	16	17	18										19			20	21					22	23	24			
	SOURCE NAME	INTERTIE	SOURCE CATEGORY										USE				TREATMENT					DEPTH		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 FIELD	SPRING	SPRING IN SPRING FIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANEANT	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 #1 ACV530				X							X			Y		X				X	38	175	NE NE	23	16N	04E
S02	Well #2				X							X			Y		X				X	40	200	NE NE	23	16N	04E
S03	InAct 05/07/1991 Well #3 -		X											X			X					66	50	NE NE	23	16N	04E
S04	InAct 10/07/2002 Well #4 Abandoned		X											X			X					46	50	NE NE	23	16N	04E
S05	Mashell River								X			X			Y		X				X		450	NE NE	23	16N	04E
S06	GWI Wells 1,2,6,7			X								X			Y		X				X	38	375	NE NE	23	16N	04E
S07	InAct 04/03/2006 Well #5		X											X	N		X					60	30	NE NE	30	16N	04E
S08	Well #6 AHG991				X							X			Y		X				X	60	200	NE NE	23	16N	04E
S09	Well #7 AKT667				X							X			Y		X				X	74	360	NE NE	23	16N	04E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
22300 K	EATONVILLE WATER DEPT	PIERCE	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	875	1486
A. Full Time Single Family Residences (Occupied 180 days or more per year)	735		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	16		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	114		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	26		
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	0
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	130	130	0
28. TOTAL SERVICE CONNECTIONS		1005	1486

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 2012

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?												
B. How many days per month are they present?												

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?	800	800	800	800	800	800	500	500	800	800	800	800
B. How many days per month are they present?	24	24	24	24	24	24	24	24	24	24	24	24

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: _____

WS ID	WS Name
22300	EATONVILLE WATER DEPT

Total WFI Printed: 1

APPENDIX D

Consistency Statement Checklist

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

Local Government Consistency Review Checklist

Water System Name: Town of Eatonville PWS ID: 22300K

Planning/Engineering Document Title: Comprehensive Water System Plan Plan Date: December 2012

Local Government with Jurisdiction: Town of Eatonville

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.	Fig 2-3 and 3-1	
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.	Page 3-8	
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.	Page 5-3 and 5-4 and Appendix I	
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)].	Page 5-3 and 5-4	
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.	Page 3-2 and 3-3	

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 municipal water supplier 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 municipal water supplier 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 municipal water supplier 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 not 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.

The Department of Health is an equal opportunity agency. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388).

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

Local Government Consistency Review Checklist

Water System Name: Town of Eatonville PWS ID: 22300K

Planning/Engineering Document Title: Comprehensive Water System Plan Plan Date: December 2012

Local Government with Jurisdiction: Pierce 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).

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.	Fig 2-3 and 3-1	
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.	Page 3-8	
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.	Page 5-3 and 5-4 and Appendix I	
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)].	Page 5-3 and 5-4	
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.	Page 3-2 and 3-3	

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.

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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 not 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.

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APPENDIX E

SEPA Checklist

SEPA CHECKLIST

To Be Submitted with Final WSP

APPENDIX F

Water Use Efficiency Program

Water Use Efficiency Program

INTRODUCTION

The Town of Eatonville (Town) recognizes that water is a valuable and essential natural resource that needs to be used wisely. This Water Use Efficiency (WUE) program provides an approach to increase water use efficiency within the Town's water service area.

BACKGROUND

The Water Use Efficiency Rule

In September 2003, the Washington State Legislature passed the Municipal Water Supply – Efficiency Requirements Act, also known as the Municipal Water Law. The Municipal Water Law requires the state to implement the Water Use Efficiency Rule. The intent of this rule is to help reduce the demand that growing communities, agriculture, and industry have placed on the state's water resources, and to better manage these resources for fish and other wildlife. Municipal water suppliers are obligated under the WUE Rule to enhance the efficient use of water by the system and/or its consumers. The requirements of the WUE Rule are set forth in Chapter 246-290 of the Washington Administrative Code (WAC), Part 8.

The WUE Rule applies to all municipal water suppliers and requires suppliers to:

- Develop WUE goals through a public process and report annually on their performance;
- Meet distribution system leakage standards based on a 3-year rolling average at or below 10 percent of production;
- Meter all existing and new service connections;
- Collect production and consumption data, calculate distribution system leakage, and forecast demands;
- Evaluate WUE measures; and
- Implement a WUE program.

Water Use Efficiency Program Requirements

The *Water Use Efficiency Guidebook,* originally published by the Washington State Department of Health (DOH) in July 2007 and revised in January 2011, identifies the water use reporting, forecasting and efficiency program requirements for public water systems. A WUE program meeting these requirements is a necessary element of a water system plan as required by the DOH and is necessary to obtain water right permits from the Washington State Department of Ecology

(Ecology). The *Water Use Efficiency Guidebook* defines the necessary components of a WUE program as the following three fundamental elements.

1. Planning requirements that include collecting data, forecasting demand, evaluating WUE measures, calculating distribution system leakage, and implementing a WUE program to meet goals.
2. A distribution system leakage (DSL) standard of 10 percent or less based on a 3-year rolling average.
3. Goal setting to provide a benchmark for achievement and to help define the success of the WUE program, as well as annual performance reporting on progress towards meeting WUE goals.

WATER SUPPLY CHARACTERISTICS

Water supply to the Town's water system is provided by the Mashel River and four wells adjacent to the river. The wells draw from an unconfined aquifer and are considered a well field under the direct influence of surface water. A summary of the sources is shown in **Table 1**, and a more detailed description of each source of supply is provided in **Chapter 2** of the Town's 2012 Comprehensive Water System Plan (WSP).

Table 1
Supply Facilities Summary

Source	Pressure Zone	Year Drilled	Existing Capacity (gpm)	Well Depth (feet)	Well Diameter (inches)	Pump Type	Pump Motor Size (hp)	Water Treatment[1]	Control Facility
Mashel River	996 Zone	n/a	400	n/a	n/a	n/a	n/a	MF/Cl_2/NaOH	Clear Wells
Well No. 1	996 Zone	1966	210	43	12	Submersible	5	MF/Cl2/NaOH	Clear Wells
Well No. 2	996 Zone	1969	220	44	10	Submersible	5	MF/Cl2/NaOH	Clear Wells
Well No. 6	996 Zone	2004	200	73.5	12	Submersible	7.5	MF/Cl2/NaOH	Clear Wells
Well No. 7	996 Zone	2004	325	99	12	Submersible	15	MF/Cl2/NaOH	Clear Wells

1 = MF: membrane filtration; Cl_2: chlorination; NaOH: caustic soda for pH

The Town currently holds several water right permits and certificates for the supply facilities shown in **Table 1**. A summary of these water rights is presented in **Table 2**. The Town has acquired water right certificates for all of the sources shown in **Table 1**. Additional water rights information for each source may be found in **Chapter 6** of the WSP, as well as on the certificates, permits, and water rights self assessment, which are included in **Appendix J** and **Appendix P** of the WSP.

Table 2
Existing Water Rights

DOH No.	Source Name	Permit or Certificate Number	Priority Date	Primary or Supplemental Right	Existing Water Rights			
					Instantaneous		Annual	
					(gpm)	(cfs)	(acre-ft)	(gpm)
S05	Mashel River	10307 and S2-004455CL	8/18/1967 6/1908	Both No	1,032	2.3	525	325
S06	Well Nos. 1, 2, 6 & 7	5676-A	11/29/1966	Both	360	0.8	394	244
S06	Well Nos. 1, 2, 6 & 7	G2-01087C	8/18/1967	Supplemental	250	0.6	400	247
Totals					1,642	3.7	525	325

The Mashel River is within the Nisqually River Basin, which is Water Resources Inventory Area (WRIA) 11. Water use within this basin is regulated by Ecology. In 1981, Ecology adopted an administrative rule titled, "Instream Resources Protection Program – Nisqually River Basin, Water Resource Inventory Area 11," which is Chapter 173-511 WAC. This rule established minimum instream flows at specific control stations on the larger rivers in the basin. The minimum instream flows are in effect a non-consumptive water right held by the state, on behalf of the public, for maintaining water in a river for in-stream uses of water. The priority date of these minimum instream flow rights is the date the rule specifying them was adopted (February 2, 1981, for Chapter 173-511 WAC). Since the Town's existing water rights were issued prior to the adoption of the instream flow rule, which means the Town's rights are senior, they are not subject to these minimum instream flows. However, if the Town decides to apply for a new water right for additional water supply, that water right would be younger (junior) than the minimum instream flow rule and would therefore be subject to the rule. Being subject to a minimum instream flow means that a water right holder cannot reduce the flow of the river when the minimum instream flows are not being met. For a surface water diversion or groundwater in direct hydraulic continuity with the river, water could only be captured when the actual flow in the river exceeds the minimum instream flows set in the rule for that particular day.

The sources of supply are not located in any of the 16 fish-critical basins established by Ecology. The Nisqually Chinook Recovery Plan has identified restoration and protection projects for the Mashel River to improve habitat conditions for Chinook salmon, a species designated under the Endangered Species Act as Threatened in the Nisqually basin. The Phase IV Nisqually Implementation Plan for Watershed Management in WRIA 11 recommends surface water augmentation to increase instream flows in the Mashel River for fish habitat. The Town is currently preparing an Alternative Water Source Investigation that includes analyses regarding altering the use of current supply sources and/or pursuing new supply sources to increase instream flow in accordance with the watershed management goals.

Environmental factors such as drought or climate change are likely to affect recharge to the sources since flow in the Mashel River is predominately rainfall dependent. Levels in the Mashel River are highest in the winter months and lowest in the summer months. The Town must rely on both the wells and river source in the summer months to meet peak demands. The river source is rarely used at other times of the year due to high turbidity and the increased levels of treatment required.

WATER USE EFFICIENCY PROGRAM

As previously described, the fundamental elements of a WUE program include planning requirements and DSL standards, as well as goal setting and performance reporting. The Town's water use data, demand forecasts, and other planning requirements are contained in **Chapter 4** of the WSP. The Town is committed to continue collecting water use data beyond that presented in **Chapter 4** for evaluation of its WUE program and water use patterns, and for forecasting demands for future facilities. The Town's WUE program that follows includes a statement of its goals and objectives, the evaluation and selection of alternative efficiency measures, the schedule and budget, and the method of program monitoring.

Water Use Efficiency Goals and the Public Process

Per WAC 246-290-830, WUE goals must be set through a public process and must be evaluated and reestablished a minimum of every 6 years. In compliance with the WUE Rule, a public hearing was held during the summer of 2009 to present and discuss the Town's initial goals. The initial WUE goals included reducing overall water demand and reducing the distribution system leakage to 10 percent or less. As is evident in **Chapter 4** of the WSP, the Town successfully reduced the overall water system demand from 132 gallons per capita per day in 2009 to 120 gallons per capita per day in 2011. The Town achieved an overall water savings of approximately 8.8 million gallons of water over the previous 2 years when most of the water savings for the 6-year planning period was realized. The goal of reducing the distributions system leakage to 10 percent or less has not been achieved since the goal was established.

New goals have been proposed based on the demand analysis and projections presented in the Town's WSP. The proposed goals and objectives of the Town's WUE program consist of:

- Reducing the four-year rolling average per capita demands by 6 percent by 2018, and by 8 percent by 2032; and
- Reducing DSL to 10 percent or less by 2015.

As a part of the water system planning process, a public hearing was held on December 10, 2012, to present and discuss the newly established proposed goals. Background information on the Town's proposed WUE program, water supply characteristics, water demand forecasts, and other elements were made available 2 weeks prior to the public forum date. All comments received at the forum were reviewed and considered by the Town. The proposed goals were adopted on December 17, 2012 at a regularly scheduled Town Council meeting. In the future, WUE goals will be evaluated and reestablished during the water system planning process, or at minimum of every 6 years.

The Town will achieve these goals and objectives through the implementation of the WUE program that follows. Reducing DSL is a supply side goal that can be achieved through measures that will mainly be carried out by the Town's Water Department, or in coordination with other Town departments. Reducing the demand per capita is a demand side goal that can be achieved through carrying out measures that affect customers' water use.

Evaluation and Selection of Water Use Efficiency Measures

The Town's evaluation of WUE measures and selected levels of implementation are presented within this section. The measures fall within three categories of implementation: 1) mandatory measures that must be implemented; 2) measures that must be evaluated; and 3) additional measures selected by the Town that must be either evaluated or implemented.

The Town served 1,036 water service connections in 2011. Based on the number of connections, at least five WUE measures must be evaluated or implemented. Measures that are mandatory cannot be credited towards the system's WUE measures. Since the Town implements the minimum number of required measures, a cost-effective evaluation is not required.

Mandatory Measures

Source Meters

The volume of water produced by the system's sources must be measured using a source meter or other meter installed upstream of the distribution system. Source meters are currently installed and operating at each of the Town's sources. If any new sources are installed in the future, they will be equipped with a source meter.

Service Meters

All public water systems that supply water for municipal purposes must install individual service meters for all water users. Service meters are currently installed and operating at all connections throughout the distribution system. All future connections that are installed or activated will be equipped with a service meter.

Meter Calibration

The Town must calibrate and maintain meters based on generally accepted industry standards and manufacturer information. Compliance will be maintained by the Town by performing maintenance on the source and service meters every 5 to 10 years at a minimum. Meter calibration is performed on an as-needed basis, typically when meter readings are inconsistent with customer consumption history.

Water Loss Control Action Plan

To control leakage, systems that do not meet the DSL standard must implement a Water Loss Control Action Plan (WLCAP). The Town's rolling 3-year average DSL was 16 percent in 2011; therefore a WLCAP is required. The Town has set a goal to reach a DSL of 10 percent or less by 2015. The Town has periodically seen DSL at 10 percent or less when active leak detection and repair is in progress. The Town plans to pursue an aggressive system-wide leak detection and repair program to meet its goal. Leak detection will be performed by professional contractors and the

Town's employees and repair of the leaking water mains will be completed as soon as possible. Further training of water and fire department employees will also be done to ensure the Town's personnel are properly trained regarding complete closure of older fire hydrants. The Town will continue to look for unauthorized water users and to ensure that water sales are recorded in the proper units. The Town takes the DSL issue very seriously and plans to utilize available resources to reduce the DSL percentage.

Customer Education

Annual customer education regarding the importance of using water efficiently is a required element of all WUE programs. Customer education is provided in the Town's annual Consumer Confidence Report (CCR) to customers and includes information on the system's DSL and progress towards meeting WUE goals. A copy of the Town's 2011 CCR is located in **Appendix M** of the WSP.

Measures That Must Be Evaluated

Rate Structure

A rate structure that encourages WUE and provides economic incentives to conserve water must be evaluated, but is not required to be implemented. The Town's current utility rates are designed to discourage excessive water use. New water rates were evaluated in the Town's 2005 Rate Study. The Town implemented a two-tiered inclining block rate structure to encourage WUE. For ¾-inch meters serving single-family residences, the inclining block rate structure imposes a charge of $0.34 for every hundred gallons over 15,000 gallons. This is an increase from the base amount of $0.24 charged per hundred gallons for 0 to 15,000 gallons. The usage rates are in addition to the single-family base rate of $28.00. Future rate studies will consider a more aggressive inclined block rate structure and an evaluation of seasonal rates to reduce peak summer water use.

Reclamation Opportunities

The Town has evaluated reclamation opportunities, but has determined that reuse opportunities are currently not feasible. The Town has installed purple pipe, which is pipe typically used for reclaimed water, at various locations throughout the Town, but the network is incomplete. Furthermore, the existing wastewater treatment plant does not have the ability to treat wastewater to an acceptable standard for reclaimed purposes. Significant upgrades to the wastewater treatment plant and the installation of substantial lengths of purple pipe would be necessary to provide reclaimed water to customers.

If the wastewater treatment facility was upgraded to treat wastewater to an acceptable standard, the Town would need to obtain a reclaimed water use permit to put reclaimed water to a beneficial use. One of the most difficult hurdles to obtaining a reclaimed water use permit is the water right impairment analysis. Under this analysis, the impact of reducing the amount of wastewater discharge is viewed similarly to a new consumptive water right from the Mashel River and the reclaimed water permit can only be granted if there is no impairment of any other water right holder, including minimum instream flows. The potential for not meeting instream flows throughout the year exists for the Mashel River, and closing the river from June 1 to October 31 would prevent reclaimed water from being used during this period. Unfortunately, this is the same period when the Town would logically be looking for reclaimed water supply to offset or cover irrigation demand, which

accounted for approximately 10 percent of the Town's billed consumption in 2011. Outside of the summer months, when the reclaimed water could be stored or utilized, there is likely minimal demand for a water supply that cannot be put to potable uses.

Due to the difficulty associated with obtaining a reclaimed water use permit for summer water use and the high cost of upgrading the wastewater treatment plant and purple pipe network, additional reclamation opportunity investigations will not be completed by the Town at this time.

Selected Measures

The Town has chosen to implement four different WUE measures in addition to those that are mandatory or required to be evaluated. Each of the chosen measures will be implemented for the two primary customer classes (i.e., the single-family class and the multi-family/commercial/school class). The Town's WUE program, therefore, counts as eight WUE measures, which exceeds the requirement of five WUE measures based on the number of service connections.

Conservation Rate Structures

Evaluating rate structures to increase water demand efficiency is required per WAC 246-290-100(4)(J)(iv), but actually implementing of a conservation rate structure counts as a WUE measure per WAC 246-290-810(4)(d). The Town is implementing an inclining block rate structure for its customers. Since this measure is implemented for all customer classes, it counts as two WUE measures for the Town's program.

Notifying Customers about Leaks on Their Property

Notifying customers of unusually high water bills potentially caused by a leak on the customer's property counts as a WUE measure per WAC 246-290-810(4)(f). When the Town's meter reader notices an unusually high meter reading, the Town contacts the property owner and advises the customer to search for leaks. Since the Town notifies customers in all customer classes of unusual high meter readings, it counts as two WUE measures for the Town's program.

Customer Education

Customer education that is carried out more than once a year counts towards meeting the program requirements for WUE measures. The Town will provide periodic customer education, in addition to the annual CCR, by periodically posting water tips on the Town's Facebook page. Since this measure is being implemented for all customer classes, it counts as two WUE measures for the Town's program.

Water Bill Showing Consumption History

The Town will continue to provide all of their customers with consumption history and will include conservation messaging on water bills. If implemented, this will count as two additional WUE measures for the Town's program.

Water Use Efficiency Program Schedule and Budget

The WUE measures described in the previous section and selected for implementation by the Town are summarized in **Table 3** with their corresponding schedule and budget. The successful implementation of this program is expected to achieve a 6 percent per capita water use reduction by the year 2018 and an 8 percent per capita water use reduction by the year 2032, as shown in **Chart 1**.

Table 3
WUE Program Schedule and Budget

Water Use Efficiency Measure	Schedule	Budget
Mandatory Measures		
Source Meters	Ongoing	O&M Funded
Service Meters	Ongoing	O&M Funded
Meter Calibration	Ongoing	O&M Funded
Water Loss Control Action Plan/Leak Detection[1]	Ongoing	$1,000/yr
Customer Education - Annual Consumer Confidence Report	Ongoing	$1,000/yr
Measures That Must be Evaluated		
Rate Structure[2]	2018	$35,000
Selected Measures		
Notifying Customers About Leaks on Their Property	Ongoing	O&M Funded
Customer Education - Facebook Tips	Ongoing	O&M Funded
Water Bill Showing Consumption History	Ongoing	O&M Funded

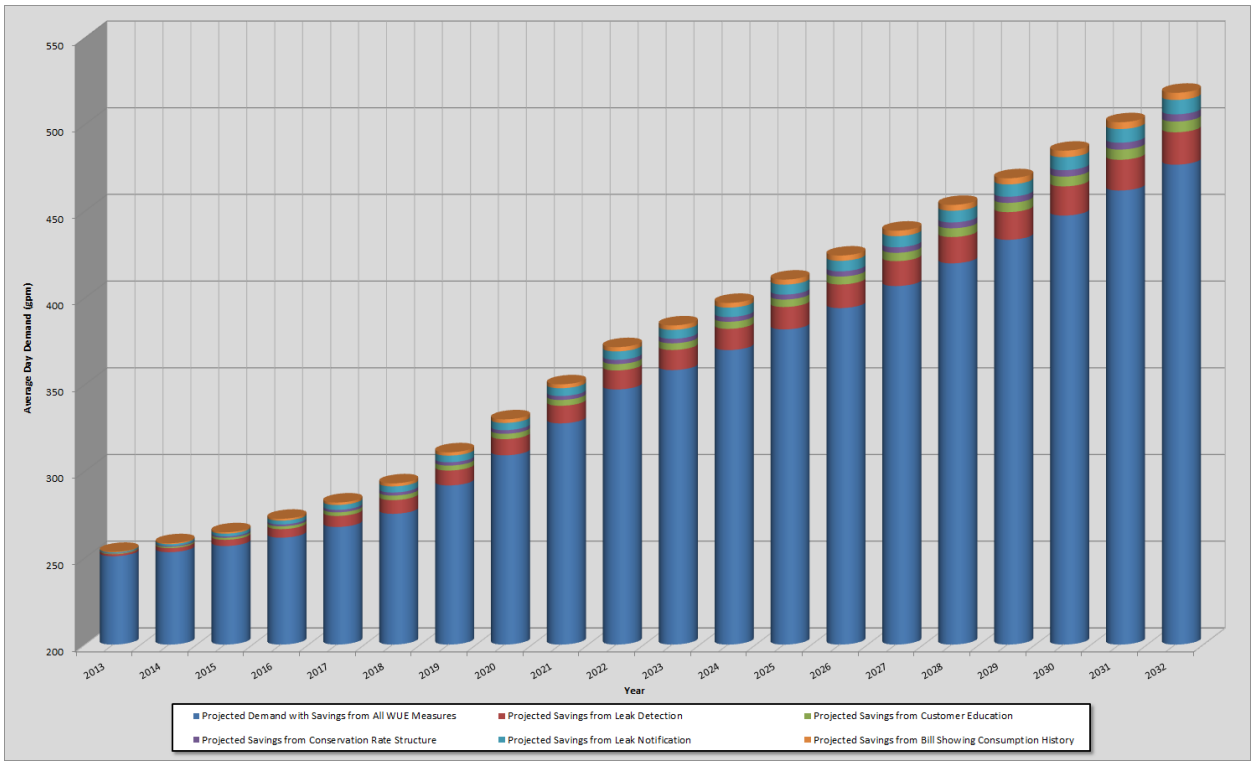
1 = When the Town's budget allows, additional resources will be utilized for leak detection.
2 = Rate structure budget reflects estimated water rate study cost.

Water Use Efficiency Program Evaluation and Reporting

The Town will continue to evaluate overall demand, per capita and per ERU water use, and the amount of DSL on an annual basis. The Town will evaluate the performance of its WUE program and implemented measures by analyzing demand data and determining the long-term trend towards reducing water usage per capita and meeting WUE goals. If the program monitoring shows that progress towards meeting the WUE goals is not being accomplished, more rigorous program implementation or additional program items will be considered, along with a cost-effective evaluation of measures.

The Town will continue to provide annual WUE performance reports to its consumers in the CCR, and will detail the results of water use monitoring and progress towards achieving the system's WUE goals. A copy of the Town's 2011 CCR is included in **Appendix M** of the Town's WSP.

Chart 1
WUE Program Projected Water Savings



APPENDIX G

Cross Connection Control Program

Cross-Connection Control Program

INTRODUCTION

A Cross-Connection Control (CCC) program is a proactive and ongoing effort of a water purveyor to protect the health of its customers by preventing contamination and pollution of the municipal water supply, which is done by preventing backflow of contaminants or pollutants through cross-connection. A cross-connection is any physical connection, actual or potential, between a water system and any source of non-potable substances. All public water systems in Washington State (State) are required to implement a CCC program. All required elements of a local CCC program must be documented and included in either the Comprehensive Water System Plan (applicable to the Town of Eatonville), or the Small Water System Management Program document (not applicable to the Town of Eatonville). Although general CCC rules have been in effect for over 25 years, the State mandate for CCC programs and the required elements of a CCC program are contained in WAC 246-290-490 Cross-Connection Control, which became effective in April of 1999. The minimum required elements in a CCC program are as follows:

- An adopted local ordinance, resolution, or code that establishes the purveyor's legal authority, describes operating policies, and the corrective actions of a CCC program.
- Develop and implement procedures and schedules for evaluating new and existing service connections to assess hazards.
- Develop and implement procedures and schedules that eliminate or control cross-connections and ensure approved backflow preventers are properly installed.
- Ensure that personnel, including one certified Cross-Connection Control Specialist (CCS), are provided to develop and implement the CCC program.
- Develop and implement procedures to ensure approved backflow preventers are properly inspected and tested.
- Develop and implement a backflow prevention assembly testing quality control assurance program.
- Develop and implement procedures for backflow incident response.
- Include CCC program information in customer education materials.
- Develop and maintain CCC program records.
- Meet any additional CCC requirements if reclaimed water is distributed or received in the water service area.

RECENT PROGRAM ACTIVITIES

The Town of Eatonville (Town) has established an active CCC program to help protect water system customers from cross-connection contamination. In the past 6 years, the program actively participated in the following CCC activities:

- Developed the Town's cross-connection hazard evaluation procedures and evaluated the hazard level of existing connections.

- Contacted an expanded list of high hazard premises and required backflow assemblies at the identified sites.
- Required new customers, as necessary, to install backflow assemblies at service connections for premise isolation.
- Updated the record keeping process with Backflow Management Inc.'s Cross-Track 5 software.
- Monitored 107 backflow assemblies by mailing letters to customers requiring annual testing of backflow assemblies, and entering the test data into Cross-Track 5.
- Maintained two certified CCS personnel.

PURPOSE AND SCOPE

This document establishes minimum standards for the Town to protect the public water supply from possible contamination from backflow. This document also describes minimum CCC program operating policies and provides guidelines for installation, testing, and maintenance of approved backflow assemblies. In addition, permitting and inspection requirements for existing and new backflow prevention assemblies are described. This document concludes with recommendations that the Town is advised to address, in order to comply with the updated CCC program requirements.

AUTHORITY

The Federal Safe Drinking Water Act of 1974 and the statutes of the State of Washington Title 43 RCW requires purveyors to protect the public water systems from contamination. In addition, Washington Administrative Code (WAC) 246-290-490 establishes CCC program requirements for the State. In Washington State, the Department of Health (DOH) is the lead agency for the development and administration of the State's CCC program. The Town adopted a formal CCC plan and ordinance in 1990. This plan is an update of the original plan, and the Town is in the process of updating the ordinance.

RESPONSIBILITY

The Town is responsible for protecting its public water supply from contamination, due to backflow of pollutants through water service connections. If the Town determines that a backflow prevention assembly is necessary at a customer's premise, the Town will notify the customer to install an approved backflow assembly on the premise. Installation of said backflow assembly shall be a condition of continued water service from the Town. Upon installation, the customer shall arrange for the inspection and testing of said assembly. The customer will be responsible for all applicable testing and inspection fees.

FAILURE TO COMPLY

Any person, firm, or corporation who violates any of the provisions of this document or future CCC ordinances, may be punished in accordance with the Eatonville Municipal Code. Any person, firm,

or corporation who violates any provisions and requirements of this document shall be subject to discontinuance of supply of Town water to the premise. Discontinuance of the Town's potable supply to the premise shall remain in effect until corrective action, as required by the Town, is completed, tested, and approved.

CROSS-CONNECTION CONTROL PROGRAM

The Town has implemented all of the required elements of the CCC program as listed above. This document will describe the Town's current CCC program, and will also discuss any areas that the Town needs to address in order to comply with the CCC program requirements. The Town is committed to protecting the public water supply from contamination by eliminating potential cross-connections. The Town's CCC program that follows includes a statement of its goals and objectives, the evaluation of CCC elements, the program implementation schedule, and recommendations.

CCC Program Goals and Objectives

The goals and objectives of the Town's CCC program consists of:

- Prevent contamination or pollution of the public water supply by eliminating or properly protecting actual or potential cross-connections.
- Inventory all potential cross-connections.
- Establish an inspection and testing program for all backflow prevention assemblies. The inspection shall include an inspection of backflow prevention assembly installations, an annual inspection of air gaps, and an annual survey of high-hazard facilities. The Town will notify customers when testing is due.

The Town will achieve these goals and objectives through the implementation of the CCC program that follows.

Evaluation of CCC Program Elements

The Town is required to develop and implement a CCC program. All required elements of a local CCC program must be documented and included in the Town's Comprehensive Water System Plan. The evaluation of these CCC program elements and the Town's current level of implementation are presented below.

Cross-Connection Control Ordinance

This CCC program element requires that the purveyor "adopt a local ordinance, resolution, code, bylaw, or other written legal instrument" outlining the purveyor's program. In addition, this document must establish the purveyor's legal authority to implement a CCC program. Operating policies, technical provisions, and corrective actions of the CCC program must also be addressed in a legal document. The Town has adopted a CCC ordinance that establishes the Town's authority in implementing a CCC program. However, this ordinance was written prior to the requirements contained in WAC 246-290, and the referenced WAC is out-of-date. This document updates the Town's CCC program in order to comply with the new WAC 246-290 requirements.

The Town's Municipal Code includes a CCC ordinance that establishes legal authority over the CCC program and describes the operating policies, technical provisions and corrective actions of the program. Chapter 13.10 of the Town's Municipal Code describes the Town's CCC program. The Town's Municipal Code will be updated to address the regulation in WAC 246-290, remove references to WAC 248-54-285, and reference the current CCC program contained in this document.

Evaluation of Service Connections

This CCC program element requires that the purveyor develop and implement procedures for evaluating existing any new or existing service connections to assess the risk of connecting the consumer's premises to the Town's public water system. This element also requires that the purveyor notify the consumer within a reasonable time frame of the evaluation results. New connections are required to be evaluated prior to service. Existing connections shall be inspected on a schedule acceptable to DOH.

The Town has an established procedure for evaluating new service connections for potential cross connection. This risk assessment evaluation is performed during the building permit or utility service agreement application review process for new water service applicants. Existing customers are evaluated during the building permit review process for structure alterations or additions and during the business license review process. If a backflow assembly is required as a result of this evaluation, the assembly, owners name, property address, and other pertinent information is recorded in a database that is maintained by the Town. The Town has also performed a system-wide risk assessment of existing service connections. The Town will continue its policies of routinely inspecting existing backflow prevention devices and inspecting new service connections for potential cross connections.

Table 1 lists standard abbreviations for backflow prevention assemblies. These abbreviations will be used in the tables that follow.

Table 1
Abbreviations

Abbreviation	Description	Level of Protection
AG	Air Gap	1
RPBA	Reduced Pressure Backflow Assembly	2
RPDA	Reduced Pressure Detector Assembly	2
DCVA	Double Check Valve Assembly	3
DCDA	Double Check Detector Assembly	3
PVBA	Pressure Vacuum Breaker Assembly	4
AVB	Atmospheric Vacuum Breaker	5
SRVB	Spill Resistant Vacuum Beaker	5

Table 2 lists the premises that are required to have isolation by an air gap or reduced pressure backflow assembly to prevent contamination to the public water system. **Table 3** shows various facilities that require or recommend backflow prevention devices.

Table 2
Premises Requiring Mandatory Service Isolation by AG or RPBA

Premises	Premises
Agricultural (farms and dairies)	Mortuaries
Beverage Bottling Plants	Nursing Homes
Car Washes	Petroleum Processing or Storage Plants
Chemical Plants	Piers and Docks
Commercial Laundries	Radioactive Material Processing Plants
Premises with Potable and Reclaimed Water	Nuclear Reactors
Film Processing Facilities	Survey Access Denied or Restricted
Food Processing Plants	Wastewater Lift Stations
Hospitals and Medical Centers	Wastewater Treatment Plants
Laboratories	Unapproved Auxiliary Supply
Metal Plating Industries	

Currently the Town requires RPBAs at industrial facilities, DCVAs at commercial facilities, DCVAs at multi-family buildings greater than or equal to three stories, and DCVAs for irrigation and sprinkler systems.

Table 3
Backflow Protection Requirements and Recommendations

Required Service Isolation
Premises with Approved Auxiliary Supply
Premises with Fire Sprinkler Systems or Private Hydrants
Tall Buildings (Over 30 feet)
Recommended Service Isolation
Mobile Home Parks
Shopping Centers

Table 4 lists fixtures, equipment, and areas that have the potential to contaminate the public drinking water system. The table also shows the minimum protection required by the Town to prevent such contamination.

Table 4
Fixtures, Equipment, and Areas with Backflow Potential

Fixtures, Equipment and Areas	Protection	Fixtures, Equipment Areas	Protection
Air Compressors	DCVA	Janitor Sinks	AVB
Air Conditioning Systems	RPBA	Kitchen Equipment	AVB
Air Washers	RPBA	Laboratory Equipment	RPBA
Aquarium Make-Up Water	AG/RPBA	Laundry Machines, Commercial	RPBA
Aspirators, Medical	AVB	Lavatories	AVB
Aspirators, Vault Drain	RPBA	Livestock Drinking Tanks	DCVA
Aspirators, Weedicide/Herbicide/Pesticide	RPBA	Make-Up Tanks	AG/RPBA
Autoclaves	RPBA	Mobile Carpet Cleaners	RPBA
Autopsy Tables	RPBA	Mop Sinks	AVB
Baptismal Fountain	RPBA,AG/AVB	Outboard Motor Test Tanks	AG/RPBA
Bathtub, Below Rim Filler	Not Allowed	Perchlorethylene Reclaim	AG/RPBA
Bedpan Washers	RPBA	Pesticide Applicator Trucks	AG/RPBA
Beverage Dispensers using C02	RPBA	Photo Developing Tanks and Sinks	RPBA
Bidets	AVB/AG-Internal	Photostat Equipment	RPBA
Boat Lifts	RPBA	Pipette Washers	AVB
Boiler Feed Lines	AG/RPBA	Potato Peelers	AVB
Bottle Washing Equipment	RPBA	Poultry Feeders	RPBA
Box Hydrants	DCVA	Private Hydrants	DCVA
Brine Tanks	AG/DCVA	Processing Tanks	AG/RPBA
Can Washing Equipment	RPBA	Pump Seal Water	AG/RPBA
Chemical Feeder Tanks	AG/RPBA	Pumps, Pneumatic Ejector	RPBA
Chilled Water Systems	RPBA	Pump Prime Lines	RPBA/DCVA
Chlorinators	RPBA	Pumps, Water Operated Ejector	RPBA
Coffee Urns	AG/AVB	Radiator Flushing Equipment	RPBA
Computer Cooling Lines	AG/RPBA	Recreational Vehicle Dump Stations	RPBA
Condensate Tanks	AG/RPBA	Serrated Faucets	AVB
Cooking Kettles	AG/AVB	Service Sinks	AVB
Cooling Towers	AG/RPBA	Sewer Connected Equipment	AG
Decorative Ponds	AG/RPBA	Sewer Flushing	AG
Degreasing Equipment	RPBA	Shampoo Basins/Hose Rinse	AVB
Demineralized Water System	RPBA	Showers, Telephone	AVB
Dental Cuspidors	RPBA	Sitz Baths	AVB
Detergent Dispensers (Dishwasher)	AVB	Soap Mixing Tanks	AG/RPBA
Dialysis Equipment	RPBA	Solar Heating Systems	RPBA
Dishwashers	AVB	Solution Tanks	AG/RPBA
Drinking Fountains	AG	Spas	AG/RPBA
Dye Vats and Tanks	AG/RPBA	Specimen Tanks	AG/RPBA
Dynamometers	DCVA	Starch Tanks	AG/RPBA
Emergency Generators	RPBA	Stream-Air Sprays	RPBA
Etching Tanks	AG/RPBA	Steam Cleaners	RPBA
Fermenting Tanks	AG/RPBA	Steam Ejectors	RPBA
Fertilizer Injection Equipment	RPBA	Steam Generating Facilities	RPBA
Film Processors	RPBA	Sterilizers	RPBA
Fire Department Connections w/o chemicals	DCVA/DCDA	Stills	RPBA
Fire Department Connections with chemicals	RPBA/RPDA	Sumps	AG
Fire Sprinkler Systems w/o chemicals	DCVA/DCDA	Swimming Pools	AG/RPBA
Fire Sprinkler Systems with chemicals	RPBA/RPDA	Toilets (Internal)	AG
Floor Drains	AG	Trap Primers	AG
Flushing Floor Drains	AVB	Ultrasonic Baths	AG
Foamite Systems	RPBA/RPDA	Urinals (Internal)	AG
Fountains, Ornamental	AG/RPBA	Used Water Systems	RPBA
Fume Hoods	RPBA	Vats	AG/RPBA

Continued on Next Page

Table 4 (continued)
Fixtures, Equipment, and Areas with Backflow Potential

Fixtures, Equipment and Areas	Protection	Fixtures, Equipment Areas	Protection
		Table Continued	
Garbage Can Washers	RPBA	Washing Pools	AG/RPBA
Garbage Disposals	RPBA	Wall Hydrants	AVB
Heat Exchangers	RPBA	Wash Basins	AG/AVB
Heat Pumps	RPBA	Wash-Up Sinks	AG/AVB
High Pressure Washers w/o chemicals	DCVA	Wash Tanks	AG/RPBA
High Pressure Washers with chemicals	RPBA	Wastewater Lines	AG
Hose Bibs	AVB	Water-Air Sprays	DCVA
Hoses, Kitchen Rinse	AVB	Water Closets (Internal)	AG
Hot Tubs	AG/RPBA	Water Cooled Equipment	RPBA
Hot Water Heating Systems	RPBA	Water Ejectors	RPBA
Hot Water Boilers	RPBA	Water Recirculating Systems	DCVA
Humidifier Tanks and Boxes	AG	Water Settling	RPBA
Hydraulically Operated Equipment	RPBA	Water Treatment Tanks	AG/RPBA
Hydrotherapy Baths	RPBA	Water Trucks	DCVA
Ice Makers	RPBA	Wet Vacuum Systems	RPBA
Industrial Fluid Systems	RPBA	Whirlpool Baths	AVB/DCVA
Interties (Looped) Water Systems	DCVA	Windshield Washer Fluid Aspirators	RPBA
Irrigation Systems w/o chemicals	DCVA	X-Ray Processors	RPBA
Irrigation Systems with chemicals	RPBA		

Table 5 summarizes the number of each type of backflow prevention assembly protecting the distribution system as of August 30, 2011.

Table 5
Summary of Backflow Prevention Assemblies

Type of Device	Quantity
AG	0
RPBA	18
DCVA	85
PVBA	0
SRVB	0
AVB	0
Other	4

Cross-Connection Control and Elimination

This CCC program element requires that the purveyor eliminate existing cross-connections wherever possible. If elimination is not possible, then approved backflow prevention assemblies should be installed properly to reduce the risk of contamination.

The Town endeavors to eliminate potential cross-connections where possible. The Town does not allow any potential cross-connection unless it is protected by an approved backflow prevention assembly. Owners are responsible for following the provisions of the Town's CCC program. In addition, owners are responsible for the elimination or protection of all cross-connections on their premises. The Town has an inventory of existing backflow assemblies that it currently operates, maintains, and inspects. A separate inventory includes all assemblies on customer's premises that

are the responsibility of the customer to maintain. The Town keeps these inventories on file at the Water Treatment Plant, and updates the inventory as necessary.

In 2010, the Town expanded its high-hazard premise inventory to include veterinary clinics, nursing homes, dentist offices, out-patient clinics, petroleum storage facilities, and chiropractic clinics, and required the facilities to install the appropriate backflow prevention devices. With the Town's high-hazard services evaluated, the Town will concentrate its efforts on reducing potential medium and low-risk cross connections.

Personnel Certification

WAC 246-290-490 requires that personnel, including one certified CCS, are provided by the purveyor to develop and implement a CCC program. **Table 6** shows the Town's personnel certifications. Mr. Mike Tiller and Mr. Steve McKasson are certified CCSs.

The Town will continue to provide properly certified personnel to implement the CCC program. The Town has the properly certified staff to implement and maintain a CCC program as outlined by the State.

Table 6
Water Division Personnel Certification

Name	Position	Certification
Mike Tiller	Water Superintendent	WWTPO III, WTPO II, WDM II, CCS I
Steve McKasson	Lead Operator	WWTPO II, WTPO II, WDM II, CCS I
Gary Sokal	Distribution Lead and Meter Reader	None

Certification Definitions
WDM - Water Distribution Manager
WTPO - Water Treatment Plant Operator
WWTPO - Waste Water Treatment Plant Operator
CCS - Cross Connection Control Specialist

Backflow Assembly Inspection and Testing

DOH requires that all backflow assemblies are routinely inspected and tested by certified personnel. Inspections are required at the time of installation, annually thereafter, after a backflow incident, and/or after the assembly is repaired, reinstalled, or relocated.

The Town is responsible for maintaining assemblies that are installed on the public water distribution system, not including those assemblies installed after a meter on private premises. The Town does not have any Backflow Assembly Testing (BAT) certified personnel. Private testers that are BAT certified personnel do all backflow assembly inspections and tests. For assemblies installed on a customers' premises, the customer shall arrange for testing of said assemblies by a backflow prevention assembly tester approved by the Town. The Town will notify customers annually of required testing, and the testing must be completed before a corrective action date passes. The customer will be subject to all applicable testing, maintenance, and repair fees. On new installations, the Town will (1) provide on-site evaluation and/or inspection of plans in order to determine the type of backflow assembly, if any, that will be require;,

and (2) perform inspection. For existing premises, the Town will perform evaluations and inspections of plans and/or premises and inform owners by letter of any corrective action deemed necessary, the method of achieving the correction, and the time allowed for the correction to be made. Ordinarily, corrections must be made within 60 days; however, the Town may shorten this time period depending on the degree of hazard involved and the history of the assembly in question. Service may be discontinued immediately if necessary. The Town will then inspect the premises on or after the expiration date of the required action to correct a cross-connection. If the premises is found not to be in compliance with the Town's request, the owner shall receive written notice that water service to the premises will be discontinued. If the owner informs the Town of extenuating circumstances as to why the correction has not been completed within 10 working days of receipt of the notice of termination, the Town may grant a time extension up to, but not exceeding, 30 days.

Inspection and testing of assemblies shall be done (1) during the initial installation; (2) during on-site reviews of existing installations; (3) after any repairs or maintenance; (4) after any relocation; and (5) on an annual basis, but may be required more frequently for certain high-hazard premises. When an initial installation or annual test indicates that a backflow assembly is not functioning properly, the owner shall correct the malfunction within 10 working days as directed by the Town. After correcting the problem, the owner shall arrange for re-inspection and testing of the assembly.

The owner shall be responsible for the payment of all fees for (1) annual or semi-annual assembly inspection/testing; (2) re-testing if the assembly fails to operate correctly; and (3) any re-inspections for non-compliance with Town requirements. The Town will continue to maintain records of backflow assembly inspections.

Testing Quality Control Assurance Program

This program element requires development and implementation of a quality control assurance program for the testing of backflow prevention assemblies. Successful implementation of this program element ensures that all backflow prevention assemblies are tested in a similar manner and kept in optimal condition.

The Town shall ensure that all testing procedures are completed in a consistent manner. Only certified personnel shall be utilized to test all backflow assemblies. Personnel shall be trained as outlined by the State, fulfilling all necessary requirements in order to comply with WAC 246-290-490. The Town does not have any BAT certified personnel. Private testers that are BAT certified personnel will do all backflow assembly inspections and tests.

Testing shall be recorded on the proper forms and maintained at the Water Treatment Plant. Examples of testing forms can be found in the AWWA Recommended Practice for Backflow Prevention and Cross-Connection Control *manual. The Town will provide forms to their customers with the annual testing notification.*

Testing personnel shall adhere to the following steps: (1) use only properly operating and calibrated gauge equipment; (2) follow proper field test procedure; (3) consult the manufacturer's repair and maintenance manual when disassembly is required; (4) use only original manufacturer spare parts; and (5) retest the backflow assembly immediately after repair or maintenance. Testers can only perform tests and repairs allowed by the Washington State Backflow Assembly Tester certification and all other repairs and installations require a Specialty Plumber's License. All persons performing tests, repairs, or installations shall have all required certifications and licenses and shall furnish the Town with copies upon request.

In addition to the above steps, testing procedures performed by certified test personnel shall be in compliance with current test procedures approved by DOH, and the AWWA Cross Connection Control Accepted Procedure

and Practice *manual, which may include the following: (1) advise customer of an impending test/inspection so that the customer's staff may participate; (2) notify the fire department when shut down of a fire service is necessary; (3) flush residual dirt through test cocks before attaching test gauges; (4) ensure that the high and low pressure bypass hoses of the test kit are connected to the proper test cocks; open test cocks slowly when bleeding air through the bypass hoses; (5) test gauges shall be properly calibrated by a certified testing agency; and (6) assemblies should be tested before the warranty expiration date.*

Incident Response

This CCC program element requires that the purveyor develop a backflow incident response plan. The following paragraph outlines the Town's response to a backflow incident. Other emergency response procedures are included in the Town's Emergency Response Plan.

Emergency Condition: Water System Contamination and Pollution Due to a Backflow Incident

Impact on System: Potentially major impact. Water not suitable for potable use–loss of supply. Potential irreversible damage to water mains and pipes.

Emergency Response

1. Shut down the affected mains if possible to contain the contaminants.
2. Notify the Public Works Director and Town's Cross-Connection Control Program Manager.
3. Notify DOH of the backflow incident.
4. Notify all customers of the problem and instruct them to boil all water to be used for consumption and cooking, or issue a no-drinking warning.
5. Flush affected water mains to remove contaminants.
6. Disinfect reservoirs and water mains, as necessary, to remove contaminated residuals.
7. Analyze water quality in other parts of the distribution system to ensure that all contaminants were contained.

This document (and the Town of Eatonville Emergency Response Plan) outlines procedures to be followed if an emergency arises. When a CCC emergency is called into the Eatonville Police Department, or other emergency responder during non-business hours, the responder will notify the Public Works Department on-call person. This person assesses the emergency and will notify any water division personnel as deemed necessary, depending on the severity of the emergency. All emergencies are reported to the Public Works Director. This person will be responsible for coordinating with water division personnel, as well as other emergency responders, if necessary.

Public Education

Another CCC program requirement is that educational information of the CCC program be included in existing water system materials that are distributed to customers. Educational materials can be included in pamphlets, brochures, bill inserts, public service announcements, and consumer confidence reports.

The Town will develop CCC program education materials and will include them in bill inserts and Town-wide newsletters.

Record Keeping

Purveyors must also develop and maintain records of their CCC program, as mandated by DOH. At a minimum, purveyors must maintain the following records.

- Master list of service connections and/or premises where backflow prevention assemblies are protecting the public water system or fixtures.
- Assessed hazard level of each backflow assembly.
- Inventory information on approved air gaps, including location, degree of hazard, installation date, inspection history, inspection results, and personnel conducting testing.
- Backflow assembly inventory information, including location, assembly description, installation date, inspection history, test and repair history, test results, and inspecting personnel.
- Atmospheric Vacuum Breaker (AVB) and Spill Resistant Vacuum Breaker (SRVB) inventory including location, description, installation date, inspection history, and inspecting personnel.
- Program summary and backflow incident reports.

The Town currently maintains a majority of the required program records outlined above, including hazard reports and backflow assembly inspection reports, on computers at the Water Treatment Plant using Backflow Management Inc.'s Cross-Track 5 software. The Town will continue to keep records as required by the CCC program. At a minimum the Town will continue to maintain the following information: (1) installation date of assemblies; (2) location of backflow assemblies; (3) inspection and testing reports of backflow assemblies; (4) the hazard level of each backflow assembly; (5) performances of backflow assemblies; and (6) performance of licensed testers. In addition to the minimum information required to be maintained, Cross-Track 5 also keeps track of tasks that need to be completed in order to be in compliance with the CCC program. All records will be on file at the Water Treatment Plant to allow access by water system personnel.

Reclaimed Water Requirements

The final CCC program requirement is for systems that distribute or receive reclaimed water within their water service area. For these systems, additional CCC requirements may be imposed by DOH in any permits issued in accordance with Chapter 90.46 RCW.

The Town does not currently distribute or receive reclaimed water within its service area; therefore these requirements are not applicable. However, if reclaimed water is used in the future, the Town will follow all requirements of the permits issued under Chapter 90.46 RCW.

PROGRAM IMPLEMENTATION AND RECOMMENDATIONS

The Town's CCC program is an on-going effort that requires staffing and resources to ensure its effectiveness in protecting the quality of drinking water in the distribution system. It is recommended that the first step the Town takes is to update its CCC ordinance. The language in this ordinance needs to be updated to reflect the requirements of WAC 246-290-490 and adopt the CCC program outlined in this document. In addition, the Town should continue to reference the

American Water Works Association (AWWA) manual entitled, "*Recommended Practice for Backflow Prevention and Cross-Connection Control (AWWA M14)*" for the development of its updated CCC program ordinance.

The Town should continue its hazard evaluation program based on the risk to the public drinking water supply. The evaluation will continue to rank existing and potential cross-connections as high, medium, and low risk. The Town will continue its elimination program, eliminating the highest risk cross-connections first.

The Town should continue its inspection notification practices for the installed approved backflow assemblies. The Town should also continue documenting inspections in order to comply with the regulatory requirements.

The Town currently meets the regulatory requirement of having at least one CCS within the water division to administer its CCC program. The Town is encouraged to continue its active training program in order to comply with these requirements.

Finally, it is recommended that the Town update its public education materials to include information on the Town's CCC program. The Town currently uses bill inserts and handouts to disseminate information to customers. The Town could either add CCC program information to existing material, create a separate CCC program handout, or use the Cross-Track 5 software to email customers CCC program reports.

SCHEDULE

The following is a schedule for implementation of the outstanding elements in the Town's CCC program in accordance with WAC 246-290-490.

- Adopt an Updated CCC Ordinance – December 2012.
- Public Education – June 2013.
- Elimination of Existing Cross Connections – Ongoing.
- Ensure all Backflow Assemblies are Annually Tested – Ongoing.

APPENDIX H

Water System Standards

TOWN OF EATONVILLE

PUBLIC WORKS WATER DEVELOPMENT AND CONSTRUCTION STANDARDS

DENNIS STRANIK, MAYOR

COUNCIL MEMBERS

PREPARED BY

WHITACRE ENGINEERS, INC.

PART 1. GENERAL REQUIREMENTS

A. PURPOSE OF STANDARDS

These standards are the minimum acceptable design criteria and standards for water distribution systems to be accepted by the Town of Eatonville.

B. SCOPE OF STANDARDS

All property owners within the Town, within the area served by the water distribution system of the Town, are required and shall be compelled to connect to the public water distribution unless the owner utilizes a water source approved by the Washington State Department of Health and the Tacoma-Pierce County Health Departments.

New private wells or private sources of water will not be allowed. Existing facilities covered by a current water right permit from the State of Washington will be allowed if they conform with all local, state and federal laws and regulations. All property owners outside of the Town limits but within the Town service area shall comply with this standard.

C. DEFINITIONS

These definitions are a supplement to Section 13.10 of the Town of Eatonville Municipal Code.

WSDOT/APWA STANDARD SPECIFICATIONS. Shall have reference to Standard Specifications for Road, Bridge and Municipal Construction prepared jointly by the Washington State Department of Transportation and the Washington State Chapter of American Public Works Association, most current edition as adopted by the Town.

CROSS-CONNECTION. Any physical arrangement whereby a public water supply is connected, directly or indirectly, with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture or other device which contains or may contain contaminated water, sewage or other wastes or liquids of unknown or unsafe quality, which may be capable of imparting contamination to a public water supply as a result of backflow.

DOE. Washington State Department of Ecology.

DOH. Washington State Department of Health.

HEALTH OFFICER. The Director of Public Health of the Tacoma-Pierce County Health Department or his duly authorized representative.

MUTCD. Manual Uniform Traffic Control Devices, prepared by the Washington State Department of Transportation, latest edition.

AWWA. American Water Works Association.

D. DEVELOPER EXTENSION AGREEMENTS

1. When extension of the existing water system is required for service a Developer Extension Agreement shall be entered into between the owner and the Town.

2. Developer agreements shall be approved by the Mayor prior to the issuance of any permits.

3. To initiate the Developer Extension Process, the owner must submit an application for utility permits along with property legal description and six sets of site and improvement plans. Upon completion of design review by the Town, approved design plans and specifications and a pre-construction letter of requirements will be sent to the owner. The owner shall resubmit plans for final approval, if required. The contractor shall work from Town approved plans only. After completion of construction, turnover documents, including as-built plans, will be provided to the Town along with a request for turnover of the constructed public facilities.

4. The owner is required to bond the project at the rate of 50% total construction costs for one (1) year after acceptance.

5. Developer Extension projects shall be deeded to the Town for the purpose of maintenance and operations by bill of sale.

E. CONNECTION CHARGES

All property benefitting from existing water facilities shall pay the following applicable connection charges, at the current rates, as specified in the Town of Eatonville Water Ordinances:

1. Permit: Plan/Inspection fee charge.

2. Regular connection charge.

3. A deposit fee for installation of domestic water meters by Town forces as specified in the Municipal Code.
4. Special connection charges for the development's contribution to the Town's mains.

To determine these fees, an owner is required to supply a legal description of the property to the Public Works Department with the plan submittal.

F. LATECOMER'S AGREEMENT AUTHORIZED

1. The Town may enter into Agreements with property owners who have installed water mains and appurtenances in order to provide for the reimbursement to owners of a fair pro-rata share of the cost of construction thereof by the owners of any real estate who have not contributed to the original cost of such facilities and who subsequently connect to the water system or use same.

2. Such agreement may be entered into at the time of acceptance of the water system. Pursuant to such agreement, the Town may agree to collect latecomer fees from owners of benefitting property who have not paid their pro-rata share. Fifteen percent (15%) will be charged for administrative costs at the time of application for service.

PART II. WATER DISTRIBUTION SYSTEM DESIGN STANDARDS

A. GENERAL

All water distribution systems shall conform to the design requirements of the State of Washington Department of Health, as well as the Town of Eatonville design requirements as stated herein.

All plumbing permits will be processed by the Town Building Officer.

All water mains, service lines and fire lines shall be tested in accordance with these Standards. In addition, all fire lines and appurtenances will be tested in accordance with NFPA 13 Standards.

All hydrants used will have to be on an approved list of the Water Division of the Public Works Department and meet the requirements of the Town.

All related Town of Eatonville code and ordinance requirements shall be met in the design and construction of any element of the distribution system, including Chapter of the Eatonville Municipal Code and Standards outlined in this development and construction manual.

B. COMPREHENSIVE WATER SYSTEM DESIGN

The Town of Eatonville has developed and will update a Comprehensive Water Plan to insure the development of an efficient and adequate water supply system for the Town. All extensions, additions, changes, or alterations to the Town water system shall be consistent with the Comprehensive Plan.

The exact location or configuration of the system may be modified or adjusted by the developer, provided the proposed system remains consistent with the overall concept of the Plan. All modifications to the Comprehensive Plan require specific approval of the Town, which will be required prior to the acceptance of the extension lines.

One element of the Comprehensive Plan is a map of proposed water main extensions to service areas presently without water. The comprehensive plan of proposed extensions indicates the general location of supply mains, branches and loops, intended to provide the framework for distribution system upgrading in deficient areas and for potential future service areas. All proposed water system improvements and extensions shall be consistent with the Comprehensive Water Plan.

C. SERVICE AREA CONSIDERATIONS

All water extensions shall be designed for the ultimate development of the potential service area in accordance with current land use plans and the Comprehensive Water Plan. The determination of the tributary area shall be based on the Comprehensive Water Plan adopted by the Town and specific detailed studies of the areas affected.

New water systems shall be designed on the basis of per capita flows or other methods as approved by the Town and DOH. Detailed design calculations and service area maps shall be required for the system design. Said calculations shall be certified by a professional engineer.

Special consideration must be given to water extensions for industrial districts.

D. EXTENT OF WATER IMPROVEMENTS

In general, a developer shall be required to extend the water system improvements to the extreme boundary of his property in accordance with the comprehensive plans. The extension shall be of the size to be extended in the future as required by the plan. In cases where the plan does not require future extension, the water main shall be extended as required to serve the affected property.

In cases where required extension of the system is beyond the needs for the development, and other benefitting properties can be identified, the developer may be able to arrange through a developer's agreement for partial reimbursement at the time of other developments. Any such arrangement must be agreed to in writing through the Town prior to acceptance of the system as public through the Town Council and/or Mayor.

E. EASEMENTS

Permanent easements for mainline water systems shall be a minimum of 10 feet (10') wide. Construction easements shall be a minimum of twent feet (20') wide. Easement legal descriptions shall be prepared by a Surveyor or Engineer licensed to practice in the State of Washington. Easement legal description shall be reviewed and approved by the Town prior to acceptance.

F. WATER SYSTEM PRESSURE

All water mains shall be sized after a hydraulic analysis based on the required fire flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. For most areas normal working pressures range between 50 psi and 60 psi. Any deviation will require approval in writing by the Town Engineer, Public Works Director or Mayor.

G. DESIGN STANDARDS FOR PLAN SUBMITTALS

1. Plans and Specifications

All plans and specifications for water main extensions and branches must be presented to the Town for review and approval prior to beginning of construction.

Permits to install public water mains, extensions, valves, meters, hydrants, fire mains, connections to

public systems, irrigation sprinkler connections and branches shall be secured from the Town before commencing any installation.
A street repair bond to assure restoration may be required prior to issuance of a permit.

Application for water service connections shall be filed with and approved by the Public Works Department before the installation of a water service connection is made.

2. Drafting Standards

The following information shall be shown on all water plan submittals to the Town.

a. Drawing must be on a 22" x 34" plan paper with 1-1/2 inch left margin for binding.

b. Scale of drawing should be 50 scale. If this scale is not appropriate for a specific development, a 20 scale or 100 scale may be substituted. Other scales are unacceptable.

c. Developer's engineer is to check with the Town Engineer as to whether a profile is required. As a general rule, where the topography varies significantly, or where the project area includes 5 acres or more, a profile drawing is required.

d. The Town's notes are to be included at the top right corner. The North Arrow should preferably be pointed up. It may be oriented to the left if required by the layout.

e. Size of pipe shall be specified.

f. Type and class of pipe shall be indicated.

g. Permanent or proposed street grades.

h. All surface and subsurface utilities and improvement structures, and all pertinent topography. A topographic map with contour intervals of not more than two feet (2') will be required for any development larger than 5 acres. Spot elevations shown on a map will be required for areas less than 5 acres.

i. All connection bends, tees, valves, water main thrust blocking, crosses, hydrants, air vacuum relief valves, and other appurtenances.

j. Location of existing buildings and services.

k. Existing and proposed street rights-of-way and easement limits for all utilities, including reference to any necessary permission and release from damages for owners of property through the ultimate supply point or facility.

l. All thrust blocks, special structures, appurtenances or other construction, all of which shall be detailed.

m. Identify any possible utility conflicts.

n. The water line and fixtures to be installed must be shown with heavier lines than the other lines. Hydrants, MJ & FL connections, etc. must be shown.

o. The Public Works Director and the Town's Engineer must receive the completed drawings a minimum of ten days prior to anticipated approval.

H. SYSTEM REQUIREMENTS

1. GENERAL

All pipes, fittings, valves, hydrants, joints, and related appurtenances shall conform to the latest standards issued by the AWWA, APWA, and be acceptable for use by the Town of Eatonville.

All fittings shall be cast iron or ductile, with flanged or mechanical joint connections and be of the same thickness class as the pipe used. All fittings shall be cement mortar lined.

2. PIPE SIZE.

1. Minimum single family residential water main shall be eight inches (8") inside diameter. In special cases a 6" line may be approved if it is no longer than 100', serves 2 or less residences and cannot be extended in the future.

2. Minimum commercials, industrial or multiple family unit water mains shall be a minimum of ten inches (10") in diameter for looped and twelve

inches (12") in diameter for non-looped systems or per the size required in the Comprehensive Water Plan, whichever is greater.

3. FLOW VELOCITY

Under maximum flow conditions, velocities as determined by engineering analysis shall not exceed ten feet per second (10 fps).

4. PIPE DEPTH

Water mains shall have a minimum depth of thirty-six inches (36") below finished grade. All water mains and services shall not be more than six feet (6') below finished grade.

5. ALIGNMENT

Horizontal and vertical curves will not be allowed unless approved in writing by the Town.

6. EXTENSIONS

If it is anticipated or indicated on the Town's Comprehensive Water Plan that the system may be expanded in the future to serve other areas, said expansion will be incorporated into the design.

7. LOOPED SYSTEM

Where possible, systems shall be closed or "looped" to avoid dead lines on water mains. Where dead-end mains occur they shall be provided with a fire hydrant if flow and pressure are sufficient, or with an approved flushing hydrant or blow-off for flushing purposes. No flushing devices shall be directly connected to any sewer. For dead-end mains serving fire hydrant longer than 50 feet, eight inch diameter pipe shall be utilized.

8. FIRE HYDRANTS

Standard fire hydrants are required approximately every 600 feet, except in commercial and industrial areas spacing shall be 300 feet. In addition, fire hydrants shall be required at all street intersections.

9. AIR/VACUUM VALVES

Two inch (2") air/vacuum valve installations shall be installed at principal high points in the system.

10. ISOLATION VALVES

Sufficient valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located at every other block or at not more than 660 foot intervals.

11. PIPE AND HYDRANT LOCATIONS

Pipe shall be generally located North and East of road center-line. Both pipe and hydrants shall be in the right-of-way.

12. SEPARATION FROM SEWER SYSTEMS

Where practical, water mains shall be designed with a ten foot horizontal separation, edge to edge, from any existing or proposed sewer. Where water mains cross over a sewer line a vertical distance of 36 inches should be maintained between the outside of the sewer main and the outside of the water main. Where these conditions can not be met, or when the water line must cross under the sewer line, special construction procedures should be specified.

13. PRESSURE REDUCING VALVES

Developer will be responsible for installing individual pressure reducing valves in areas of excessive pressure (over 80 psi).

14. DETECTOR CHECK VALVES

Where detector check is installed in conjunction with a valve controlling fire flow, all pipe leading from both sides of the valve shall consist of the same class and size if ductile iron pipe. This pipe shall meet Town standards as stated in the General Specifications for Materials. Said pipe shall extend to the water main cut-in and to the facility for which the fire flow is intended.

15. LOCATOR TAPE

Water line locator tape shall be placed 12 inches above all new or replaced lines.

RT III. CONSTRUCTION MATERIALS

A. GENERAL

All materials used for construction shall be new and undamaged and shall be inspected and approved by the Town prior to installation. Where possible, the same manufacturer of each item shall be used throughout the project. Acceptance of the materials by the Town shall not relieve the developer from the responsibility to guarantee construction and materials.

All materials and methods referenced herein shall conform to the applicable standards for materials and construction found in the "Standard Specifications for Roads, Bridge and Municipal Public Works Construction", latest edition, published by the Washington State Department of Transportation and Washington State Chapter of the American Public Works Association (WSDOT/APWA Standard Specifications)

When reference to the following capitalized abbreviations are made, they refer to specifications, standards, or the respective society or jurisdiction entity.

ANSI	American National Standards Institute
APWA	American Public Works Association
ASTM	American Society of Testing and Materials
AWWA	American Water Works Association
WSDOT/ APWA	Washington State Department of Transportation and Washington State Chapter of American Public Works Association Standard Specifications for Road, Bridge and Municipal Construction

The numbers and letters following the abbreviations denote the serial designation for the specification or standard to which reference is made. Unless a particular issue is designated, all references to the above specifications, standards, or methods shall, in each instance, be understood to refer to the issue in effect (including all amendments) on the date of the approved plans.

B. DUCTILE IRON PIPE AND FITTINGS

Ductile Iron Pipe shall conform to AWWA C151. pipe shall be designed for the working water pressure plus 100 psi surge allowance. Joints shall be push-on or mechanical joint in accordance with AWWA C111. Rubber gaskets shall

conform to AWWA C111 and be suitable for the specific pipe sizes and pressure and shall be furnished by the pipe manufacturer. The pipe shall be standard cement mortar lined and seal coated in accordance with AWWA C104. An outside coating of bituminous material minimum 1 mil thick shall be applied.

Minimum pipe thickness classes are as follows:

Diameter	Thickness Class	Metal Wall Thickness
12"	Class 52	Metal Thickness 0.37"
10"	Class 52	Metal Thickness 0.35"
8"	Class 52	Metal Thickness 0.33"
6"	Class 52	Metal Thickness 0.31"

Ductile Iron fittings shall be mechanical joint or flanged conforming to AWWA C110. Fittings shall be cement lined in accordance with ANSI A21.4 and shall be coated inside and out with a bituminous material minimum 1 mil thick. Mechanical joint gaskets shall conform to AWWA C111. Flanged joint rubber gaskets shall be rubber, ring or full faced and minimum 1/8 inch thick conforming to all material requirements of AWWA C111.

C. CAST IRON FITTINGS

1. Mechanical Joint. Mechanical joint cast iron fittings shall be short body conforming to AWWA STANDARD C110 with a 250 psi pressure rating for sizes four to twelve inches. Fittings shall be cement lined in accordance with ANSI A21.4 and coated inside and out with a bituminous material minimum 1 mil thick. Joints and rubber gaskets shall be in accordance with AWWA STANDARD C111.

2. Flanged. Flanged cast iron fittings shall be 250 psi pressure rated for sizes four to twelve inches conforming to AWWA STANDARD C110. Fittings shall be short body, cement lined in accordance with ANSI A21.4, and coated inside and out with a bituminous material minimum one mil thick. Bolt circle and bolt holes of fittings shall match those of Class 125 flanges shown in ANSI B16.1. Flanges shall be plain faced without projection and shall be finished smooth or with shallow serrations. Flange gaskets shall be rubber, ring or full faced and minimum 1/8 inch thick conforming to material requirements of AWWA STANDARD C111. Bolts shall be in accordance with Appendix A of AWWA STANDARD C110.

3. Fittings for Connections to Existing Asbestos Cement Pipe. Fittings shall be "roll-up" type, cast iron, and conform to AWWA STANDARD C110 with bells designed to accept asbestos cement pipe. Bell dimensions shall conform to AWWA STANDARD C400, Appendix A.

D. STEEL PIPE

Steel pipe shall conform to AWWA Standard C200 with wall thickness as specified on plans. Pipe shall be electrically welded or seamless type and shall be subjected to a minimum mill hydrostatic test pressure of 500 psi.

Joints: Except where shop-welded, field welded, or mechanically coupled joints are required, pipe ends shall be bell and spigot with rubber gasket, and conform to AWWA Standard C200, Paragraph 3.6.6. Field-welded lap joints or butt joints shall conform to AWWA Standard C206. Pipe with plain ends shall be furnished where jointing is with mechanical couplings or flanged coupling adapters. The hold-back on plain end pipe shall be at least eight inches. Flanges for pipe shall be steel hub flanges, as specified, conforming to AWWA Standard C207. Nuts, bolts, and gaskets for flanged joints shall be as recommended in AWWA Standard C207.

Coal-tar enamel: The interior surface of steel pipe shall be cleaned, and lined with coal-tar enamel, and the exterior shall be cleaned, primed, lined and coated with coal tar enamel with a bonded felt wrapper. All such material and application shall be in accordance with AWWA Standard C203. Field repair of defects in the coating shall be per AWWA Standard C203 and the manufacturer's recommendations.

Cement-mortar coated and lined: If specified, the interior surface of steel pipe shall be cleaned and lined with cement-mortar, and the exterior surface of the pipe shall be cleaned and coated with wire reinforced cement-mortar. All such materials and applications shall be in accordance with AWWA Standard C205.

Fittings: Fittings shall be standard steel tube turns, or segmentally welded sections of the same material and thickness as the pipe. Dimensions of fittings shall conform with AWWA Standard C208. Coatings shall be in accordance with AWWA Standard C203 or C205 as appropriate. Steel bends shall have the same joints as specified for steel pipe.

E. POLYVINYL CHLORIDE (PVC) PIPE

PVC pipe shall conform to AWWA C900. PVC pipe shall have the same outside dimensions as ductile iron pipe. PVC pipe shall be pressure Class 150. The pipe shall bear the seal of the National Sanitation Foundation for potable water pipe.

F. POLYVINYL CHLORIDE (PVC) PIPE FITTINGS

Fittings for PVC pipe shall be the same as specified for ductile iron pipe. Dimensions of fittings and design of bell may be modified to conform with the pipe being used.

G. GALVANIZED STEEL PIPE AND FITTINGS

Galvanized steel pipe shall conform to ASTM A-120, Schedule 40. Fittings shall be galvanized malleable iron screwed fittings, in accordance with ANSI B16.3.

H. VALVES

1. Buried Gate Valves. Buried gate valves shall be double-disk and shall conform to AWWA Standard C500 or, resilient seat and shall conform to AWWA Standard C509. Valves 12" and smaller shall be 200 psi iron body, bronze fitted, single gate, nonrising stem, with O-ring seals and two inch square operating nut. Valves 16" and larger shall be as directed by the Engineer. A bypass shall be required for valves twelve inch and larger or as specified. The bypass valve shall be cast iron body, non-rising stem, with two inch operating nut. The bypass valve shall be two inch for twelve inch valves and as specified by AWWA

I. FIRE HYDRANTS

Fire Hydrants shall conform to AWWA STANDARD C502 and have a 5-1/4 inch main valve opening (MVO), O-ring stem seal, two 2-1/2 inch NST hose nozzle connections and one 4 1/2" pumper connection. Inlet connection shall be six inch flanged. Operating nut shall turn counterclockwise to open and be 1-1/4 inch pentagonal. Unless otherwise designated, cover over pipe shall be 42 inches. Paint hydrant with High Visibility White enamel. Hydrants shall be Iowa, Mueller or approved equal by the Town.

J. VALVE BOXES

Valve Boxes and covers shall be Cast Iron, two (2) piece, equal to Rich Company or Olympic Foundry Company and shall conform to WSDOT/APWA Standards.

K. DETECTOR CHECK VALVE

The detector check assemblies shall be Hersey, Viking, or approved equal and consist of a counter weighted check valve, a metered bypass line, two OS & Y gate valves, and a concrete vault.

The counter weighted check valve shall be UL listed. It shall prevent leakage against the direction of normal flow and be weighted to hold drip tight to a 1.5 psi pressure differential in the direction of flow.

The check valve shall be tapped and a metered bypass line shall be installed as shown on Standard Detail. The tap shall be standard pipe threads and the meter shall be sized as follows:

Valve Size	Meter Size
4"	3/4"
6"	3/4"
8"	3/4"
10"	1'

The check valve shall be painted red with a coal tar enamel paint.

The OS & Y (outside screw and yolk) valves shall be UL listed. They shall be flange by flange and each valve shall have attached one flange by a mechanical joint cast iron adaptor with a cast iron retainer gland. The OS & Y valves shall be painted red with a coal tar enamel paint.

The counter weighted check valve and OS & Y valves shall be sized as indicated on the drawings.

The concrete vault shall be as specified for a meter vault. It shall be sized as indicated on the drawings and in the standard details.

The metered bypass shall be installed by the Contractor.

L. WATER METERS

The size and type of meter shall be specified by the Town. Meters shall conform to AWWA STANDARD C700, C701, C702. C703, and C704 as appropriate. Meter shall be manufactured by Rockwell or as approved by the Town. Meters shall be purchased through the Town.

M. METER SETTER AND RESETTER

Meter setters shall have a copper tube inlet, IP outlet, curbstop with drilled wings for padlock, and be equal to Ford Meter Box Company's "Coppersetter".

Meter resetters shall be compatible with meter, brass and copper with drilled wings for padlock and be equal to Ford Meter Box Company's valve type "Resetter".

N. ANGLE METER STOP

Angle Meter Stop shall have copper tube inlet, swivel nut meter coupling, drilled wings for padlock, equal to Mueller No. H-14255 Lock Wing Angle Type.

O. CORPORATION STOP

Corporation Stop threads shall conform to AWWA C800. Corporation Stop shall be brass with outlet coupling nut for copper service, AWWA thread for insertion directly into water main or service clamp, equal to Mueller No. H-15000.

For 1-1/2 inch and 2 inch tap, Corporation Stop shall have IP inlet and outlet thread equal to Mueller No. H-10013 without coupling.

P. SERVICE CLAMPS

Pipe saddles shall be of galvanized malleable iron, ductile iron or brass with galvanized straps, rubber gasket, equal to Smith-Blair 311 Single Strap and Smith-Blair 313 Double Strap.

For 3/4 inch and 1 inch tap, use a single strap saddle in all sizes with AWWA thread. For 1-1/2 inch to 2 inch tap use double strap saddle in all sizes with IP thread.

Q. CURB STOP

Curb stops shall have solid tee head, copper inlet and IP thread outlet, equal to Mueller H-15316 or Hays 5050 (Copper Pipe).

R. PIPE COUPLINGS

For AC and steel pipe, couplings shall be as specified for type and size of pipe connection. Smith-Blair or approved equal.

Cast or ductile iron pipe shall be coupled with a mechanical joint sleeve. Sleeve shall be long body. Tyler or approved equal.

S. SERVICE PIPE

Copper: Type K, soft annealed copper service pipe.

Polyethylene: Pipe and tubing shall be 160 psi ultra-high molecular weight polyethylene conforming to ASTM D-1248, ASTM D-2239, ASTM D-2737 as applicable. Polyethylene pipe shall be copper tube size (CTS) and cold flared.

T. METER BOX

Meter Box shall be concrete with full steel plate lid, equal to Fog-Tite Meter Seal Co. 1-D, or all cast iron equal to Olympic Foundry Co, or high density plastic when not in any vehicle traffic or parking area.

U. METER VAULT

Meter Vaults shall be pre-cast concrete with concrete top and galvanized steel lid. Minimum inside vault size shall be as shown on the plans. Lid and frame shall be hot dipped galvanized and have a design loading of AASHTO H-20. Lid shall have a spring lock and hinge allowing 180° swing to open. Minimum inside clear opening shall be 34" x 34".

Water tight cement grout shall be placed around all pipe entering or leaving the vault and shall be finished smooth to the full wall thickness.

V. COMBINATION AIR RELEASE & VACUUM VALVE

Combination Air Release and Vacuum Valve shall be furnished with both a large and small orifice. The small orifice shall be a minimum diameter of 3/32". The large orifice shall be the full diameter of the nominal size of the valve. The valve shall have a screwed inlet and outlet and be manufactured by Olympic Foundry, GA Industries, or approved equal. See Standard Detail.

W. HYDRANT GUARD POST

Post shall be six feet long and nine inches in diameter, precast reinforced concrete as manufactured by Fog-Tite Meter Seal Co. or equal. See Standard Detail.

X. VALVE MARKER POST

Post shall be 42 inches long and minimum four inches by four inches above ground dimension, precast reinforced concrete as manufactured by Fog-Tite Meter Seal Co. or equal. See Standard Detail.

Y. CONCRETE BLOCKING

All blocking shall be concrete - ready-mixed. See Detail.

PART IV. CONSTRUCTION STANDARDS

A. CONSTRUCTION PERMITS AND AUTHORIZATION

All construction on water main extensions and distribution system improvements shall be in accordance with the WSDOT/APWA Standard Specifications and DOH standards.

B. TRENCH EXCAVATION

Trenches shall be constructed per OSHA/WISHA requirements.

The trench shall be kept free from water until pipe joining is complete. Surface water shall be diverted so as not to enter the trench. The Contractor shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out. Pump discharge shall be diverted such that downstream properties are not damaged.

The owner shall perform all excavation of every description and of whatever substance is encountered. Boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth of 6 inches (6") below water main grade. Where material is removed from below water main grade, the trench shall be backfilled to grade with material satisfactory to the Town and thoroughly compacted.

C. PIPE BEDDING.

All pipe bedding for rigid piping (ductile iron, concrete, etc.) See Standard Detail.

Bedding for PVC pipe shall extend at least twelve inches (12") above the crown of the pipe as shown for Class F in.

D. BACKFILLING.

Backfilling and surface restoration shall closely follow installation of pipe, so that not more than 100 feet is

left exposed. If suitable native material, as determined by the Town, is not available from trenching operations, the Town may order the placing of select backfill or some other suitable material in the trench profile. Backfill material shall be placed and compacted above the bedding material and compacted to 95% of the maximum density as determined by ASTM Designation D 1557-66T Method.

a. When other governmental agencies other than the Town have jurisdiction over roadways within the construction area, the backfill and compaction shall be performed to the satisfaction of the agency having jurisdiction.

E. CONSTRUCTION ON EASEMENTS.

All construction on easements shall be performed strictly in accordance with the easement provisions. The contractor is responsible to make himself aware of all conditions pertaining to the easement agreement. No work shall be permitted in easement areas until specifically authorized by the Town. All affected property owners must be notified in writing at least 3 days prior to construction.

F. INSTALLATION OF WATER MAINS

The water main shall be installed as shown on the plans. The exact locations will be staked in the field by the developer at a location approved by the Town. The contractor shall notify the Town at least three working days prior to starting any new section of line. Unless otherwise specified, the minimum cover over the pipe shall be thirty six inches (36").

All nonmetallic water lines (mains and service lines) shall be installed with detectable marking tape. Detectable marking tape placement, material specifications, and color code designation shall conform to the latent edition of WSDOT/APWA Standard Specifications 1991.

Principal fittings, including modifications, shall be staked in the field. Pipe shall be laid to specified grade and alignment. Replacement of stakes lost or destroyed shall be made at the contractor's expense and in accordance with the plans, including modifications approved by the Town.

G. VALVE INSTALLATION

Valve installation shall conform to AWWA STANDARD C600. Valves shall be set vertically on a stable trench foundation so that the pipe will not be required to support the weight of the valve. In no case shall valves be used to bring misaligned pipe into alignment during installation. All valves shall be opened and closed under pressure and show no leakage. A valve box or vault shall be provided for every valve.

H. VALVE BOX INSTALLATION

The valve box shall be installed so as not to transmit shock or stress to the valve and shall be centered over the operating nut. Box cover shall be set flush with pavement and two inches below grade in gravel roads.

I. VALVE VAULT INSTALLATION

Vaults shall be provided for all valves that have exposed gearing or operating mechanisms and installed as shown on plans. Vault structures shall have adequate foundation to prevent settlement on the pipe. All valve operating mechanisms shall be readily accessible through the valve vault opening. Vault covers shall be flush with finished grade or as specified. A two inch drain with grate shall be provided in solid base installations. Place cement grout around all pipe entering vault to prevent entrance of earth and rocks.

J. VALVE MARKER INSTALLATION

Concrete marker posts shall be set for all valves, except auxiliary hydrant valves. The post shall be set at right angles to the road from the valve and shall be situated in a safe and reasonable conspicuous location, normally on the property line. Posts shall be painted with quick-dry High Visibility Blue Enamel No. X-3472 as manufactured by Farwest Paint MFG. Co. Distance to valve shall be neatly stenciled on the post with two inch numerals using black enamel paint. See Standard Detail.

K. CONCRETE BLOCKING

Concrete blocking shall be cast in place and have minimum of 1/4 square foot bearing against the fitting and bearing area against undisturbed.

L. PIPE IN FILLS

Special treatment may be required at the discretion of the Town. This treatment may consist of compacting the backfill in six inch layers, careful choice of backfill materials, use of Mechanical Joint/Restrained Joint Pipe or such other methods that are reasonable and necessary in the opinion of the Town.

M. HIGHWAY CROSSINGS

Highway crossings shall be as shown on the plans. The work shall be done according to the requirements of the Town, State and County Highway Departments and shall be subject to their approval. The Contractor shall give at least two working days notice to the Highway Department before commencing work. Prior to any work on Town streets or right-of-ways, the Public Works Director must be notified in writing and approved by the Public Works Director.

Normally, highway crossings require the placing of a steel, or concrete pipe casing by jacking or tunneling and laying the water main within this casing. In case of tunneling, subsequent low pressure grouting through the pavement may be required. In "open cut" situations the ditch shall be backfilled with crushed rock and compacted to avoid settlement.

N. CONNECTION TO EXISTING WATER MAINS

Connections and live taps will be made by the contractor and supervised by the Town. The Contractor will notify the Town at least three (3) working days prior to the time he desires the work done. The hours selected for cut-in or connection to existing mains shall be subject to the approval of the Town.

Cut-ins on six inch diameter pipe and smaller shall be made with mechanical joint sleeves, cast iron tee and flanged valve. Connections to eight inch diameter pipe and larger shall be made with a tapping sleeve and valve. See Standard Details.

O. SERVICE CONNECTIONS

Service connections shall be protected during construction. Connection to new mains will be made by the Contractor unless otherwise specified.

Connections shall be installed with pipe saddles on asbestos cement and steel pipe and by direct tap into

ductile iron pipe except where connections 1 1/2 inch and larger are made to ductile iron pipe in dimensions six inches and less. In this case saddles shall be used.

P. CLEARING AND GRUBBING

Within the clearing limits set forth on the drawings, all trees, stumps, brush, logs, fences, upturned stumps and roots of down trees and other similar items shall be removed and disposed of, except as otherwise shown, specified or directed. The Contractor shall be responsible for keeping the clearing operations within the designated limits. No work shall be done outside of the designated clearing limits.

No firewood shall be removed from the construction site without written permission from the land owner. The refuse resulting from the clearing operation shall be hauled to a waste site secured by the Contractor and shall be disposed of in such a manner as to meet all requirements of State, County and municipal regulations regarding health, safety, and public welfare. When authorized by the proper fire authorities, the Contractor may dispose of such refuse by burning on the site of the project provided all requirements set forth by the authorities are met.

In all cases, the authority to burn shall not relieve the Contractor in any way from damages which may result from his operations. In no case shall any material be left on the project, shoved into abutting private properties, or be buried in embankments or trenches on the project.

The Contractor shall be responsible for all damages to existing improvements or conditions resulting from his operations.

All plants, trees, shrubs and other planting in landscaped areas shall be salvaged or replaced, as directed by the Town.

Q. RESTORATION AND CLEAN-UP

The areas disturbed by construction shall be graded to resemble the original contours except as otherwise shown and shall present a uniform appearance.

In residential areas, the Contractor shall restore the site of construction as directed by the Town. This restoration will generally include replacing disturbed lawn either by replacing sod or reseeding, replanting shrubs removed during construction, replacing any other

items or fixtures disturbed by the Construction and restoring the site to its original, pre-construction condition.

The Contractor shall, as directed by the Town, remove at his own expense from all public and private property, all temporary structures, rubbish and waste materials resulting from his operation. This requirement shall no apply to property used for permanent disposal of rubbish or waste materials in accordance with permission of such disposal granted to the Contractor by the owner thereof.

R. HYDROSTATIC TESTS

Except as specified herein, hydrostatic tests shall be in accordance with AWWA C600. Prior to acceptance of the work, the installation shall be subject to a pressure test of 200 psi or static pressure plus 100 psi at the lowest elevation, whichever is greater. A leakage test shall be conducted concurrently with the pressure test. Test pressure shall not vary by more than ±5 psi.

Any leaks or imperfections developing under said pressure shall be remedied by the Contractor before final acceptance of the work. Leakage shall be measured by approved means. Test pressure shall be maintained while the entire installation is inspected. The Contractor shall provide all necessary equipment and shall perform all work connected with the test. Blocking shall be in place at the time of testing. Insofar as is practical, tests shall be made with pipe joints, fittings and valves exposed for inspection. Not more than 2,000 feet of line shall be left exposed for testing at any one time, except by permission of the Town.

The cost of the Hydrostatic test shall be included in the price quoted for the installation of pipe.

Allowable leakage per 1,000 feet of pipe - gallons per hour (gph): (18 foot pipe lengths, 200 psi test pressure)

2" - 0.21 gph	8" - 0.85 gph	14" - 1.48 gph
4" - 0.43 gph	10" - 1.06 gph	16" - 1.48 gph
6" - 0.64 gph	12" - 1.28 gph	18" - 1.91 gph

S. STERILIZATION AND FLUSHING OF WATER MAINS

Disinfection procedures shall be in accordance with AWWA STANDARD C651. Dry calcium hypochlorite granules may be used subject to the approval of the Town, and shall be in accordance with the following procedure:

As each length of pipe is laid, sufficient high test calcium chlorite (65-70% chlorine) shall be placed in the pipe to yield a dosage of not less than 50 ppm available chlorine, calculated on the volume of water which the pipe and appurtenances will contain. (The amount of 65% test calcium hypochlorite required per 18-foot length of 12 inch diameter pipe is one ounce). Where this procedure is followed, flushing shall be done after disinfection.

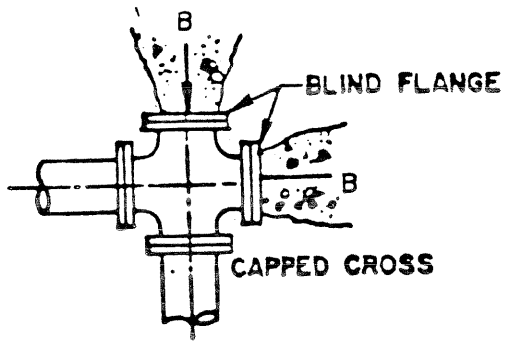
Dry calcium hypochlorite tablets may be used subject to the approval of the Town, and use shall be in accordance with the procedure detailed in AWWA Standard C651-86.

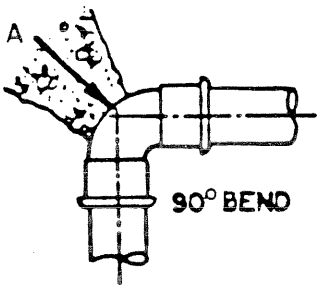
Water samples shall be taken for approval to the local health agency by the Town. The Contractor shall exercise special care in flushing to avoid damage to surrounding property.

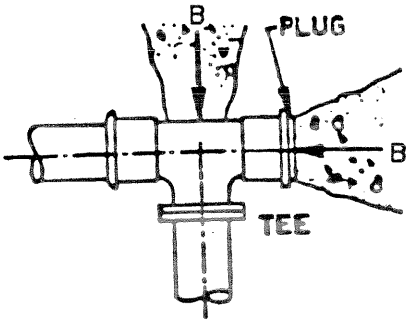
INDEX OF WATER STANDARD DETAILS

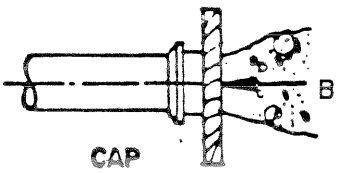
FOR THE TOWN OF EATONVILLE

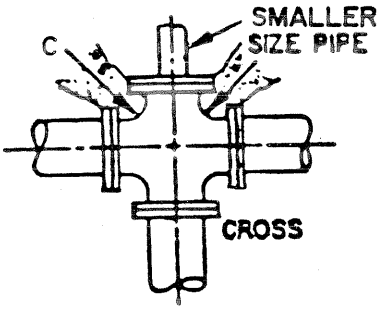
W-1	Concrete Blocking Horizontal
W-2	Concrete Blocking Vertical
W-3	Thrust Table
W-4	Fire Hydrant Assembly
W-5	Guard Posts
W-6	Wet-tap Assembly
W-7	Pipe Trench
W-8	Trench Detail - AC Pavement Section
W-9	Air and Vacuum Relief Valve Assembly
W-10	Detector Check and Vault
W-11	Single Service/Meter
W-12	Double Service/Meter

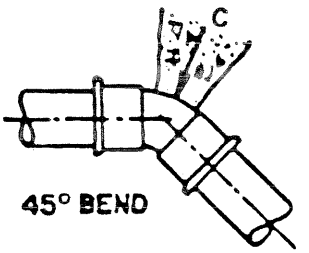


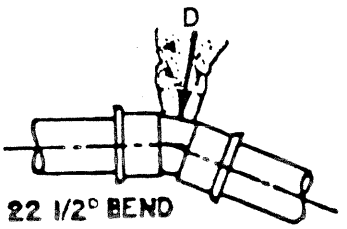


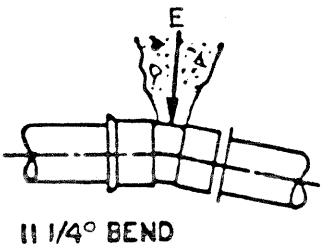












NOTES:

SEE THRUST BLOCK TABLE

PROVIDE POLYETHYLENE SHEETING
TO COVER BOLTS AND JOINTS
FOR DISMANTLING.

JULY 1991

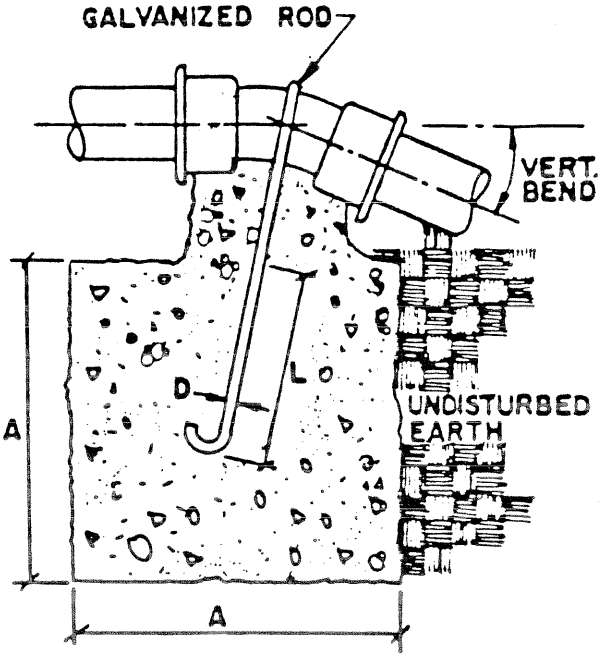
DATE	REVISION	BY	APPR'D

CONCRETE BLOCKING
HORIZONTAL

W-1

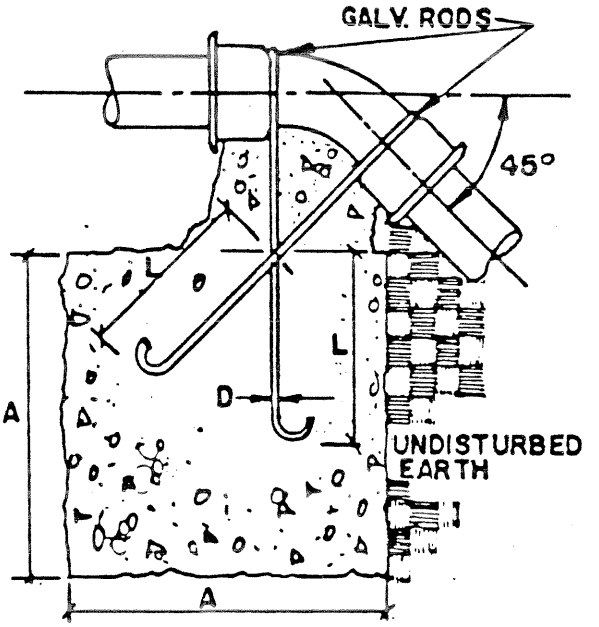
FOR 11 1/4°, 22 1/2°, 30° BENDS

PIPE SIZE	V B	CU FT	A	D	L
4"	11 1/4°	8	2.0'	3/4"	1.5'
	22 1/2°	11	2.2'		2.0'
	30°	17	2.6'		
6"	11 1/4°	11	22'	3/4"	2.0'
	22 1/2°	25	2.9'		
	30°	41	3.5'		
8"	11 1/4°	16	2.5'	3/4"	2.0'
	22 1/2°	47	3.6'		
	30°	70	4.1'	3/4"	2.5'
10"/12"	11 1/4°	32	3.2'	3/4"	2.0'
	22 1/2°	88	4.5'	7/8"	3.0'
	30°	132	5.1'		



VERTICAL BLOCKING
FOR 11 1/4°, 22 1/2° & 30° BENDS

VERTICAL BLOCKING FOR 45° BENDS					
4"	45°	30	3.1'	3/4"	2.0'
6"		68	4.1'		
8"		123	5.0'		
10"/12"		232	6.1'	3/4"	2.5'



VERTICAL BLOCKING
FOR 45° BENDS

NOTE: CONCRETE BLOCKING BASED ON 200 PSI PRESSURE AND 2500 PSI CONCRETE

JULY 1991

DATE	REVISION	BY	APPR'D

CONCRETE BLOCKING VERTICAL

THRUST BLOCK - TABLE
Min. Bearing Area Against Undisturbed Soil
Square Feet

Pipe Size	A(ft.^{2})	B(ft.^{2})	C(ft.^{2})	D(ft.^{2})	E(ft.^{2})
4"	3	2	2	2	2
6"	4	4	2	2	2
8"	7	6	4	2	2
10"	11	10	6	3	2
12"	16	14	9	5	3

Notes:

1. Bearing area of concrete thrust - block based on 200 psi pressure and safe soil bearing load of 2,000 pounds per square foot.

2. Areas must be adjusted for other pipe sizes, pressures and soil conditions.

3. Concrete blocking shall be cast in place and have a minimum of 1/4 square foot bearing against the fitting.

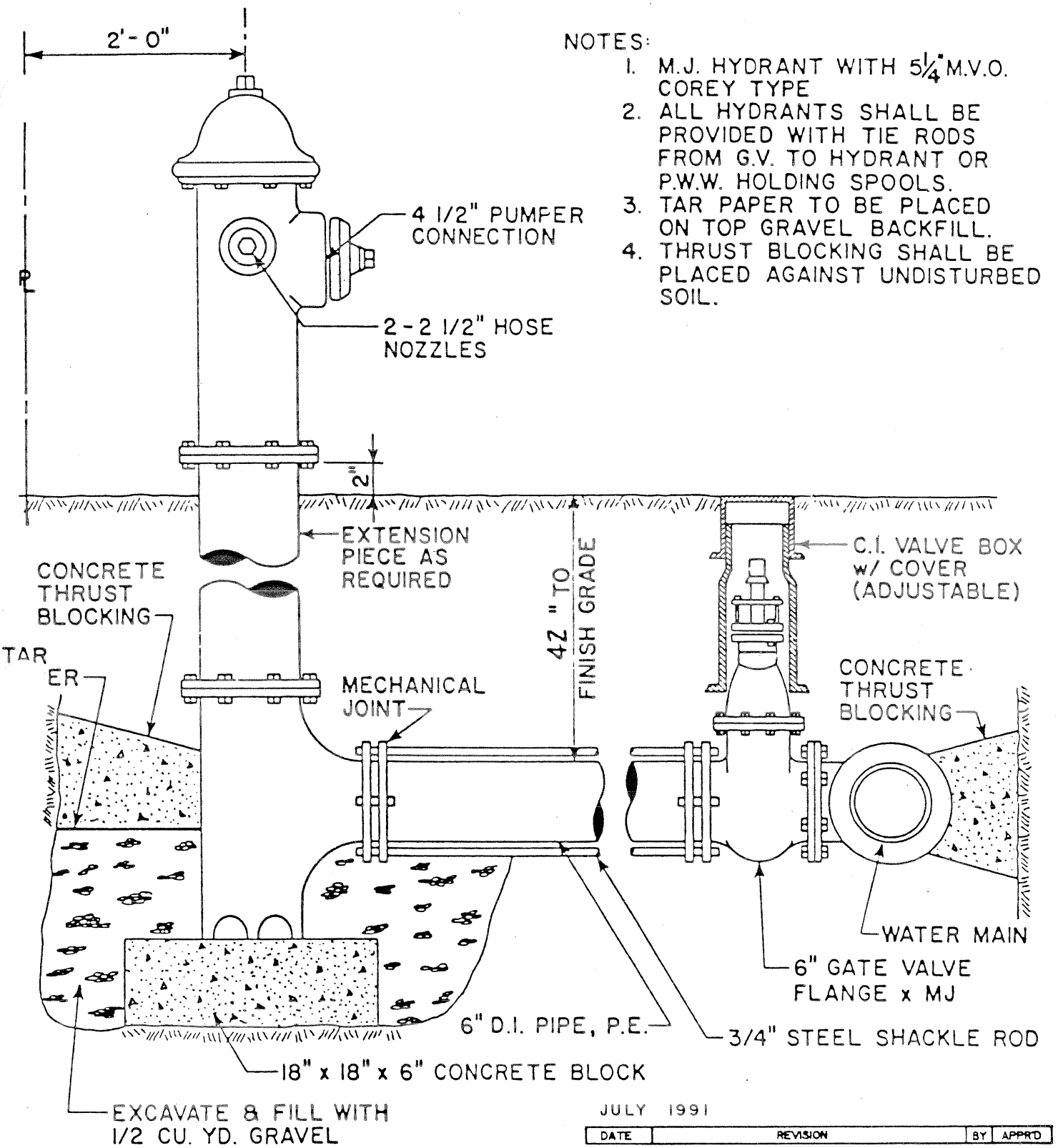
4. Block shall bear against fittings only and shall be clear of joints to permit taking up or dismantling of joint.

5. Contractor shall install blocking adequate to withstand full test pressure as well as to continuously withstand operation pressure under all conditions of service.

JULY 1991

DATE	REVISION	BY	APPR'D

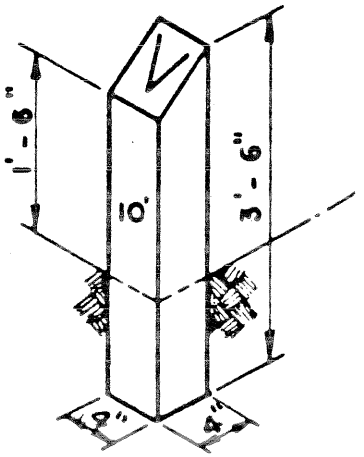
THRUST TABLE



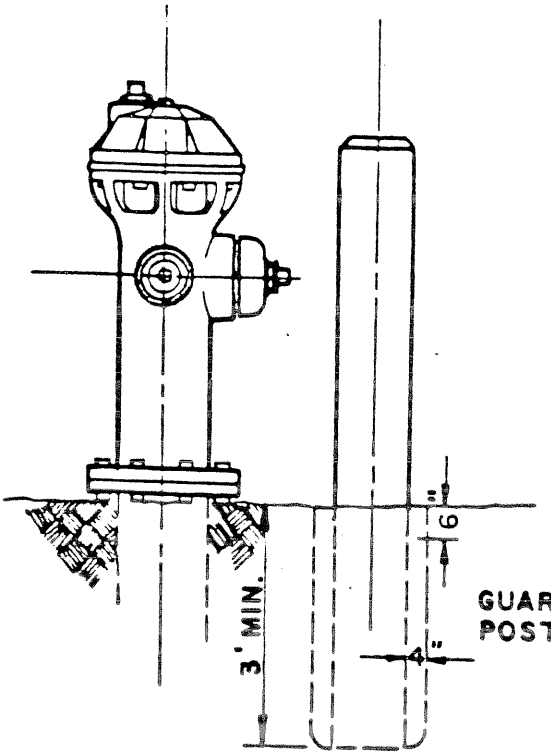
JULY 1991

DATE	REVISION	BY	APPR'D

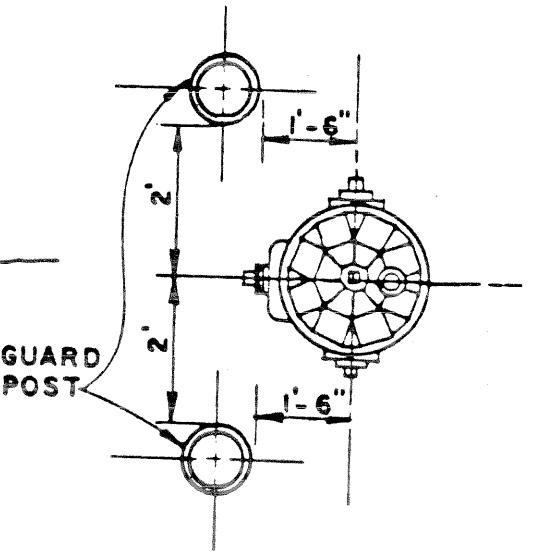
SHACKLE RODS SHALL BE CLEANED AND GIVEN 1 COAT OF AN APPROVED PRIMER (RED LEAD OR ZINC CHROMATE) AFTER CUTTING AND BEFORE INSTALLATION. AFTER INSTALLATION RODS SHALL BE PAINTED WITH ONE COAT OF AN APPROVED BITUMINOUS PAINT.



VALVE MARKER POST



FIRE HYDRANT-GUARD POST
ELEVATION



PLAN

CONCRETE BACKFILL TO 6"
FROM GROUND WHERE SPECIFIED
EARTH BACKFILL COMPACTED IN
6" LAYERS ELSEWHERE.

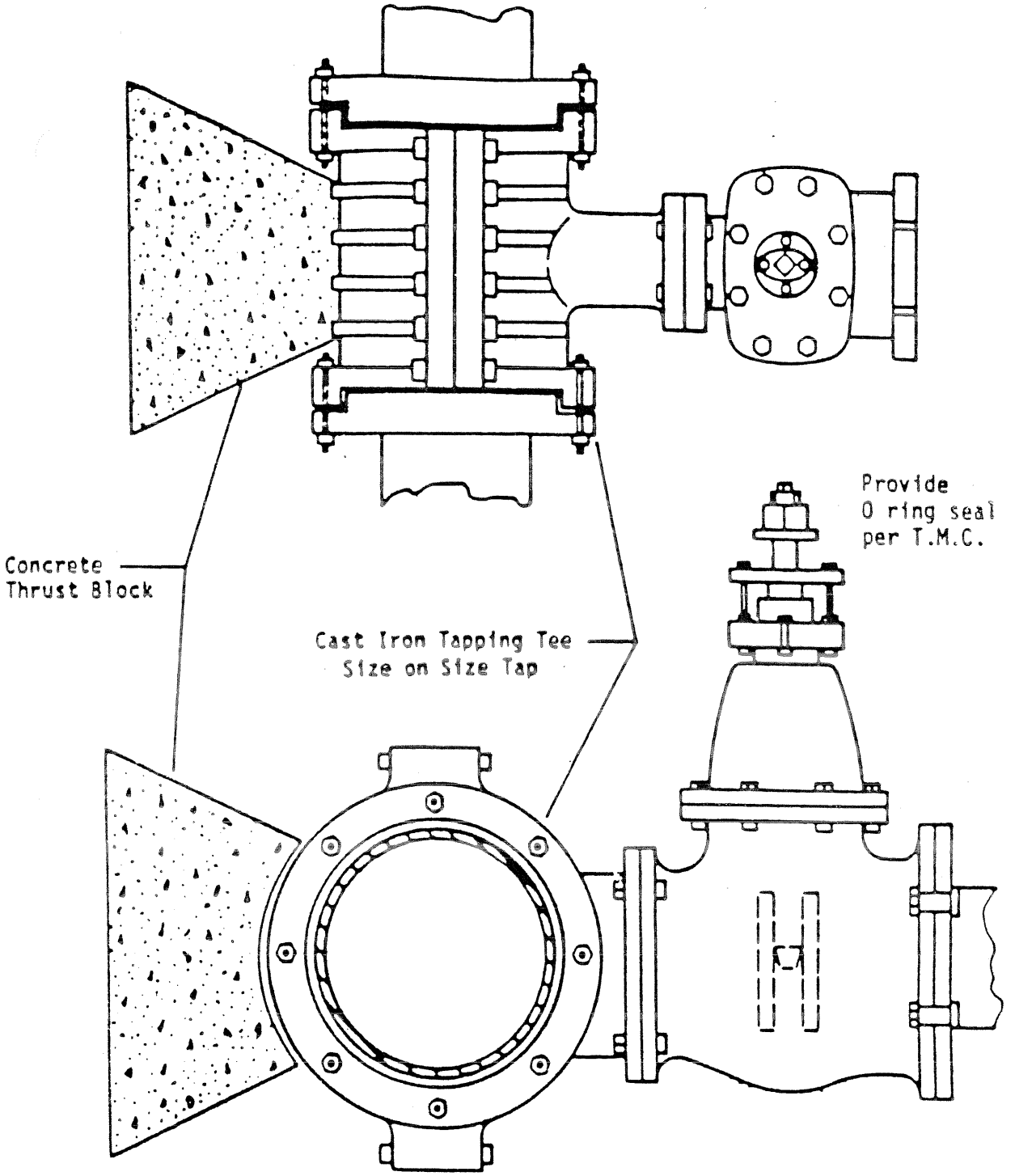
NOTES:

GUARD POST SHALL BE 6' LONG AND 9" IN DIAMETER PRECAST CONCRETE AS MANUFACTURED BY FOG-TITE METER SEAL CO. OR EQUAL. PAINT POST WITH HIGH VISIBILITY ~~YELLOW~~ WHITE ENAMEL ~~NO. X-3472~~ AS MANUFACTURED BY FARWEST PAINT MFG. CO.

VALVE MARKER POST SHALL BE MINIMUM 42" LONG PRECAST CONCRETE AS MANUFACTURED BY FOG-TITE METER SEAL CO. OR EQUAL. PAINT POST WITH HIGH VISIBILITY BLUE AS MANUFACTURED BY FARWEST PAINT MFG. CO. NEATLY STENCIL DISTANCE TO VALVE ON POST WITH 2" NUMERALS USING BLACK ENAMEL PAINT.

JULY 1991

DATE	REVISION	BY	APPR'D

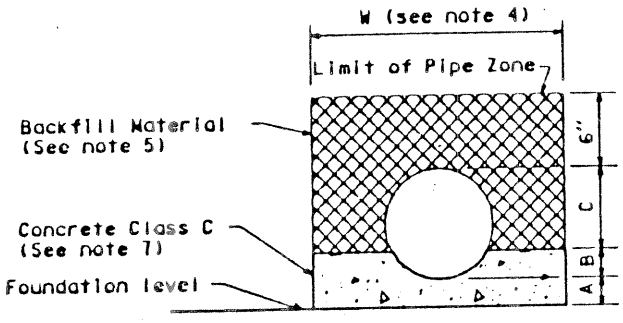


JULY 1991

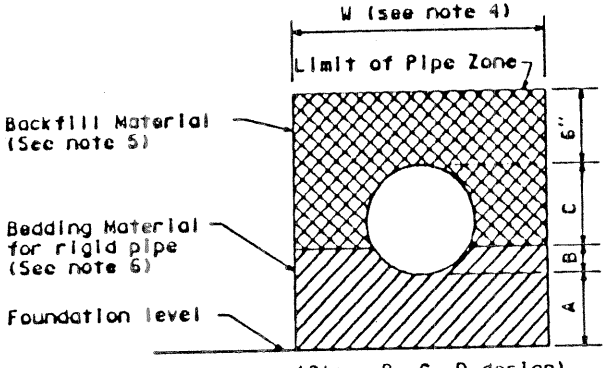
DATE	REVISION	BY	APPR'D

NOTE:
FOR TAPS ON CEMENT LINED, ASBESTOS CEMENT, CAST IRON OR SIZE ON SIZE UP TO AND INCLUDING 12" I.D.

WET TAP ASSEMBLY

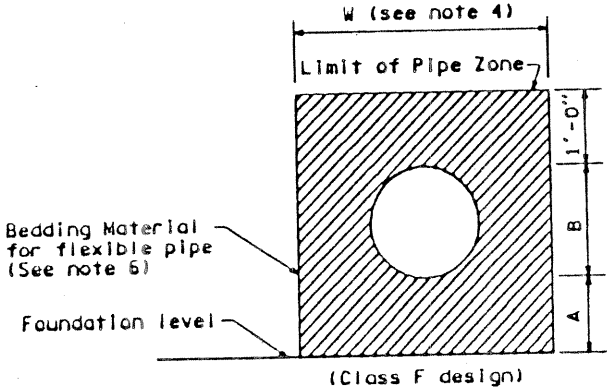


(Class A design)



(Class B, C, D design)

BEDDING FOR RIGID PIPE IN TRENCHES



(Class F design)

BEDDING FOR FLEXIBLE PIPE IN TRENCHES

NOTES:

1. Provide uniform support under barrel.
2. Hand tamp under haunches.
3. Compact bedding material to 95% MAX density except directly over pipe, hand tamp only.
4. See Sec. 7-17.3(1) for trench width "W" and trenching options. The pipe zone will be the actual trench width, except for class A bedding, the minimum concrete width shall be 1½ I.D. + 18". (APWA/WSDOT)
5. Trench backfill shall conform to Sec. 7-17.3(3), except that rocks or lumps larger than 1" per foot of pipe diameter shall not be used in the backfill material. (APWA/WSDOT)
6. See section 9-03.15.16 of the Standard Specifications for material specifications. (APWA/WSDOT)
7. Pipe must be anchored in such a manner as to ensure flow line is maintained.

	BEDDING CLASS DESIGN				
DIMENSION	CLASS A	CLASS B	CLASS C	CLASS D	CLASS F
A	4" MIN ¼ I.D. 12" MAX	*	*	Zero	*
B	¼ O.D.	½ O.D.	⅛ O.D.	Zero	O.D.
C	¾ O.D.	½ O.D.	⅞ O.D.	O.D.	-

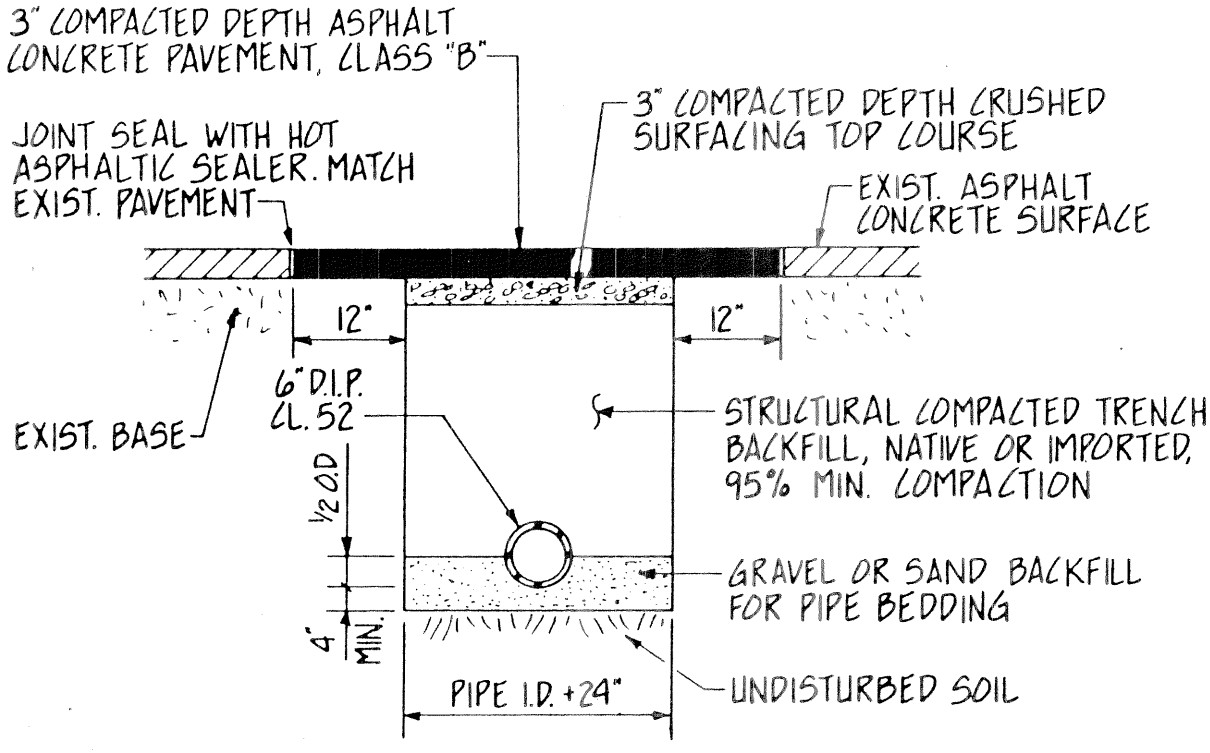
* A = 4" MIN. 27" I.D. and under
6" MIN. over 27" I.D.

JULY 1991

DATE	REVISION	BY	APPR'D

PIPE TRENCH

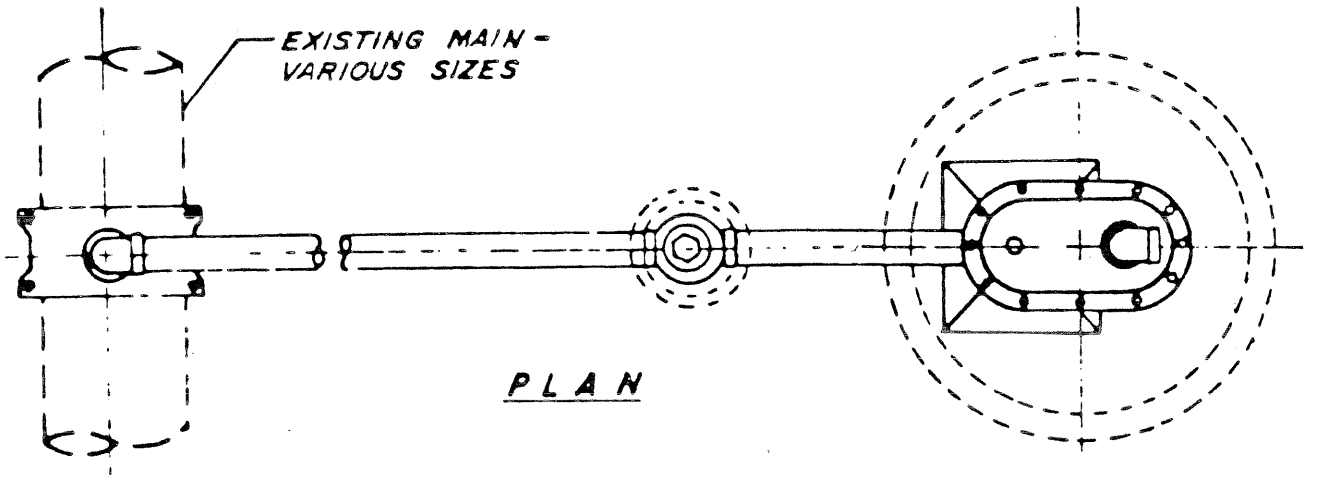
W-7



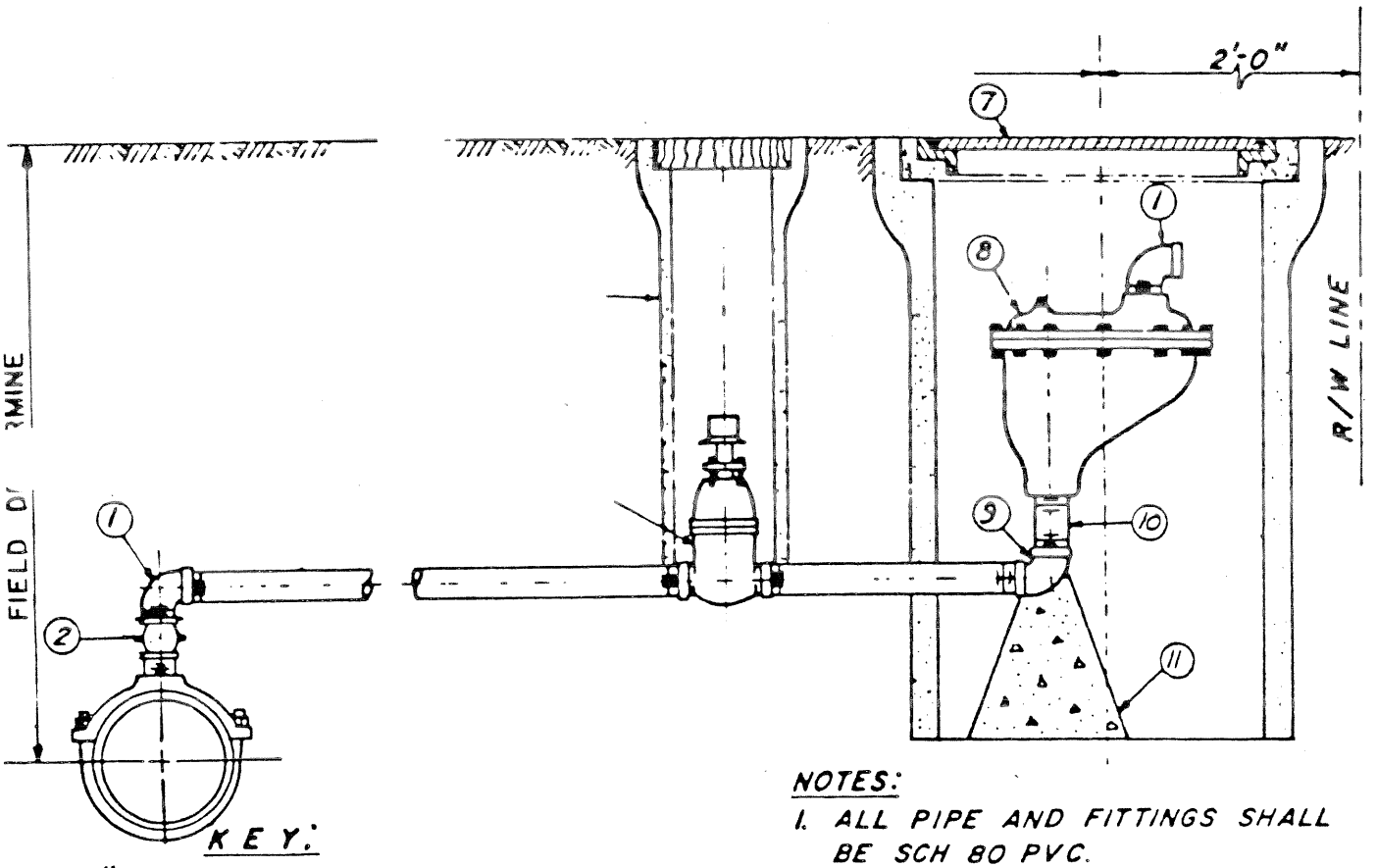
TRENCH DETAIL / A.C. PAV'T. SECTION

JULY 1991

DATE	REVISION	BY	APPR'D



PLAN



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE SCH 80 PVC.

KEY:

1. 1" STREET ELL
2. 1" CORPORATION STOP, FORD OR EQUAL
3. DOUBLE STRAP SERVICE CLAMP
4. 1" GATE VALVE, AWWA, WITH OPERATING NUT
5. CAST IRON VALVE BOX
6. 21" CONC. SEWER PIPE
7. 18" SIDEWALK MANHOLE COVER WITH SOLID LID
8. 1" AIR & VACUUM RELEASE VALVE, APCO OR EQUAL
9. 1" ELBOW
10. 1" NIPPLE
11. CONC. SUPPORT

JULY 1991

DATE	REVISION	BY	APPR'D

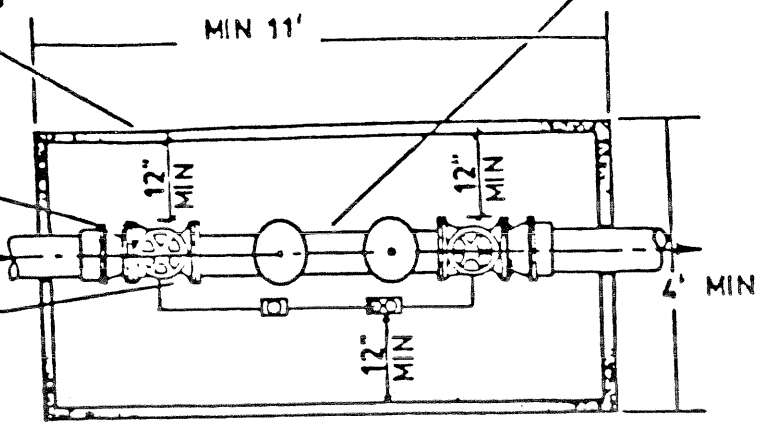
AIR AND VACUUM
RELIEF VALVE ASSEMBLY

W.S.D.H. APPROVED DOUBLE DETECTOR CHECK VALVE ASSEMBLY

CONC. VAULT— PROVIDE SHOP DRAWINGS TO ENGINEER PRIOR TO INSTALLATION SIZE TO MEET MINIMUM CLEARANCE

2— FLANGE COUPLING ADAPTORS, ROCKWELL 912 OR EQUAL

2— MUELLER GATE VALVES, FLXFL, O, S&Y



PLAN

34"X34" MIN CLEAR OPENING W/ GALV STL LID & FRAME PER AASHO H—20 DESIGN LOADS LID TO BE CENTERED.

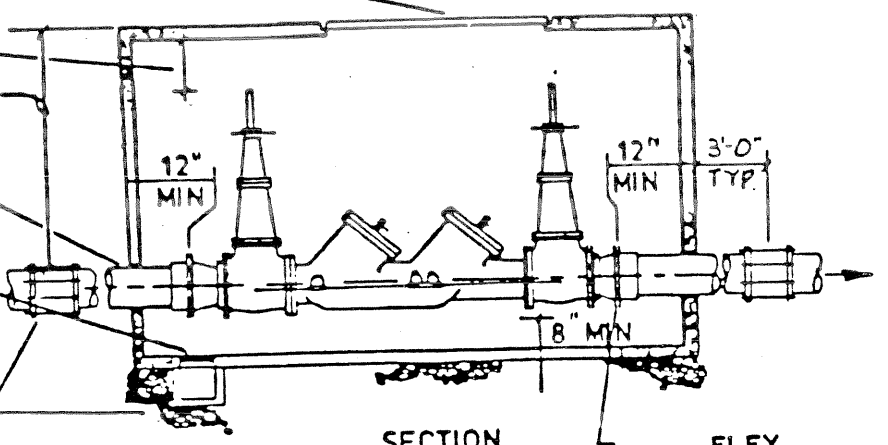
6" MIN CLEARANCE TO VALVE WHEN FULLY OPEN

MIN 4'6"

WATERTIGHT GROUT ALL VAULT PENETRATIONS

12" GRATE AND SUMP. PROVIDE MIN 1/4 CY ROCK SUMP APPROVAL BY THE ENGINEER REQUIRED

6' — 1 1/2" WASHED ROCK BASE



FLEX COUPLING (2)

SECTION

FLEX REDUCER (2)

NOTES:

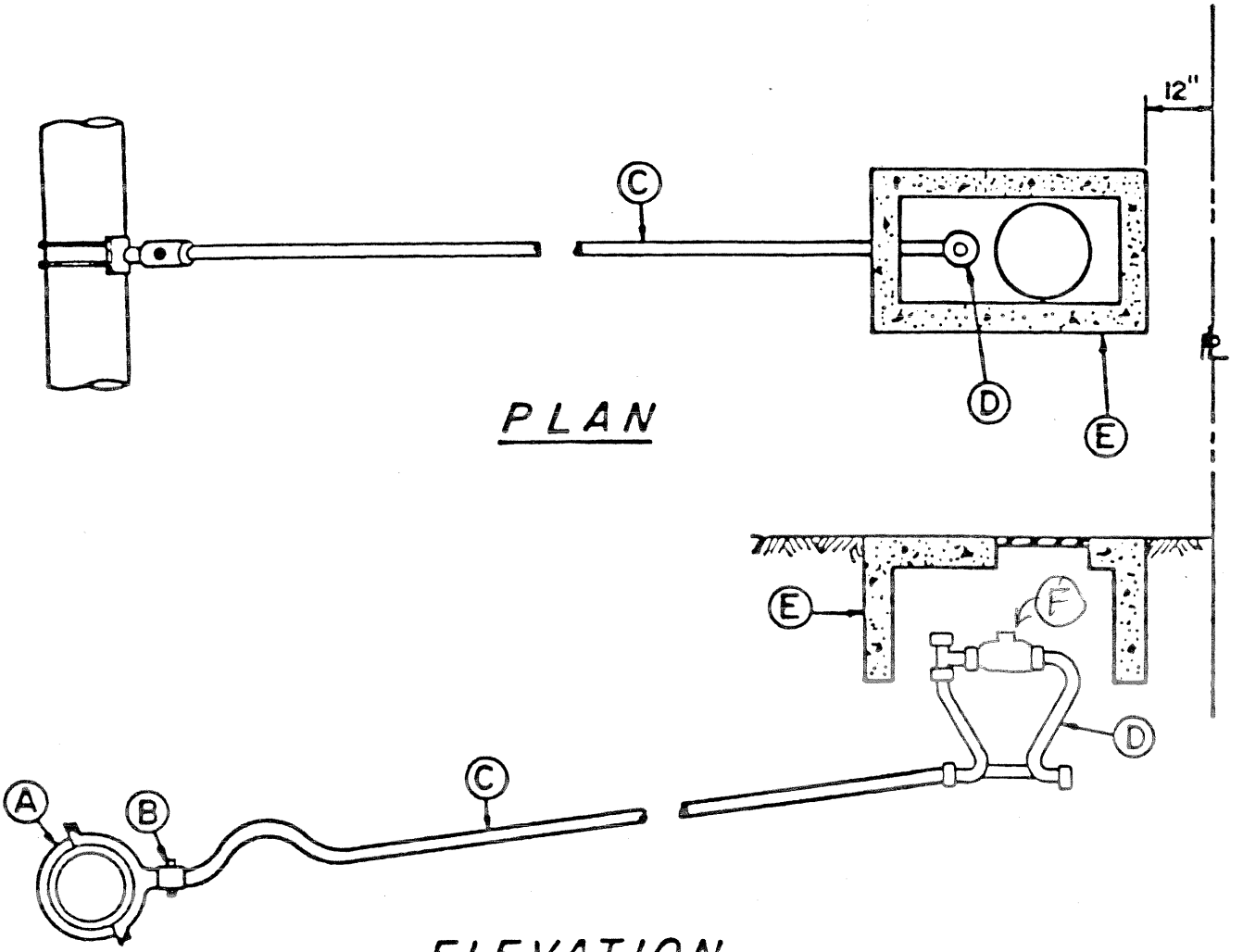
1. SLOPE PAVEMENT AWAY FROM COVER WHEN VAULT IS IN TRAFFIC AREA.

2. BYPASS METER TO READ IN CUBIC FEET.

DETECTOR CHECK TYPE-1 DETAIL

JULY 1991

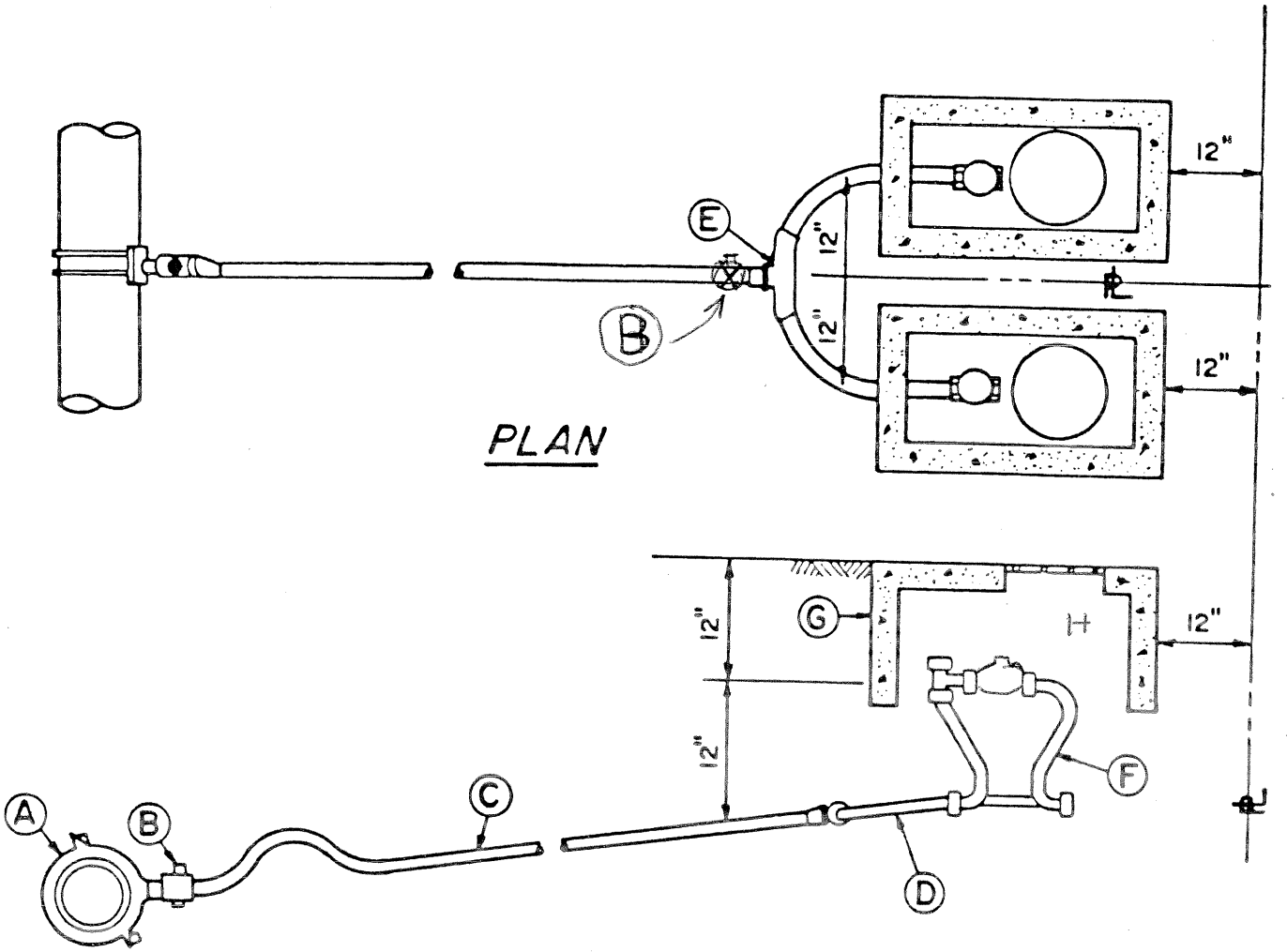
DATE	REVISION	BY	APPR'D



(A) PIPE SADDLE, 1" TAP, SMITH BLAIR OR EQUAL
(B) 1" CORPORATION STOP, MUELLER H-15028 OR EQUAL
(C) HIGH MOLECULAR WEIGHT POLYETHYLENE
ASTM D-1248, D-2239, D-2737 AS APPLICABLE (1" DIA)
(D) 3/4" WATER METER SETTER, MUELLER H 1404-2 WITH 14222 & 14227
5/8" X 3/4" METER.
(E) CONC. METER BOX, FOG TITE OR EQUAL
F Master Meter, in U.S. Gallon

JULY 1991

DATE	REVISION	BY	APPR'D



Ⓐ PIPE SADDLE, 1" TAP, SMITH BLAIR OR EQUAL

Ⓑ 1" CORPORATION STOP, MUELLER OR EQUAL

Ⓒ HIGH MOLECULAR WEIGHT POLYETHYLENE ASTM D-1248, D-2239, D-2737 AS APPLICABLE (1" DIAMETER)

Ⓓ SAME AS "C" (3/4" DIAM.)

Ⓔ SERVICE TEE 3/4"X 3/4"X 1" WITH COMPRESSION FITTING ADAPTORS

Ⓕ 3/4" WATER METER SETTER, MUELLER H 1404-2 WITH 14222 & 14227 5/8"X 3/4" METER

Ⓖ CONC. METER BOX, FOG TITE OR EQUAL

Ⓗ Master Meter in U.S. Gallon

JULY 1991

DATE	REVISION	BY	APPR'D

Town of Eatonville Water Distribution and Wastewater Collection Specifications

1----- Water mains shall be constructed of the following materials. PVC-C 900 or Ductile Iron (gasket)
2----- Wastewater collection mains shall be constructed of gasket PVC
3----- Saddle taps shall not be closer than 12 inches and not in line.
4----- Wastewater Cleanouts will be placed at the property line (Minimum 6 inch), and 2 feet out from the house.
5-----Wastewater cleanouts will be brought up to finish grade and caped.
6----- Both water and wastewater mains will be bedded with sand at a Minimum of 6 inches under the pipe and 12 inches above.
7----- The proper warning tape will be placed between 12 inches and 18 inches above the pipe.
8-----Locate wire will be either taped to the main or wrapped around the main.
9-----Water main valve boxes will be turned to indicate the direction of flow that the valve shuts off.
10----Water services shall be made of 1 inch polypipe (200psi) from the corporation valve on the main to the meter setter with NO splices.
11----Meters shall read in U.S. Gallons.
12----Meters shall be Master Meters (Brand)
13----Meter setters shall have check valves on them.
14----When at all possible, the meter will be installed at the property line.
15----The Town of Eatonville is only responsible to the meter for repairs.
16----Water service line from the meter setter to the house will be of ¾ inch polypipe (200psi)
17----All services lines with sprinkler systems will have a double check and be tested annually.
18-----All service lines with a sprinkler system may have a 1 inch supply and 1 inch meter. (costs more for the 1 inch)
19-----Meter splitters may be use in new developments.
20-----Meter boxes will be set to finish grade with the meter 6 inches below top of the box lid.
21-----Driveway meter boxes will be used if in a traffic area.
22-----Fire hydrants will be made by Mueller.
23-----Fire hydrant burial will be not more or less than 6 inches from the

APPENDIX I

Water Ordinances and Code

Title 13

PUBLIC SERVICES

Chapters:

13.04 Water Service
13.08 Water Main Extensions
13.10 Water System Cross-Connections
13.11 Fire Hydrants
13.13 Agreements with Owners of Real Estate for Water or Sewer Facilities
13.14 Sanitary Sewer and Waste Disposal
13.16 Electric Service
13.18 Utility Deposit
13.20 Cemetery
13.24 Storm Drainage Utility
13.28 Development Agreements for Water, Sewer and Street Facilities

Chapter 13.04

WATER SERVICE

Sections:

13.04.010 Regulations established – Purpose.
13.04.020 Application – Form – Contents.
13.04.030 Charges to constitute lien.
13.04.040 Billing – Delinquency – Penalty – Shutoff – Reconnection.
13.04.050 Use restrictions.
13.04.060 Installation and connection charges for meters.
13.04.065 Public works water development and construction standards.
13.04.070 Connection – Specifications – Exceptions.
13.04.075 Corporation stops.
13.04.080 Turn-off or turn-on – Prohibited – Exceptions.
13.04.090 Connection – Owner responsibility – Cost.
13.04.100 Prohibited acts – Exceptions.
13.04.110 Connection – Permit required – Penalty – Water service from fire hydrant.
13.04.120 Turn-on – Payment in advance required – Right to turn off – Notice.
13.04.130 Discontinuance – Short term – Procedure.
13.04.140 Shut-off – Town rights and responsibilities.
13.04.150 Irrigation or sprinkling – Prohibited during fire.
13.04.160 Right of access for inspection.
13.04.170 Extra connections – Charge.
13.04.180 Water main extensions – Fees.
13.04.190 Extension, repair or replacement of distribution mains within town limits.
13.04.200 Meters – Testing procedures and charges.
13.04.210 Fire hydrant – Operation restrictions.
13.04.220 Fire hydrant – Operation by inspector – Costs borne.
13.04.230 Connections outside of town limits.
13.04.235 Fire hydrant – Monthly rates for water consumption.
13.04.240 Piling rubbish on meters prohibited.
13.04.250 Fire protection service – Standby charges.
13.04.260 Fire protection service – Equipment installation and maintenance.
13.04.270 Meter installation – Town's rights – Costs.
13.04.280 Meter rates for water services within the town limits.
13.04.290 Irrigation water service meter charges.
13.04.300 Violation – Penalty – Additional liability.

13.04.010 Regulations established – Purpose.

The following rules and regulations are established for fixing, regulating and controlling the use and sale of water supplied by the town to both residents and nonresidents of the town. (Ord. 70-3 § 1, 1970).

13.04.020 Application – Form – Contents.

All applications for the use of water must be made to the public works director at the office of the town to be furnished by the clerk for that purpose. Such applications must be made by the owner or the authorized agent of the property to which the water is to be furnished. The applicant shall state fully and truthfully all the purposes for which the water may be required, and must agree to conform to the rules and regulations and any modifications thereof that may be established from time to time, as a condition for the use of water. The applicant shall be required to pay a nonrefundable permit fee of $100.00 to the town clerk. The permit fee will be applied to billings for water service, until exhausted, if connection to the water system is made within 90 days of the application. (Ord. 91-15 § 1, 1991: Ord. 70-3 § 2, 1970).

13.04.030 Charges to constitute lien.

All charges for water sold and furnished by the town to any user shall at all times constitute a lien against the real property where such water services are delivered and distributed by the town and shall bind all successors in interest to the real property. It shall be the responsibility of the owner to notify the town following any change in ownership, occupancy or tenancy. (Ord. 91-15 § 2, 1991; Ord. 70-3 § 3, 1970).

13.04.040 Billing – Delinquency – Penalty – Shutoff – Reconnection.

A. All utility bills are due and payable when mailed.

B. All bills become delinquent if not paid within 25 days after date of billing; if unpaid, the town may impose a late payment fee.

C. Bills become subject to shutoff if not paid within 25 days from the billing date.

1. The town may make written demand to such consumer to either pay such fees or cease such

violation, as the case may be, and may shut off service to the premises at any time after five days following delivery of such demand, if the late payment fee has not been paid or the violation is not ceased.

2. Discontinuance of service shall not occur earlier than five days after written notice of the discontinuance date has been deposited in the mail addressed to the consumer, and not earlier than 24 hours after an additional written notice has been posted at the front door of the premises.

D. When service has been shut off, reconnection will be made only after payment of all back charges for service rendered to said premises, and correction of any other violation of this chapter and payment of the reconnection fee established by the town. Unauthorized reconnection or tampering with the utilities, by persons other than town employees, without express written consent of the mayor or public works director, is unlawful.

E. Fees for late payment, reconnection, and costs of staff time to repair tampering may be set by resolution adopted by the town council, which may be amended from time to time as deemed necessary. (Ord. 99-26 § 2, 2000).

13.04.050 Use restrictions.

No person supplied with water from the town mains shall be entitled to use it for any purpose other than those stated in the application, or to supply other persons or families in any way or for any purpose, without first securing a permit to do so from the public works director. (Ord. 91-15 § 4, 1991; Ord. 70-3 § 5, 1970).

13.04.060 Installation and connection charges for meters.

A. Installation of the meter will be done only after payment of the minimum meter installation charge is received. A meter installation charge shall be set by resolution of the town council.

B. The water main shall be considered to be in the center of the right-of-way, and in addition to the installation charge, a per-lineal-foot charge shall be added. Measurement shall be at right angles from the main to the property line. This lineal-foot charge shall be set by resolution of the town council.

C. All new construction, residential and commercial, on property which is located within 150 feet of a water main of the town, shall be required to extend the water main to and across the entire frontage of their property and connect to the town water system prior to the occupancy of the building. No new wells shall be constructed and no alterations to existing wells shall be permitted on properties that can be served, within 150 feet of a water main of the town, or are now served by the town water system.

D. Sprinkler connections shall be constructed at the property owner's expense subject to approval and inspection by the public works department.

E. Water meter connection charges may be waived, with proper approval of the public works director, if constructed and paid for by the property owner; provided, all the work is done to town standards.

F. Any person, firm or corporation desiring to construct any new or the replacement of water service systems, water mains or side water lines which are to be constructed by anyone other than the town shall first submit a plan for the construction to the public works director. To assure that an as-built plan is submitted for the town records and approved by the public works director, the water meter shall be secured in the off position and remain that way until the as-built plan is received and approved. (Ord. 91-15 § 5, 1991; Ord. 70-3 § 5, 1970).

13.04.065 Public works water development and construction standards.

All persons within the town, all persons served by the water distribution system of the town, and all persons who desire to be served by the water distribution of the town, shall adhere to the "Town of Eatonville Public Works Design, Development and Construction Standards," a copy of which is on file with the town clerk. The standards may be revised and reissued from time to time by the public works director. (Ord. 91-15 § 6, 1991).

13.04.070 Connection – Specifications – Exceptions.

All service connection pipes shall be installed directly from the street main to the owner's property line and shall be laid at a depth of not less than 24 inches below the surface of the ground, with the meter box to be located at or near the property line. The meter box may be located elsewhere if reasonable to do so, by special permission of the public works director. (Ord. 91-15 § 7, 1991; Ord. 70-3 § 7, 1970).

13.04.075 Corporation stops.

All service pipes must come direct from the street main and shall be laid at such depth and at such point as the public works department designates. No bibb or fixture of any kind shall be installed between the main and the meter. All cor-

poration stops and connections thereto shall be maintained under the control of the public works department. (Ord. 91-15 § 8, 1991).

13.04.080 Turn-off or turn-on – Prohibited – Exceptions.

No person except an officer or employee of the town will be allowed to turn the water off or on at the town's curb stop after the plumbing has been completed and the water turned on by the town. (Ord. 70-3 § 8, 1970).

13.04.090 Connection – Owner responsibility – Cost.

All pipes and connections from the property line shall be put in at the expense of the owner, who shall be responsible for all damages resulting from leaks or breaks. (Ord. 70-3 § 9, 1970).

13.04.100 Prohibited acts – Exceptions.

No plumber or person other than an officer or employee of the town will be allowed to make connections with the town's mains, or to make alterations in any conduit, pipe or other fixture connecting therewith, or to connect pipes when they have been disconnected, or to turn water off or on any premises at the town's stopcock. (Ord. 70-3 § 10, 1970).

13.04.110 Connection – Permit required – Penalty – Water service from fire hydrant.

A. Any person making connection to or alterations in any pipe whereby water may be drawn from the town's mains, or taking water from any fire hydrant, bibb pipe or fixture of any kind without first having secured a permit for the same from the town clerk, shall be deemed guilty of a misdemeanor and, upon conviction, shall be fined not less than $50.00 nor more than $500.00. All such fines shall revert to the water fund.

B. Any person, business, or agency desiring water service from a fire hydrant, or hose connection, shall first request their use of a hydrant to the public works director, and pay a fee equal to a two-inch basic meter charge plus the water usage charge in effect at the time of hook-up. The town employee shall install a meter on each hydrant prior to any water usage. This subsection does not apply to uses of the fire hydrant by the town fire department. (Ord. 91-15 § 9, 1991; Ord. 70-3 § 11, 1970).

13.04.120 Turn-on – Payment in advance required – Right to turn off – Notice.

Should it be desired to have the water turned on after it has been turned off, or where new services have been put in and the plumbing is completed, charges for the remainder of the month must be paid in advance, upon payment of which the water will be turned on. The town shall have the right at any time to shut off the water service to any premises on which there are situated leaky faucets, closets or other fixtures after notice to such property owner given 24 hours in advance. (Ord. 70-3 § 12, 1970).

13.04.130 Discontinuance – Short term – Procedure.

Should it be desired to discontinue the use of water supplied to vacant premises for a period of not less than 30 days, notice in writing must be given to the town clerk. The water will then be turned off and turned on again upon proper application and payment of a $25.00 charge, but no remission of charges will be made for a period of less than 30 days or without the notice prescribed in this section. (Ord. 91-15 § 10, 1991; Ord. 70-3 § 13, 1970).

13.04.140 Shut-off – Town rights and responsibilities.

A. The water may, at any time, be shut off from the mains, without notice, for repairs, extensions or other necessary purposes, and the town shall not be responsible for the safety of boilers supplied by direct pressure from the mains or otherwise on the premises of any water consumer. Persons having boilers supplied by direct pressure from the mains are cautioned against danger of explosion or collapse, and where meters are in use or to be used on such service, a safety valve shall be placed between the boiler on such service and the meter, at the owner's expense, and such person shall be held responsible to the town for any and all damages to meters or injuries to persons caused by hot water.

B. The town will not be responsible for the safety of boilers or other fixtures on the premises of any water consumer.

C. It shall be the responsibility of the property owner to place on record with the town, life-support equipment data that requires water for its operation or function. The town shall not be responsible for service interruption but shall endeavor to give prior notice if possible. (Ord. 91-15 § 11, 1991; Ord. 70-3 § 14, 1970).

13.04.150 Irrigation or sprinkling – Prohibited during fire.

No person shall use water for irrigation or sprinkling during the progress of any fire in the town, and all irrigation or sprinkling shall be immediately stopped when requested by the fire chief or his designee. (Ord. 91-15 § 12, 1991; Ord. 70-3 § 15, 1970).

13.04.160 Right of access for inspection.

Officers and employees of the town shall have access at all times in the day to all parts of the building in which water may be delivered from the town mains for the purposes of proper inspection after obtaining access by the home owner. (Ord. 91-15 § 13, 1991; Ord. 70-3 § 16, 1970).

13.04.170 Extra connections – Charge.

Extra connections from the town shall be charged the regular rate for the time such service is used. An additional service connection charge shall be made for such additional service connections. (Ord. 91-15 § 14, 1991; Ord. 70-3 § 17, 1970).

13.04.180 Water main extensions – Fees.

All water main extensions financed by other than town funds must have the design plans approved by the town. Plan review fees will be at $25.00 per hour and/or actual cost of consulting engineer fees, if required by the public works director. Field inspection fees will be at the rate of one-half of one percent of actual construction bid costs or $100.00 whichever is greater, but in any event not less than $25.00. (Ord. 91-15 § 15, 1991; Ord. 78-8 § 14, 1978; Ord. 70-3 § 19, 1970).

13.04.190 Extension, repair or replacement of distribution mains within town limits.

Whenever there is need for extension, repair or replacement of distribution mains, the following methods are available:

A. Formation of a local improvement district as set forth in the Revised Code of Washington;

B. Private funding with the option of latecomer agreement;

C. Other funding methods allowed by law and approved by the town council.

Before connecting such pipe with the municipal water system, the property owner to be supplied by such extension shall execute a bill of sale to the town for the water main and appurtenances together with an easement, if required by the town, for the water main and appurtenances. The charges shall include assessments in lieu of LID, charges under latecomer agreements, permit fees, system buy-in charges, inspection fees and any additional fees imposed by the town. (Ord. 91-15 § 16, 1991; Ord. 70-3 § 20, 1970).

13.04.200 Meters – Testing procedures and charges.

In the event of the meters getting out of order and failing to properly register the amount of water used, the property owner shall be charged at the average rate of monthly consumption as shown by the meter when in order. When the property owner requests that the meter be checked for errors the town may replace the meter with another meter. The meter that was replaced may be tested by the town or may be taken out of service. (Ord. 91-15 § 25, 1991; Ord. 70-3 § 21, 1970).

13.04.210 Fire hydrant – Operation restrictions.

It is unlawful for any person, other than properly authorized employees of the town or members of the fire department, to operate fire hydrants and hose outlets unless permission has first been granted by the public works department and proper arrangements have been made with the clerk for payment of the water to be used. (Ord. 91-15 § 18, 1991; Ord. 70-3 § 22, 1970).

13.04.220 Fire hydrant – Operation by inspector – Costs borne.

When it is deemed necessary by the public works department, the town will furnish an inspector to operate a fire hydrant or hose connection to avoid damage and to obtain the necessary information for computing the volume of water consumed. The expense for the services of the inspector and equipment furnished shall be paid by the applicant, and in no case shall the charge be less than $35.00. (Ord. 91-15 § 19, 1991; Ord. 70-3 § 23, 1970).

13.04.230 Connections outside of town limits.

Whenever any one or more persons outside the corporate limits of the town, not already furnished with water by the town, desires the system to be extended so as to furnish any premises with water which are not already connected with the system, such person or persons shall apply to the town to have such water service so extended by the applicant. Such application shall designate the premises to be supplied and the number of services desired, together with the plans and specifications for the extension. In addition, if the area to be served can-

not be legally annexed to the town, the property owner desiring service shall complete an out-of-town water user agreement and enter into a developer's water extension agreement per this code if the extension requires any additional mains prior to the issuance of any permit. The connection charges outside the corporate limits of the town shall include permit fees, system fee, meter installation charges, inspection fees, and shall be at the same rates, fees and charges as within the corporate limits of the town plus a 50 percent surcharge. The monthly water rates charged to water users outside the corporate limits of the town shall be the same as for users residing within the town. (Ord. 91-15 § 17, 1991; Ord. 70-3 § 24, 1970).

13.04.235 Fire hydrant – Monthly rates for water consumption.

The monthly rate for water consumed from fire hydrants shall be the same as for a two-inch meter as set forth by town resolution. The user shall be billed for the service until the town is notified in writing that the service is to be discontinued. (Ord. 91-15 § 20, 1991).

13.04.240 Piling rubbish on meters prohibited.

All persons are prohibited from piling rubbish of any kind on water meters and covers so as to prevent free access thereto by employees of the public works department. (Ord. 91-15 § 21, 1991).

13.04.250 Fire protection service – Standby charges.

The monthly rate for water supplied for the purpose of building sprinkler systems and fire hydrants on private property shall be set by resolution of the town council. (Ord. 91-15 § 22, 1991).

13.04.260 Fire protection service – Equipment installation and maintenance.

A. Pipes for fire protection purposes must be fitted with such fixtures only as are needed for fire protection and such fixtures shall be sealed by the fire marshal, and in no case shall such seal be broken, except in case of fire or by the fire chief for the purpose of testing the pipes, fixtures or hose.

B. When seals are broken in case of fire, it shall be the duty of the owner or tenant of the premises to notify the fire marshal within 24 hours after its occurrence, and the seal shall be replaced by the fire marshal.

C. Violation of this section shall be deemed a misdemeanor. All fines collected shall be placed to the credit of the water/sewer operating fund.

D. No domestic water services shall be allowed to be connected to a dead-end water main that is designed to be installed on private property for fire protection. All domestic water services shall be connected to the water system within the road rights-of-way unless approved by the public works director. (Ord. 91-15 § 23, 1991).

13.04.270 Meter installation – Town's rights – Costs.

The right is reserved to the town through its public works director to place a town water meter on any service for the purpose of measuring the water used on the premises by such service, and payment for installation and water used shall be made by the property owner in the manner as prescribed in this chapter. (Ord. 91-15 § 24, 1991).

13.04.280 Meter rates for water services within the town limits.

The rates for water service within the town limits shall be set from time to time by town resolution. (Ord. 91-15 § 26, 1991).

13.04.290 Irrigation water service meter charges.

Users with water service meters for landscape irrigation only shall not be charged from November 1st through April 30th unless the meter shows usage during such months; in which event, a charge shall be made for the billing period in which the water was used. (Ord. 91-15 § 27, 1991).

13.04.300 Violation – Penalty – Additional liability.

Any knowing violation of the provisions of this chapter or any knowing failure to comply with the requirements of this chapter or any of the provisions of any other ordinances of the town relating to water regulations, shall be a misdemeanor and any person, firm or corporation found guilty thereof shall be punished by a fine not to exceed $500.00 or imprisonment in jail not to exceed 90 days, or both such fine and imprisonment, and the water shall be turned off and remain so until the penalty and all other charges due are paid; provided, that the penalties shall not apply to violations of sections of the water ordinances of the town of which specific penalties have been provided. In addition thereto, any person violating any of the provisions of this chapter shall be liable to the town for any expense, loss or damage occasioned by the town by reason of such violation. (Ord. 91-15 § 28, 1991).

Chapter 13.08

WATER MAIN EXTENSIONS

Sections:

13.08.010 Water main extensions – Procedure.

13.08.010 Water main extensions – Procedure.

All water main extensions shall be applied for, designed, installed, constructed, inspected, and approved in accordance with the "Town of Eatonville Public Works Development and Construction Standards," as time to time amended by the public works director. A copy of the current standards shall be on file with the town clerk. (Ord. 91-16 § 2, 1991).

Chapter 13.10

WATER SYSTEM CROSS-CONNECTIONS

Sections:

13.10.010 Definitions.
13.10.020 Purpose.
13.10.030 Administration and enforcement.
13.10.040 Inspection of premises.
13.10.050 Design standards.
13.10.060 Backflow prevention devices.

13.10.010 Definitions.

For purposes of this chapter:

A. "Consumer" means an individual dwelling unit or individual business which receives water through an individual meter or master meter.

B. "Council" means the town council of the town of Eatonville.

C. "Mains" means water lines designed or used to serve more than one premises.

D. "Person," "customer," "owner" and "occupant" means and includes natural persons of either sex, associations, copartnerships and corporations whether acting individually or by a servant, agent or employee; the singular number shall be held to include the plural and the masculine pronoun to include the feminine.

E. "Premises" means a continuous tract of land, building or group of adjacent buildings under a single control with respect to use of water and responsibility for payment therefor. Subdivisions of such use or responsibility shall constitute a division into separate premises as herein defined.

F. "Standard specifications" means the specifications set forth in the current volume of Standard Specifications for Road, Bridge, and Municipal Construction prepared and distributed jointly by the Washington State Department of Transportation (WSDOT) and by the Washington State Chapter of the American Public Works Association (APWA) and the current "Standards" of the American Water Works Association (AWWA).

G. "Superintendent" means the person duly appointed by the mayor of the town as the superintendent of the water department and is in responsible charge of all day-to-day activities.

H. "Town" means the town of Eatonville, Washington, or as indicated by the context, may mean the water department, water superintendent, clerk-treasurers, engineer or other employee or agent representing the town in the discharge of his duties.

I. "Town engineer" means the professional engineer regularly employed or retained by the town.

J. "Residential water service" means domestic water service (including lawn and garden sprinkling) provided to a residential living unit.

K. "Commercial water service" means water service provided to premises utilized for business or industrial purposes. (Ord. 90-12 § 1, 1990).

13.10.020 Purpose.

A. The purpose of this chapter is to protect the water supply of the town from contamination or pollution from potential cross-connections.

B. The installation or maintenance of any cross-connections which would endanger the water supply of the town is prohibited. Any such cross-connection now existing or hereafter installed is declared unlawful and shall be abated immediately. (Ord. 90-12 § 2, 1990).

13.10.030 Administration and enforcement.

The superintendent is charged with the administration and enforcement of this chapter. Water service to any premises served by the town water system may be discontinued for any violation or abridgement of the provisions of this chapter after due notice thereof. (Ord. 90-12 § 3, 1990).

13.10.040 Inspection of premises.

Authorized employees of the water department, properly identified, shall have free access at reasonable hours of the day, to all premises served by the town water system for the purpose of ascertaining conformity to this chapter. (Ord. 90-12 § 4, 1990).

13.10.050 Design standards.

Design standards shall be adopted from time to time by the council upon the recommendation of the water superintendent and the town engineer and three copies of the same shall be maintained on file at the office of the town clerk. (Ord. 90-12 § 5, 1990).

13.10.060 Backflow prevention devices.

A. The council may require the installation of backflow prevention devices on any premises being serviced by the water system when in the judgment of the council, acting upon the advice and recommendation of the town engineer, the nature and extent of activities on the premises or materials stored on the premises would present an immediate and dangerous hazard to health should a cross-connection occur. The cost of such devices and the installation thereof shall be borne by the owner of the premises affected. The control or elimination of cross-connections shall be in accordance with the Cross Connection Control Regulation in Washington State (Rules and Regulations of the State Board of Health Regarding Public Water Supplies, WAC 248-54-285). 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 edition.

B. Water service to any premises shall be contingent upon the customer providing cross-connection control in a manner approved by the town.

C. Backflow devices required to be installed shall be a model acceptable to the Washington State Department of Health. (Ord. 90-12 § 6, 1990).

Chapter 13.11

FIRE HYDRANTS

Sections:

13.11.010 Purpose.
13.11.020 Definitions.
13.11.030 General applicability.
13.11.040 Procedures for compliance.
13.11.050 Water system requirements.
13.11.060 Fire hydrant requirements.
13.11.070 Purveyor requirements.
13.11.080 Industrial and commercial area requirements.
13.11.090 Compliance.
13.11.100 Waivers.
13.11.110 Exemptions.

13.11.010 Purpose.

The purpose of this chapter is to better protect the residents, inhabitants, commercial developments and industrial developments in the town against the dangers of fire. (Ord. 91-17 § 1, 1991).

13.11.020 Definitions.

The words and phrases used in this chapter shall have the following meanings:

A. "Agricultural building" means a structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products. This structure shall not be a place of human habitation or a place of employment where agricultural products are used by the public.

B. "Board of appeals" means the town council.

C. "Building valuation data" means the building standards issued monthly by the International Conference of Building Officials.

D. "Commercial areas" means any area proposed to be developed with buildings or structures other than family dwellings.

E. "Dead-end main" means a water main over 50 feet long and not being fed from both ends at the time of the installation.

F. "Family dwelling" means a building under one roof which accommodates not more than two families.

G. "Fire department" means the fire authority normally responsible for fire protection in the area.

H. "Fire flow" means the minimum flow of water required for fighting a fire at a specific building, development or within a specific area. The minimum flows shall be determined by the fire marshal based on the criteria set forth in the insurance service office guide for determination of required fire flow (current edition).

I. "Fire hydrant" means a mechanical device which is self-draining and frost-free and is constructed to provided the required fire flow for the area served. The fire hydrant must be approved by the town's department of public utilities.

J. "Fire marshal" means the building official of the town.

K. "Flush-type hydrant" means a hydrant that is installed entirely below the grade.

L. "Gpm" means gallons per minute.

M. "Industrial area" means an area developed with uses first permitted in zone classifications I (industrial) or subareas of A-D (airport district).

N. "I.S.O." means the insurance service office pamphlet entitled "Guide for Determination of Required Fireflow," current edition.

O. "Private hydrant" means a fire hydrant situated and maintained to provide water for firefighting purposes. The location shall be such that it is readily accessible for immediate use by the fire department.

P. "Public fire protection" means the current edition of the pamphlet entitled "Public Fire Protection" published by the Washington Surveying and Rating Bureau.

Q. "Public hydrant" means a fire hydrant so situated and maintained as to provide water for firefighting purposes without restrictions as to its use for the purpose of firefighting. The location is such that it is accessible for immediate use of the fire department.

R. "Purveyor" means the federal agency, state agency, county agency, city/town, municipal corporation, partnership, district, institution, person or persons owning or operating a public water system or the authorized agent.

S. "Substantial alteration" means any alteration, remodeling or structural change, with a total cost of 25 percent or more, of the current assessed valuation of the building. Substantial alterations will be cumulative over a five-year period. When the cumulative alteration costs reach 25 percent or more of the building's current assessed valuation, the building shall meet all water flow requirements.

T. "Travel distance" means that measurements are made by the route the fire engine would travel.

U. "UBC" means the Uniform Building Code as adopted by the town.

V. "UFC" means the Uniform Fire Code as adopted by the town.

W. "Water main" means the piping used to deliver fire flows intended for fire protection in amounts as required by this chapter. (Ord. 91-17 § 2, 1991).

13.11.030 General applicability.

Except as exempted in this chapter, the following shall be subject to the minimum flow and fire hydrant requirements:

A. New commercial and industrial structures;

B. Subdivisions and/or short subdivisions;

C. Substantial alterations or additions to existing commercial or industrial structures;

D. New water systems, replacements or new extension to existing systems shall comply with the town's comprehensive water plan and water construction standard;

E. Changing of occupancy of an existing building to a higher classification;

F. A new residential building. (Ord. 91-17 § 3, 1991).

13.11.040 Procedures for compliance.

The following shall be required of all subdivisions, short subdivisions, and commercial and industrial areas:

A. The water main to be installed shall meet the requirements of the town's comprehensive water plan.

B. Water system plans shall be approved in writing by the public works director and/or the town engineer, and shall be inspected by the same.

C. The approved water system must be installed prior to the issuance of a building permit. The requirement may be waived if a bond or other surety is posted and approved prior to the issuance of the building permit. The amount of the bond or other surety shall be determined by the purveyor supplying the water. The type of bond, or other surety, and the form thereof shall be approved by the town attorney and filed with the clerk prior to issuance of the building permit. The water system, fire hydrants and fire flows shall be installed and approved prior to issuance of the occupancy permit. (Ord. 91-17 § 4, 1991).

13.11.050 Water system requirements.

A. The insurance service office pamphlet, current edition, shall be used as the standard for the amount of fire flow that is required.

B. New or replaced water mains shall be installed or replaced in accordance with the town's comprehensive water plan. In areas not covered by the town's comprehensive water plan, new or replaced water main sites shall be determined by the director of public works and/or the town engineer. In cul-de-sacs, an eight-inch main need only extend to the last required fire hydrant, and normal domestic lines may be installed thereafter to the remaining residences. (Ord. 91-17 § 5, 1991).

13.11.060 Fire hydrant requirements.

A. Standard fire hydrants shall have no less than five-inch main valve openings (MVO) with two-and-one-half-inch outlet ports and a four-and-one-half-inch steamer outlet. All ports shall have national standard threads that meet the approval of the affected fire department. Fire hydrants shall meet AWWA standards for private fire hydrants.

B. Fire hydrants shall stand plumb and be set to the finished grade. The bottom of the lowest outlet of the fire hydrant shall be no less than 18 inches above the grade. The area around the fire hydrant shall be free of obstructions which would prevent adequate access to and use of the fire hydrant. Where the street cannot be clearly defined or recognized, the steamer port shall face the most likely route of approach by fire apparatus.

C. Fire hydrants shall not be obstructed by any structure, vegetation or have the visibility impaired for a distance of 50 feet in the direction of the vehicular approach to the fire hydrant. Blue reflectors in the street are also required to help locate the hydrant in the dark by the lights of the fire truck.

D. Fire hydrants are to be accessible for fire department pumpers.

E. Fire hydrants subject to vehicular damage (e.g., those located in parking lots) shall be adequately protected.

F. Table A, as set forth in this subsection, specifies the maximum allowable distance which buildings shall be from a fire hydrant:

Type of Development	Hydrant Spacing Maximum (in feet)	Distance to Structure Maximum (in feet)
Subdivisions and short subdivisions – limited to family dwellings	660	350
Multiple dwelling-low density – 12 or less units per acre	500	250

Commercial and multiple dwelling – high density – more than 12 units per acre	400	200
Industrial, hospitals, shopping centers, schools, areas of more than 20 commercial establishments	300	150

G. When the center of a building to be protected is greater than the maximum travel distance from the structure to a fire hydrant, on-site fire hydrants shall be installed.

H. Location of the fire hydrants shall be determined by the fire marshal, and/or fire chief.

I. The location of all water mains, fire hydrants and valves to be installed shall be properly and accurately marked on identifiable plans or drawings. Four copies of all plans and drawings shall be furnished to the town building department.

J. All fire hydrants must be approved by the appropriate water authority prior to installation and shall be the brands required by the town.

K. The installation of all fire hydrants and their attendant water system connections shall conform to the design standards and specifications promulgated by the appropriate water authority. (Ord. 91-17 § 6, 1991).

13.11.070 Purveyor requirements.

All purveyors shall continuously supply water at or above the minimum flow requirements specified in this chapter; provided, that the purveyor need not comply with these regulations in the event of vandalism, acts of God, loss of power and temporary shutdown for repairs and/or replacement. (Ord. 91-17 § 7, 1991).

13.11.080 Industrial and commercial area requirements.

The requirement stated in this section applies to all commercial and industrial areas: When the required fire flow exceeds 2,000 gpm, additional fire hydrants shall be required. Fire hydrants shall be served on the property by an eight-inch or larger water main. (Ord. 91-17 § 8, 1991).

13.11.090 Compliance.

If there is a conflict between the provisions of this chapter and any other ordinance or code of the town, then the most stringent requirements shall apply. (Ord. 91-17 § 9, 1991).

13.11.100 Waivers.

Some of the requirements of this chapter may be waived and/or alternate procedures approved by the fire marshal, if the alternate procedure will not result in an unreasonable risk to persons or property. All waivers and alternate procedures shall be in writing; the reasons shall be given for each; a copy shall be placed in a waiver notebook; a copy shall be mailed to the appropriate fire chief; and a copy shall be given to the board of appeals. (Ord. 91-17 § 10, 1991).

13.11.110 Exemptions.

The following may be exempt from these regulations: a single-family dwelling or duplex that is built upon a single lot which is not constructed for the purpose of sale or rental. To apply for this exemption, the owner must indicate in a letter the reasons for the request for exemption and distance to the nearest water main. The owner shall sign an agreement with the town to participate in an ULID or LID or pay a fair share of any water main to be placed in the future in his area and hold the town harmless. (Ord. 91-17 § 11, 1991).

Chapter 13.13

AGREEMENTS WITH OWNERS OF REAL ESTATE FOR WATER OR SEWER FACILITIES

Sections:

13.13.010 Latecomer agreements authorized.
13.13.020 Notice required.
13.13.030 Approval by the town council.
13.13.040 Provisions required in agreement.

13.13.010 Latecomer agreements authorized.

The town is hereby authorized to contract with the owners of real estate in the manner provided in Chapter 35.91 RCW, the Municipal Water and Sewer Facilities Act. (Ord. 90-29 § 1, 1990).

13.13.020 Notice required.

The owner desiring to contract with the town shall notify the mayor in writing at least 30 days prior to construction of the facilities of his intent to enter into a latecomer agreement with the town. The notice shall contain the following information:

A. The description of the facilities to be installed;

B. The legal and general description of the area where the facilities are to be installed and a map showing the location thereof;

C. The cost estimate of the facilities. (Ord. 90-29 § 2, 1990).

13.13.030 Approval by the town council.

A. The owner shall submit the final construction costs to the mayor within 60 days from the date of final approval of the construction by the town. The matter shall then be submitted to the town council, which shall have authority to approve or disapprove entering into the latecomer agreement with the owner. If the project is approved for a latecomer agreement by the town council, the town shall have 90 days thereafter to finalize the agreement.

B. In the event the owner fails to comply with any of the time limitations set forth in this chapter, then the owner shall have waived his right to enter into a latecomer agreement with the town. (Ord. 90-29 § 3, 1990).

13.13.040 Provisions required in agreement.

The latecomer agreement shall be approved as to form by the town attorney and shall contain the following provisions:

A. The latecomer agreement shall be in effect for a period of up to 15 years from the date thereof.

B. The town shall have sole authority to determine the fair pro rata share of the cost of construction to be collected from latecomers for reimbursement to the owner.

C. In addition to the amounts agreed to be collected by the town, the town shall charge a sum equal to 15 percent of the agreed amount to defray the cost of labor, bookkeeping and accounting.

D. The ownership of all water and sewer main lines shall be conveyed to the town and any water or sewer line installation on private property shall be conveyed with an appropriate easement in a form acceptable to the town. All deeds and easements for the main lines shall be submitted to the town within 60 days of the completion of construction. (Ord. 90-29 § 4, 1990).

B. Appeals of decisions made by the public works director may be brought before the council's public works committee, consisting of the mayor and one council member appointed by the mayor, who may direct the reevaluation of the appeal. Appeals beyond the public works committee may then be brought before the council.

C. Any appeal under this chapter shall be filed with the public works director no later than 20 days after billing. Any subsequent appeal shall be brought within 20 days of the date of the decision appealed from.

D. Nothing in this chapter shall be construed to grant a right to judicial review that does not otherwise exist in law. In all cases, the decision of the council shall be final and conclusive. (Ord. 99-15 § 12, 1999).

Chapter 13.28

DEVELOPMENT AGREEMENTS FOR WATER, SEWER AND STREET FACILITIES

Sections:

13.28.010 Development agreement required.
13.28.020 Predesign conference.
13.28.030 Contents.
13.28.040 Execution.
13.28.050 Fees.
13.28.060 Exclusions.

13.28.010 Development agreement required.

Whenever any developer of commercial, industrial or residential land desires or finds it necessary to construct sanitary sewage facilities, water distribution facilities, storm drainage facilities and streets at his own expense before connection with, delivery to and operation by the town, such developer shall, before securing a building or construction permit, enter into a developer's agreement with the town. (Ord. 91-7 § 1, 1991).

13.28.020 Predesign conference.

A predesign conference with the mayor or his designee shall be held during which the matters which will be in the development agreement will be discussed. (Ord. 91-7 § 2, 1991).

13.28.030 Contents.

The development agreement entered into shall contain but need not be limited to the following provisions:

A. Prior to commencing construction the developer shall deliver to the town two (or such further number as required by the town) sets of plans and specifications, with an appropriate stamp by a professional engineer, for the proposed sewer system, water system, storm drainage system and streets prior to construction, and the governing standards for such plans and specifications;

B. Inspection requirements;

C. Conveyance of necessary property rights, including but not limited to water lines, sewer lines, drainage systems, roads which are to be used as public roads and any necessary easements;

D. Notice of when construction commences;

E. Control over execution of construction contracts;

F. State and county construction licenses and permits;

G. Testing requirements of systems;

H. Warranty bond for repairs necessary within one year from the date of acceptance arising from faulty labor, workmanship or materials;

I. Indemnity and hold-harmless clause;

J. Provision that the construction improvements be performed by a licensed, insured and bonded contractor;

K. Limitation on assignment of the agreement;

L. Provision for charges, taxes and future assessments applicable to the property;

M. Waiver clause;

N. Certification of the consulting engineer/town engineer as a prerequisite for connection to the town sewer or water lines and acceptance of streets;

O. Submission of a performance bond in an amount satisfactory to the town to ensure completion of the improvements;

P. Agreements regarding easements and servitudes;

Q. Change and correction requirements. (Ord. 91-7 § 3, 1991).

13.28.040 Execution.

The developer's agreement shall be executed by a developer presently constructing any sanitary sewage facility, waste distribution facility, storm drainage facility or street at his own expense prior to connection with, delivery to or operation by the town. (Ord. 91-7 § 4, 1991).

13.28.050 Fees.

The following fees shall be paid by the developer:

A. A plan review fee in the amount which the consulting engineer/town engineer is paid for his services.

B. An inspection fee at the rate of $40.00 per hour.

C. A construction review fee in the amount which the consulting engineer/town engineer is paid for checking the progress, compliance and completion of the improvements to required standards.

D. Reimbursement to the town for other actual costs incurred in testing and verification that the improvements meet required standards. (Ord. 91-7 § 5, 1991).

13.28.060 Exclusions.

A development agreement shall not be required for extension of utilities for two or less single-family residences by a single individual. (Ord. 91-7 § 6, 1991).

RESOLUTION 2012-II

A RESOLUTION OF THE EATONVILLE TOWN COUNCIL SETTING WATER INSTALLATION AND CONNECTION CHARGES IN ACCORDANCE WITH EMC 13.04.060

WHEREAS, EMC 13.04.060 provides that water installation and connection fees are to be set by resolution of the Town Council;

WHEREAS, EMC 13.04.060(A) authorizes the Town Council to set meter installation charges by way of resolution;

WHEREAS, EMC 13.04.060(B) authorizes the Town Council to set lineal-foot charges for water main connections by way of resolution;

WHEREAS, Resolution 2006-NN is the current resolution setting water installation and connection fees;

WHEREAS, this resolution is intended to reduce some of the fees found in Resolution 2006-NN;

WHEREAS, the Town Council desires to stimulate development while securing revenue to pay for necessary water system improvements;

NOW, THEREFORE, BE IT RESOLVED by the Council of the Town of Eatonville as follows:

Section 1. Resolutions 2006-NN, 2005-W, 2004-L, 99-CC, 95-L, and 91-J are hereby repealed.

Section 2. In accordance with EMC 13.04.060(A), water meter installation charges are set as follows:

Applicants shall pay the actual cost of the water meter as set by the Town's supplier plus a 25% markup and labor for the installation with a minimum 1 hour callout. By way of illustration only, the current total cost for a water meter, markup, and labor as of the date of this resolution's passage is shown in the table below.

Meter Size	Water Meter Installation Charge
3/4 Inch and Smaller	$313.89
1 Inch	$410.98
1.5 Inch	$592.10
2 Inch	$787.01

In the event the total cost for a water meter, markup, and labor increases or decreases in the future, the charge authorized by this Section and EMC 13.04.060(A) increase or decrease proportionately.

Section 3. In accordance with EMC 13.04.060(B), a per-lineal-foot charge for water connections shall be set at $65.00 per foot, PROVIDED that the aggregate charge under EMC 13.04.060(B) for the construction of a single family home on a single family lot shall not exceed $5,000.00.

Passed by the Council of the Town of Eatonville at a regular meeting this 29th day of June, 2012.

Raymond Harper, Mayor

ATTEST:

Town Clerk

APPROVED AS TO FORM:

Town Attorney

Installation Charge

Meter Size	Meter Charge (A)	Mark Up (B)	Labor (C)	Total Installation Charge = (AB+C)	
3/4 Inch and Smaller	199.11	125%	$ 65.00	$ 313.89	
1 Inch	276.78	125%	$ 65.00	$ 410.98	
1.5 Inch	421.68	125%	$ 65.00	$ 592.10	
2 Inch	577.61	125%	$ 65.00	$ 787.01	

Total Water Connection Fee

Lot Width Linear Feet (D)	Rate (E)	Total Per-Lineal-Foot Charge = (D*E)	3/4 Inch Meter Installation Charge = (AB+C)	Total Water Connection Fee = (D*E) + (AB+C)	Total Savings Above Current $7400 Fee
50	$65.00	$3,250.00	$313.89	$3,563.89	$3,836.11
60	$65.00	$3,900.00	$313.89	$4,213.89	$3,186.11
70	$65.00	$4,550.00	$313.89	$4,863.89	$2,536.11
80+	$65.00	$5,000.00	$313.89	$5,313.89	$2,086.11

RESOLUTION 2012-GG

A RESOLUTION OF THE EATONVILLE TOWN COUNCIL RELATING TO DEFERRAL OF CONNECTION FEES UNDER TITLE 13 OF THE EATONVILLE MUNICIPAL CODE

WHEREAS, Title 13 of the Eatonville Municipal Code provides that connection fees for electrical systems, water, sewer, and stormwater system development are to be set by Council resolution;

WHEREAS, the Council desires to provide developers with the ability to defer payment of these fees until such time as the property is ready for occupancy;

NOW, THEREFORE, BE IT RESOLVED by the Council of the Town of Eatonville as follows:

Section 1. The Council declares that any connection fees for electrical systems (chapter 13.16 EMC), water service (chapter 13.04 EMC), sanitary sewer and waste disposal (chapter 13.14 EMC), and storm drainage utility (chapter 13.24 EMC), shall become due to the Town only as a prerequisite for obtaining an occupancy permit. Such fees are not to be paid as a prerequisite for the issuance of any building or development permit.

Passed by the Council of the Town of Eatonville at a regular meeting this 14th day of May, 2012.

Raymond Harper, Mayor

ATTEST:

Town Clerk

APPROVED AS TO FORM:

Town Attorney

Water	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	$ 2,013.00
90% of CPI April 2008 to April 2012					1.971	2.169	2.394	3.267	2.862	2.4	1.9	$ 1.78
Adjustment Multiplier					1.01971	1.02169	1.02394	1.03267	1.02862	1.02439	1.01900	$ 1.02
Single Family												
5/8-3/4 Single Family					$ 28.55	$ 29.17	$ 29.87	$ 30.85	$ 31.73	$ 32.50	$ 33.12	$ 33.71
Rate Up to 15,000					$ 0.24	$ 0.25	$ 0.26	$ 0.26	$ 0.27	$ 0.28	$ 0.28	$ 0.29
1 inch Single Family					$ 45.28	$ 46.26	$ 47.36	$ 48.91	$ 50.31	$ 51.54	$ 52.52	$ 53.45
Rate over 15,000					$ 0.35	$ 0.35	$ 0.36	$ 0.37	$ 0.39	$ 0.39	$ 0.40	$ 0.41
1.5 inch SF					$ 71.54	$ 73.09	$ 74.84	$ 77.29	$ 79.50	$ 81.44	$ 82.99	$ 84.47
2 inch SF					$ 102.36	$ 104.58	$ 107.08	$ 110.58	$ 113.75	$ 116.52	$ 118.73	$ 120.85
3 inch SF					$ 185.87	$ 189.90	$ 194.45	$ 200.80	$ 206.55	$ 211.59	$ 215.61	$ 219.45
4 inch SF					$ 276.24	$ 282.23	$ 288.99	$ 298.43	$ 306.97	$ 314.46	$ 320.43	$ 326.14
6 inch SF					$ 518.04	$ 529.28	$ 541.95	$ 559.66	$ 575.67	$ 589.71	$ 600.92	$ 611.63

SINGLE FAMILY LOW INCOME												
5/8-3/4					$ 23.66	$ 24.17	$ 24.75	$ 25.56	$ 26.29	$ 26.93	$ 27.44	$ 27.93
Rate first 15,000					$ 0.24	$ 0.25	$ 0.26	$ 0.26	$ 0.27	$ 0.28	$ 0.28	$ 0.29
1 inch					$ 29.37	$ 30.00	$ 30.72	$ 31.73	$ 32.63	$ 33.43	$ 34.07	$ 34.67
Rate 2nd 15,000					$ 0.35	$ 0.35	$ 0.36	$ 0.37	$ 0.39	$ 0.39	$ 0.40	$ 0.41
1.5 inch					$ 36.40	$ 37.19	$ 38.08	$ 39.33	$ 40.45	$ 41.44	$ 42.23	$ 42.98
2 inch					$ 44.15	$ 45.11	$ 46.19	$ 47.70	$ 49.07	$ 50.26	$ 51.22	$ 52.13
3 inch					$ 61.18	$ 62.51	$ 64.01	$ 66.10	$ 67.99	$ 69.65	$ 70.97	$ 72.24
4 inch					$ 78.62	$ 80.32	$ 82.25	$ 84.93	$ 87.37	$ 89.50	$ 91.20	$ 92.82
6 inch					$ 112.47	$ 114.91	$ 117.66	$ 121.51	$ 124.99	$ 128.03	$ 130.47	$ 132.79

Commercial/School/MF												
5/8-3/4					$ 28.55	$ 29.17	$ 29.87	$ 30.85	$ 31.73	$ 32.50	$ 33.12	$ 33.71
Rate					$ 0.27	$ 0.27	$ 0.28	$ 0.29	$ 0.29	$ 0.30	$ 0.31	$ 0.31
1 inch					$ 45.28	$ 46.26	$ 47.36	$ 48.91	$ 50.31	$ 51.54	$ 52.52	$ 53.45
1.5 inch					$ 71.54	$ 73.09	$ 74.84	$ 77.29	$ 79.50	$ 81.44	$ 82.99	$ 84.47
2 inch					$ 102.36	$ 104.58	$ 107.08	$ 110.58	$ 113.75	$ 116.52	$ 118.73	$ 120.85
3 inch					$ 185.87	$ 189.90	$ 194.45	$ 200.80	$ 206.55	$ 211.59	$ 215.61	$ 219.45
4 inch					$ 276.24	$ 282.23	$ 288.99	$ 298.43	$ 306.97	$ 314.46	$ 320.43	$ 326.14
6 inch					$ 518.04	$ 529.28	$ 541.95	$ 559.66	$ 575.67	$ 589.71	$ 600.92	$ 611.63

RESOLUTION 2011-B

A RESOLUTION OF THE EATONVILLE TOWN COUNCIL ESTABLISHING A NEW STANDARD METHOD OF ADJUSTING RATES FOR INFLATION IN THE WATER, WASTEWATER, CEMETERY, REFUSE, AND STORMWATER DEPARTMENTS

WHEREAS, the Town's water rate resolution currently requires that an annual adjustment to rates be made based on 90% of the increase in the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) Greater Metropolitan Index measured from July 2001 to July 2005, rounded up or down to the nearest ($0.10) ten cents, and annually thereafter on January 1 each year on the same basis, and;

WHEREAS, the Town's wastewater rate resolution currently requires that an annual adjustment to rates be made based on 90% of the increase in the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) Greater Metropolitan Index measured from January 2008 to January 2009, rounded up or down to the nearest ($0.10) ten cents, and annually thereafter on January 1 each year on the same basis, and;

WHEREAS, the Town's stormwater rate resolution currently requires that an annual adjustment to rates be made based on 90% of the increase in the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) Greater Metropolitan Index measured from July 1999 to July 2000, rounded up or down to the nearest ($0.10) ten cents, and annually thereafter on January 1 each year on the same basis, and;

WHEREAS, the Town's cemetery rate resolution currently requires that an annual adjustment to rates be made based on 90% of the increase in the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) Greater Metropolitan Index measured from January 2008 to January 2009, rounded up or down to the nearest ($0.10) ten cents, and annually thereafter on January 1 each year on the same basis, and;

WHEREAS, the Town's refuse rate resolution currently requires that an annual adjustment to rates be made based on 90% of the increase in the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) Greater Metropolitan Index measured from July 2009 to July 2010, rounded up or down to the nearest ($0.10) ten cents, and annually thereafter on January 1 each year on the same basis, and;

WHEREAS, the US Department of Labor currently produces this data every other month in February, April, June, August, October, and December, and;

WHEREAS, this data is needed in January every year but January data is not available until March or April every year, and;

WHEREAS, the variety of methods for calculating rates of inflation across departments combined with the available data makes calculating rate adjustments very difficult, and;

WHEREAS, the Eatonville Town Council wishes to standardize these calculations and apply them to water, wastewater, stormwater, cemetery, and refuse rates beginning in 2012, and;

WHEREAS, using April data will allow the Council to consider rates of inflation when preparing the town's annual budget, and;

WHEREAS, taking the average rate of inflation for the five (5) years prior will help to mitigate any sharp 1 year inflationary increases.

BE IT RESOLVED by the Town Council of the Town of Eatonville as follows:

Section 1: Section 4 of Resolution 2005-V is hereby repealed.

Section 2: Section 5 of Resolution 2007-U is hereby repealed.

Section 3: Section 3 of Resolution 2002-N is hereby repealed.

Section 4: All but the following language in Section 4 of Resolution of 2008-JJ is hereby repealed: "That new prices for cemetery plots and services are hereby adopted in accordance with Exhibit A as attached."

Section 5: Section 2 of Resolution 2010-KK is hereby repealed.

Section 6: The water, wastewater, stormwater, cemetery, and refuse rates as established in Resolutions 2005-V, 2007-U, 2002-N, 2008-JJ, and 2010-KK, shall be adjusted from the 2011 rates on January 1, 2012, by an amount equal to ninety percent (90%) of the adjustment in the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) Greater Seattle Metropolitan Index as measured by averaging the April adjustments for the previous five (5) years, with the resulting rate rounded up or down to the nearest ten cents ($0.10). Rates shall be adjusted annually thereafter on January 1 each year, on the same basis.

PASSED by the Council of the Town of Eatonville at a regular meeting this 24 day of January, 2011.

Ray Harper, Mayor

ATTEST:

Chrystal McGlone, Town Clerk

APPROVED AS TO FORM:

Patricia Buchanan, Town Attorney 5/25/11

RESOLUTION 2005 – V

A RESOLUTION SETTING THE RATES FOR WATER SERVICE IN THE TOWN OF EATONVILLE AND REPEALING RESOLUTION 2002-L

BE IT RESOLVED, by the Town Council of the Town of Eatonville as follows:

Section 1. That Resolution Number 2002 – L is hereby repealed.

Section 2. Water rates for water users of the Town of Eatonville shall be charged a base rate as set forth below for Water usage.

METER SIZE	SINGLE FAMILY	METER RATES FOR GALLONS USED
5/8-3/4"	$ 28.00	.24 per 100 gallons to 15,000 .34 per 100 gallons after 15,001
1"	$ 44.40	Same
1-1/2"	$ 70.16	Same
2"	$ 100.38	Same
3"	$ 182.28	Same
4"	$ 270.90	Same
6"	$ 508.03	Same

METER SIZE	SINGLE FAMILY LOW INCOME	METER RATES FOR GALLONS USED
5/8-3/4"	$ 23.20	.24 per 100 gallons to 15,000 .34 per 100 gallons after 15,001
1"	$ 28.80	Same
1-1/2"	$ 35.70	Same
2"	$ 43.30	Same
3"	$ 60.00	Same
4"	$ 77.10	Same
6"	$ 110.30	Same

METER SIZE	MULTI FAMILY	METER RATES FOR GALLONS USED
5/8-3/4"	$ 28.00	.26 per 100 gallons
1"	$ 44.40	Same
1-1/2"	$ 70.16	Same
2"	$ 100.38	Same
3"	$ 182.28	Same
4"	$ 270.90	Same
6"	$ 508.03	Same

METER SIZE	COMMERCIAL	METER RATES FOR GALLONS USED
5/8-3/4"	$ 28.00	.26 per 100 gallons
1"	$ 44.40	Same
1-1/2"	$ 70.16	Same
2"	$ 100.38	Same
3"	$ 182.28	Same
4"	$ 270.90	Same
6"	$ 508.03	Same

METER SIZE	SCHOOLS	METER RATES FOR GALLONS USED
5/8-3/4"	$ 28.00	.26 per 100 gallons
1"	$ 44.40	Same
1-1/2"	$ 70.16	Same
2"	$ 100.38	Same
3"	$ 182.28	Same
4"	$ 270.90	Same
6"	$ 508.03	Same

Section 3. When there is one water meter for multiple units being served with water, each unit served with water shall be billed at the appropriate base rate. The total combined used gallons per month, per unit, shall be charged at the appropriate rate and divided equally in cost to the users. When more than one meter is used per unit user, each meter shall be charged accordingly. The amount used shall be determined by combined meter readings, and charges shall include all base rates plus the combined amount used.

Section 4. The rates described herein shall be adjusted on January 1, 2006 by an amount equal to 90 percent (90%) of the increase in the consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) Greater Seattle Metropolitan Index measured from July 2001 to July 2005, rounded up or down to the nearest ten cents ($0.10). Rates shall then be adjusted annually thereafter on January 1 each year, on the same basis.

Section 5. The state and federal low income rate discount is actable with this water rate.

Section 6. This resolution shall be effective.

PASSED by the Council of the Town of Eatonville at a regular meeting held this 13th day of June, 2005.

Bruce Rath, Mayor

ATTEST:

Carrie Lynn Loffelmacher, Town Clerk

APPROVED AS TO FORM:

Robert Mack, Town Attorney

APPENDIX J

Water Rights Information

Ground Water Certificate 5676-A

Town of Eatonville
201 Center Street West
Eatonville, Washington 98328

WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE OF WASHINGTON
CERTIFICATE OF WATER RIGHT
SUPERSEDING

Document Title: Certificate of Water Right

Agency: Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Applicant: Town of Eatonville
201 Center Street West
Eatonville, Washington 98328

Reference Number:

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
November 29, 1966	8408	5676	5676A

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	TRIBUTARY OF (IF SURFACE WATERS)
4 Wells (Well 1, 2, 6 and 7)	

MAX. CUBIC FEET PER SECOND	MAX. GALLONS PER MINUTE	MAX. ACRE-FEET PER YEAR
	360	394 (non-additive)

QUANTITY/TYPE OF USE/PERIOD OF USE

394 Acre-feet per year Municipal supply Year-round, as needed

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼ NE¼	23	16	4E	11	Pierce

PARCEL # 033-1531-001-011

ADDITIONAL LEGAL IS ON PAGE 2

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
N/A	N/A	N/A	N/A	11	Pierce

PARCEL # N/A

ADDITIONAL LEGAL IS ON PAGE 2

CONTINUED LEGAL DESCRIPTION FOR LOCATION OF DIVERSION/WITHDRAWAL

Well 1: (ACV 530) 980 feet West and 1070 feet South of the Northeast corner of Section 23.
Well 2: (ACV 539) 920 feet West and 1090 feet South of the Northeast corner of Section 23.
Well 6: (AHG 991) 1060 feet West and 960 feet South of the Northeast corner of Section 23.
Well 7: (AKT 667) 780 feet West and 990 feet South of the Northeast corner of Section 23.

CONTINUED LEGAL DESCRIPTION FOR PROPERTY ON WHICH WATER IS TO BE USED

The service area described in the most recent water system plan approved by the Washington State Department of Health, as long as the Town of Eatonville remains in compliance with the criteria in RCW 90.03.386(2), this provision may have the effect of revising the place of use of this water right.

PROVISIONS

"Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307."

The certificate, when issued, supersedes that of same number issued on February 5, 1967, and is subject to the following provisions.

An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

(continued on page 3)

Given under my hand and the seal of this office at Olympia, Washington, this 22nd *day of* June, *2006.*

DEPARTMENT OF ECOLOGY STATE OF WASHINGTON

Jay Manning, Director
Department of Ecology

DATA OK JW

By Thomas Loranger
Thomas Loranger, Section Manager

If you need this publication in an alternate format, please call the Water Resources Program at 360-407-6300. Persons with hearing loss or speech disability can call 711 for Washington Relay Service.

Provisions Continued

Water use data shall be recorded weekly. The maximum rate of diversion/withdrawal and the annual total volume shall be submitted to Ecology by January 31st of each calendar year.

"The following information shall be included with each submittal of water use data:

1. Owner	2. Source name
3. Contact name if different	4. Annual quantity used including units
5. Mailing address	6. Maximum rate of diversion including units
7. Daytime phone number	8. Peak monthly flow including units
9. WRIA	10. Well tag number
11. Certificate No.	

In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information."

Chapter 173-173 WAC 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".

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.

The Water Resources Act of 1971 specifies certain criteria regarding utilization and management of the waters of the state in the best public interest. Use of water may be subject to regulation at certain times, based on the necessity to maintain water quantities sufficient for preservation of the natural environment.

POW

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
APPLICATION FOR CHANGE
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
November 29, 1966	8408	5676	5676A

NAME
Town of Eatonville

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
201 Center Street West	Eatonville	Washington	98328

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
4 Wells (Well 1, 2, 6 and 7)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	360	394 (non-additive)

QUANTITY, TYPE OF USE, PERIOD OF USE		
394 Acre-feet per year	Municipal supply	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL
Well 1: (ACV 530) 980 feet West and 1070 feet South of the Northeast corner of Section 23.
Well 2: (ACV 539) 920 feet West and 1090 feet South of the Northeast corner of Section 23.
Well 6: (AHG 991) 1060 feet West and 960 feet South of the Northeast corner of Section 23.
Well 7: (AKT 667) 780 feet West and 990 feet South of the Northeast corner of Section 23.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼ NE¼	23	16	4E	11	Pierce

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The service area described in the most recent water system plan approved by the Washington State Department of Health, as long as the Town of Eatonville remains in compliance with the criteria in RCW 90.03.386(2), this provision may have the effect of revising the place of use of this water right.

If you require this publication in an alternate format, please contact Water Resources at (360) 407-6300, or TTY (for the speech or hearing impaired) 711 or 800-833-6388.

DESCRIPTION OF PROPOSED WORKS

4 Wells

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	In-use

REPORT

BACKGROUND:

On July 1, 2005 Gary Armstrong on behalf of the Town of Eatonville submitted two Applications for Change of Water Right to modify ground water certificate 5676-A and G2-01087. The applicant proposes to add additional points of withdrawal to each certificate to facilitate the operation of a wellfield. The Town of Eatonville is located in the Nisqually River Watershed, Water Resource Inventory Area 11.

A public notice detailing this proposed change was published on January 25th and February 1, 2006 and no protests were received. This application was determined to be categorically exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW.

Chapter(s) 90.03 and 90.44 RCW authorize the appropriation of public water for beneficial use and describe the process for obtaining water rights including the process to amend or change existing rights. Laws specifically governing the water right permitting process are RCW 90.03.250 through 90.03.340 and RCW 90.44.060. Changes or amendments to these rights are covered under RCW 90.03.380 and RCW 90.44.100.

Based on my evaluation of this request, I recommend approval of these Applications for Change and issuance of superseding certificates.

INVESTIGATION:

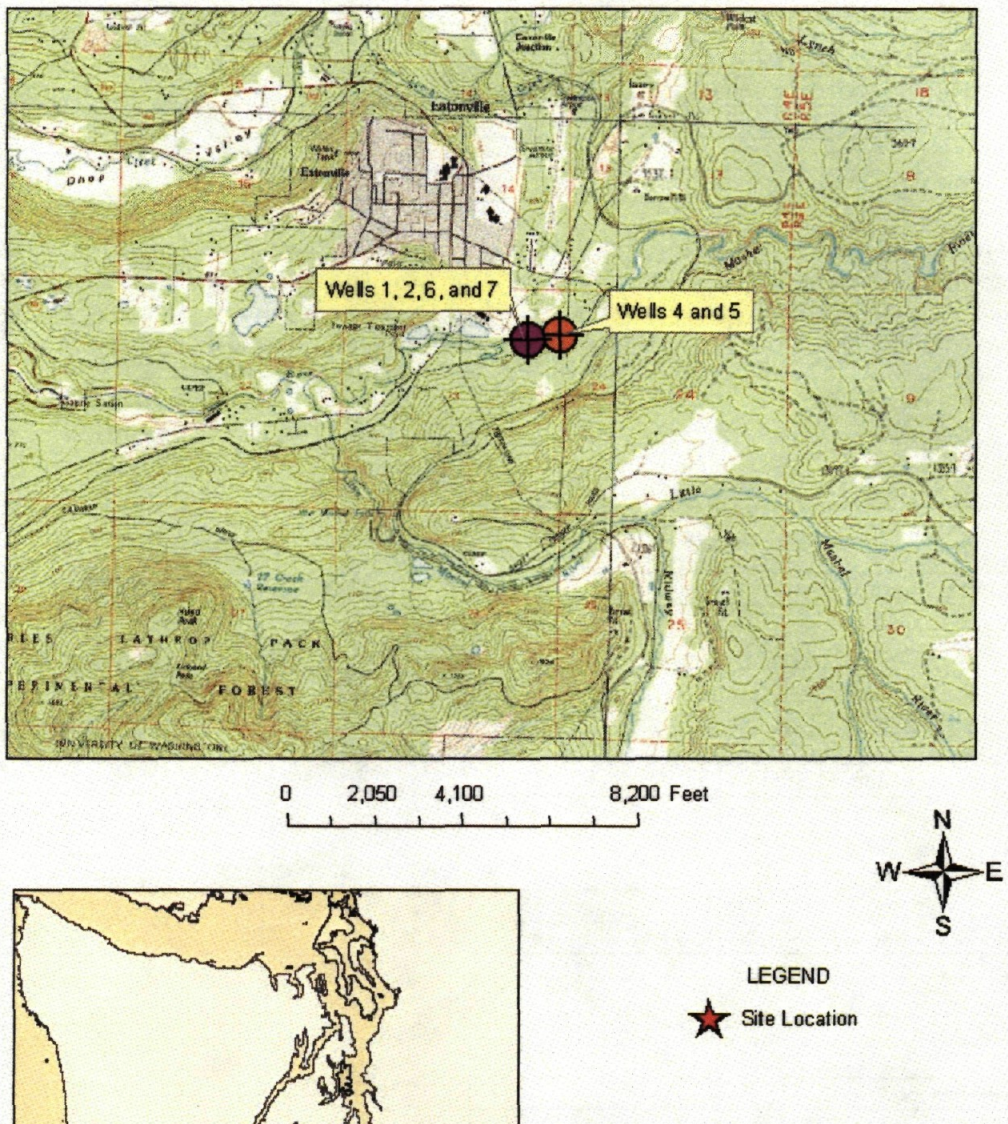
In considering this application, my investigation included, but was not limited to research and/or review of:

- The State Water Code
- SEPA Requirements
- Records of other water rights in the vicinity
- Technical memorandum prepared by Golder Associates dated May 20, 2005
- Hydrogeologic report by Tammy Hall (December 28, 2005)

The Town of Eatonville operates four wells and a surface water diversion on the Mashel River for municipal supply. The Town holds two ground water certificates, one surface water certificate and a surface water claim. The Town has recently drilled new wells.

The intent of this *Application for Change* is to add additional wells to each of the Town's groundwater certificates and eliminate use from two existing wells that do not produce adequate instantaneous volume to suit the Town's needs. The Town proposes to add Wells No. 1 and 7 as new points of withdrawal to certificate 5676 and Wells 2 and 6 to certificate G2-02087. Wells No. 4 and 5, currently unused due to low production capacity, will be decommissioned.

Figure 1. Map showing locations of two wellfields operated by the Town of Eatonville , located in the NE 1/4 NE 1/4, Section 23, of T6N, R4E.



Eatonville's Water Rights:

Source	WR. #	Date	Qi	Qa	
			GPM	*Additive*	*Non-additive*
Mashel River*	Claim 4455	File 1971	Undetermined	Undetermined	Undetermined
Mashel River	10307	8/18/1967	1,032	525	
Well 1 & 7**	5676-A	11/29/1966	360		394
Well 2, 5 & 6**	G2-01087	8/18/1967	250		400
Total				525 ac-ft/yr	

**The Town has a water right claim (4455), which was filed in 1971. At that time, the Town claimed a vested right for use of surface water that pre-dated the 1917 surface water code. The claim form indicates that surface water was first put to use in June 1908. Ecology does not have the authority to validate water right claims. Only the Courts may do so. However, it may be presumed that some portion of Eatonville's water use is likely to hold an earlier priority date than surface water certificate 10307. Accordingly, Eatonville's 1967 surface water right was issued as "Supplemental" to the quantities already claimed by the presumed vested right.*

***In April 2004 Wells 6 and 7 were added to the certificates as additional withdrawal point via a 90.44.100 Showing of Compliance.*

Attributes of Ground Water Certificate G2-01087

Priority Date	August 18, 1967
Purpose of Use	Municipal Supply
Sources	Wells 2, 4, 5, and 6
POW Location	NE ¼ NE ¼ Sec. 23, T. 16 N., R 4 EWM
Place of Use	Town of Eatonville
Period of Use	Continuously
Instantaneous Quantity	250 gpm
Annual Quantity	400 acre-feet (non-additive)

Proposed Change

Sources	Wells 1, 2, 6 and 7
POW Location	NE ¼ NE ¼ Sec. 23, T. 16 N., R 4 EWM

Attributes of Ground Water Certificate 5676

Priority Date	November 29, 1966
Purpose of Use	Municipal Supply
Sources	Wells 1 and 7
POW Location	NE ¼ NE ¼ Sec. 23, T. 16 N., R 4 EWM
Place of Use	Town of Eatonville
Period of Use	Continuously
Instantaneous Quantity	360 gpm
Annual Quantity	394 acre-feet (non-additive)

Proposed Change

Sources	Wells 1, 2, 6 and 7
POW Location	NE ¼ NE ¼ Sec. 23, T. 16 N., R 4 EWM

Hydrogeology

The hydrogeology of central Pierce County that includes the area surrounding the Town of Eatonville is discussed in *Ground-Water Occurrence and Stratigraphy of Unconsolidated Deposits, Central Pierce County, Washington* (Water Supply Bulletin No. 22, 1968, Kenneth L. Walters and Grant E. Kimmel, 1968) (Walters and Kimmel, 1968).

The hydrogeologic units in the general area are primarily unconsolidated Quaternary deposits and volcanic bedrock that underlies the glacial deposits and forms the upland areas west of the Town of Eatonville. The lateral extent of the unconsolidated units was governed by the extent of the four glacial advances and retreats that occurred during the Pleistocene and younger alluvial and mudflow deposits of the Holocene (Walters and Kimmel, 1968). The glacial deposits are collectively referred to as "drift" and consist of till over-lain by sand and gravel deposited as the glacier advanced, as well as the material that was deposited as the glacier retreated. These deposits tend to be heterogeneous and may be discontinuous in nature. The bedrock materials that underlie the glacial deposits and alluvium are associated with volcanic activity that predates the glaciation connected with the development of the Cascade Range and Mount Rainier.

The Town of Eatonville is located near the eastern fringe of the glacial drift plain, on the western flank of the Cascade Range. The Town is situated on a terrace with an approximate surface elevation of approximately 800 feet above mean sea level (msl) composed of undifferentiated Vashon age glacial drift (Walters and Kimmel, 1968). These glacial deposits are underlain by the bedrock that comprises the Cascade Range.

The Town of Eatonville's wells are completed in an alluvial aquifer, adjacent to the Mashel River. This alluvial aquifer is approximately 70 feet in thickness near the Town of Eatonville and is underlain by bedrock. Available information indicates that groundwater flow within this alluvial aquifer is controlled by the Mashel River. Groundwater in the shallow alluvial aquifer system is in direct hydraulic continuity with the surface water system.

Hydrogeologic Analysis

The Town of Eatonville's municipal water wells range in depth from 45 to 100 feet and are in two general wellfield locations. The well reports for all wells are similar and describe drilling through sandy and gravelly layers alternating with finer grained materials (clay and silt). All the Town's wells are completed in the same alluvial aquifer and draw water from the same body of public groundwater. The well locations are shown in Figure 1.

Wells 4 and 5 form one wellfield. Well 5 was drilled in 1976 to a completed depth of 71.5 feet below ground surface (bgs) and is screened from 61 to 71 feet. Well 5 has a static water level of 30 feet bgs, measured after drilling. A well report is not available for Well 4; however, it is assumed that Well 4 is completed at a similar depth and draws water from the same alluvial aquifer as Well 5.

Wells 1, 2, 6, and 7 forms the second wellfield, located west of Wells 4 and 5. Well 1 was drilled in 1966 and is 12 inches in diameter. Well 1 is completed at 52 feet bgs and is screened from 38.5 to 43.5 feet. A pump test conducted after drilling yielded 260 gpm with 5.4 feet of total drawdown measured after 4 hours of pumping, and 352 gpm with 10.7 feet of drawdown after pumping 3 hours. The static water level for Well 1 was 19 feet bgs, measured after drilling.

Well 2 was drilled in 1969 and is 10 inches in diameter. Well 2 is completed at 45.5 feet bgs and is screened from 38 to 44 feet bgs. A pumping test conducted indicated drawdown of 12.5 feet after pumping at a rate of 240 gpm for 4 hours.

Well 6 was drilled in 2003 and is 12 inches in diameter. Well 6 is completed at 73.5 bgs and is screened from 59.5 to 69.5 feet bgs, with a static water level of 19.4 feet bgs, measured after drilling. This well was pump tested at a rate of 230 gpm with 25 feet of drawdown measured after 72 hours of pumping.

Well 7 was drilled in 2004 and is 12 inches in diameter. The well is completed at a depth of 99 feet bgs and is screened from 73.5 to 93.5 feet bgs. Well 7 was pump tested at 430 gpm with 16.5 feet of drawdown measured after 72 hours of continuous pumping. Well 7 has a static water level of 16.5 feet bgs, measured after drilling.

Effects to Neighboring Water Users

The intent of this Application for Change is to replace two low producing wells (Wells 4 and 5) with two higher capacity wells (Wells 1, 2, 6 and 7), located less than 900 feet west. All four of the wells (Wells 1, 2, 6, and 7) will be operated as a wellfield. The locations of the wells involved in this change are identified in Figure 1.

Ecology's data bases were queried to determine the number of water right certificates, permits, claims, and wells located within ½ mile of the proposed change. A ½ mile radius was chosen for the ease of records retrieval. In addition, because the close proximity of the proposed points of withdrawal to the original points of withdrawal, it is not expected that area wells will be affected by this change.

Available information indicates a direct hydraulic relationship between groundwater and surface water; therefore, only the water rights issued downstream of the Town of Eatonville wells were evaluated, since upstream wells and diversions would not be affected.

The nearest documented well is located approximately 2,000 feet from the Town's wells. There are no wells or surface diversions located between the original and proposed points of withdrawal.

Following is a summary of all certificates, permits, claims, and wells located within ½ mile downstream of the Town of Eatonville wells:

- Six surface water certificates have been issued authorizing a combined instantaneous amount of 0.13 cubic feet per second (cfs) and 6 ac-ft per year. Water is used for domestic supply, irrigation, and fire protection.
- Three water right claims have been filed for surface water use from springs. One claim has been filed for domestic purposes from a well.
- Approximately twelve wells have been drilled in the area that surrounds the Town of Eatonville's wells. The wells range in depth from 35 feet to 225 feet bgs. All the wells, except two, are shallow and draw water from the alluvial aquifer.

Since the actual quantity of water being pumped from this wellfield is not increasing, this change is not anticipated to effect neighboring water users.

Effects to Surface Water

Minimum instream flows were established in 1981 for many streams in the WRIA through WAC 173-511, the Instream Resources Protection Program for the Nisqually River Basin Water Resource Inventory Area (WRIA) 11. Instream flows for the Nisqually River have been at four locations throughout its length. Gage # 12-0870-00 is located at the confluence of the Mashel and Nisqually Rivers. Instream flows have also been set for the Mashel River and the WAC closes the Mashel River from June 1 to October 31 each year to ground water withdrawals that would clearly have an adverse impact of the surface water system.

Because this application addresses a change of an existing water right, it represents no net increase in water quantity; this change will not result in any additional impairment to the Mashel or Nisqually Rivers, or other regulated surface water in WRIA 11.

Historical Water Use

With the passage of 2E2SHB 1338 - the Municipal Water Law, and subsequent updates to RCW 90.03, the Eatonville water system is designated as a municipal water system in good standing. The water right is eligible to be changed as requested.

These water right certificates are held by a municipal purveyor for municipal supply purposes and are considered to be in good-standing so long as the Town continues to manage their withdrawals in a manner consistent with the original intent of the water right application.

The Town of Eatonville began recording total water withdrawn and diverted from their combined system in 1989, and began metering ground water separately from surface water in 1999.

Service Area

The original place of use of each of the Town's water right certificates is defined as, "The area served by the Town of Eatonville".

Changes to the water code also affect the purveyor's legal requirement to file with the Department of Ecology to change the place of use on the original water right certificate. For all Class A municipal water systems future modification of the service area/place of use will need to be addressed through updates to their appropriate Water System Planning documents.

The 2003 Municipal Water Law defines the place of use as the area served within the retail and wholesale service of the Town of Eatonville as described within a Department of Health approved Water System Plan.

Ecology considers the Town of Eatonville to qualify as a municipal water purveyor. Accordingly, the place of use of this water right is governed by the service area described in the Water System Plan approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

The Town of Eatonville's service area has been defined and mapped within the purveyor's most recently approved State Department of Health water system plan.

The place of use of this water right is;

> *The service area described in the most recent Water System Plan approved by the Washington State Department of Health. As long as the Town of Eatonville remains in compliance with the criteria in RCW 90.03.386, this statute may have the effect of revising the place of use of this water right.*[1]

Conservation Planning

The Municipal Water Law amended sections of the State Board of Health Code, RCW 43.20; the laws governing Public Water Systems, RCW 70.119A; and sections of the state Water Code, RCW 90.03. These changes affect the Department of Health's water system planning process and include the development of new standards and requirements for water conservation and water use efficiency for public water systems such as Rainier View Water.

The Washington State Department of Health (DOH) is specifically tasked with the development of a conservation/water use efficiency rule. RCW 90.03.386 requires municipal water suppliers to implement cost-effective water conservation in accordance with the DOH conservation/water use efficiency rules, as part of their approved water system plan, and sets minimum conservation requirements for water system plans. It also requires municipal water suppliers to meet current conservation requirements and continue implementing their current programs. Draft conservation/efficiency regulations are currently being prepared by DOH's Drinking Water Program and its Water Use Efficiency Subcommittee. These regulations are expected to be adopted in 2006.

The current Conservation Planning Requirements published by the Departments of Ecology and Health in 1994 identifies the water use reporting, forecasting and conservation program requirements for public water systems. A water conservation plan meeting these requirements is a necessary element of a Water System Plan.

Currently, the elements of a Conservation Plan include 1) water use data collection, 2) water demand forecasting, 3) water conservation program. The Conservation Plan needs to identify goals and objectives, evaluate alternative conservation measures, and identify the selected measures including their schedule, cost, monitoring requirements, and estimated water savings. The Municipal Water Law adds additional requirements for conservation planning programs including increased evaluation of cost-effectiveness of conservation measures and through exploring opportunities for water reclamation.

Eatonville has a Water Conservation Plan and has been working to promote conservation and reduce unaccounted-for water. Their efforts include repair of leaking water mains, replacement of leaking and old service meters, and improved recording of water use.

RCW 90.54.030 directs the Department of Ecology to be informed with regard to all phases of water resources of the state, in order to make sound resource management decisions. This permit will include detailed provisions for the collection and submittal of water production data.

FINDINGS AND CONCLUSIONS:

- Given the area hydrogeology, well location, and well depth all the Town of Eatonville's wells are completed in the same body of public groundwater.
- The water will continue to be put to beneficial use for municipal supply.
- No detriment to the public interest could be identified during the investigation of this *Application for Change*. This transfer will be beneficial to the public interest by providing a reliable drinking water source. The Department of Ecology encourages the development of public water supply systems to provide water to regional areas and developments (RCW 90.54.020 (8)). Ecology recognizes the access to a reliable source of public water to benefit the public living within rural areas of Pierce County.
- The close proximity of the proposed points of withdrawal to the original points of withdrawal indicates that area wells will not be affected by this change. The nearest documented well is located approximately 2,000 feet from the Town's wells. There are no wells or surface diversions located between the original and proposed points of withdrawal.
- Because the new wells are not anticipated to have any greater impacts to the instream flows of the Mashel River than the original well, this change will not be detrimental to public interest or cause any detrimental environmental affect on the natural environment.
- The Town of Eatonville's certificates were issued for municipal purposes, and remain in good standing.

In accordance with Chapter 90.03 and 90.44 RCW, I find that water is available for appropriation from the source in question, the change would occur within the same body of public groundwater, and that the appropriation would not impair existing rights.

RECOMMENDATIONS:

I recommend approval of this application and issuance of two superseding certificates as follows:

- Superseding Certificate 5676-A for Wells 1, 2, 6 and 7 with an instantaneous quantity of 360 gallons per minute and 394 acre feet per year for municipal supply.
- Superseding Certificate G2-01087 for Wells 1, 2, 6 and 7 with an instantaneous quantity of 250 gallons per minute and 400 acre-feet per acre for municipal supply, year-round as needed.

PROVISIONS:

"Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307."

An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

Water use data shall be recorded weekly. The maximum rate of diversion/withdrawal and the annual total volume shall be submitted to Ecology by January 31st of each calendar year.

"The following information shall be included with each submittal of water use data:

1. Owner	2. Source name
3. Contact name if different	4. Annual quantity used including units
5. Mailing address	6. Maximum rate of diversion including units
7. Daytime phone number	8. Peak monthly flow including units
9. WRIA	10. Well tag number
11. Certificate No.	

In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information.

Chapter 173-173 WAC 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".

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.

The Water Resources Act of 1971, Chapter 90.54 RCW specifies certain criteria regarding utilization and management of the waters of the State in the best public interest. Favorable consideration of this application has been based on sufficient waters available, at least during portions of the year. However, it is pointed out to the applicant that this use of water may be subject to regulation at certain times, based on the necessity to maintain water quantities sufficient for preservation of the natural environment.

REPORTED BY: Jill E Walsh Date: 3/22/06

FINDINGS OF FACT AND DECISION

Upon reviewing the above report, I find all facts, relevant and material to the requested Application for Change have been thoroughly investigated. Furthermore, I find water is available for appropriation and the appropriation as recommended is a beneficial use and will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER a superseding certificate be issued under Water Right Number 5676A, subject to existing rights and indicated provisions, to allow appropriation of public water for the amount and uses specified in the foregoing report.

Signed at Olympia, Washington, this 22nd day of March, 2006.

Thomas Loranger

Thomas Loranger
Water Resources Section Manager
Southwest Regional

'06 FEB -6 10:38

AFFIDAVIT OF PUBLICATION

State of Washington, County of Pierce, ss: Judith A. East, being duly sworn on oath depose and say that they are publishers or publishers' authorized representatives of The Dispatch, a weekly newspaper. That said newspaper is a legal newspaper and it is now and has been for more than six months prior to the date of publication herein-after referred to, published in the English language continually as a weekly newspaper, in Eatonville, Pierce County, Washington, and is now and during all of said time was printed in an office maintained at the aforesaid place of said newspaper. That the annexed is a true copy of this legal advertisement as it was published in regular issues (not in supplement form) of said newspaper for 2 consecutive weeks. First publication was on the 25th day of Jan, 2006 and last publication was on the 1st day of Feb, 2006 and that such newspaper was regularly distributed to its subscribers during all of said periods.

Judith A East

Signature of Judith A. East

Subscribed and sworn to before me this 2nd day of Feb, 2006.

Michele K. Stoney

Notary public in and for the State of Washington, residing in Pierce County.
Michele K. Stoney
Commission Expires September 11, 2005

MICHELE K. STONEY
COMMISSION EXPIRES
NOTARY
PUBLIC
9-11-09
STATE OF WASHINGTON

State of Washington
DEPT. OF ECOLOGY
Notice of Application to add additional points of withdrawal to existing water rights

Take Notice: That Town of Eatonville has filed two applications to add additional points of withdrawal to existing water rights granted under Ground Water Certificates No. G2-01087C and 5676. Certificate No. G2-01087C was issued in the amount of 250 gpm, 400 acre-feet per year from 4 wells (2,4,5 & 6) located within the NE 1/4 NE 1/4 Section 23 T. 16 N., R. 4 E.W.M. Certificate No. 5676 was issued in the amount of 360 gpm, 394 acre-feet per year from 2 wells (1 & 7) located within the NE 1/4 NE 1/4 Section 23, T. 16 N., R. 4 E.W. M. Pierce Co. for the purpose of municipal supply.

Purpose of Applications: the Town has recently developed the new wells to increase the reliability of it's groundwater supply & to allow increased flexibility in the operation of all the wells.

Certificate No. G2-01087C -- request to add additional points of withdrawal (Wells 1, 2, 6 & 7) located within the NE Â1/4 NE 1/4 Section 23 T. 16 N., R. 4 E.W.M. Certificate No.5676' request to add additional points of withdrawal (Wells 1,2, 6 & 7) located within the NE 1/4 NE 1/4 Section 23 T. 16 N., R. 4 E.W.M. No other changes will be made to the certificates.

Protests or objections to approval of this application must include a detailed statement of the basis of objections and are subject to public disclosure. Protests must be accompanied by a $50.00 fee & filed with the Dept. of Ecology, at P.O. Box 47775 Olympia, WA 98504-7775 within (30) days.

Published January 25 and February 1, 2006
THE DISPATCH

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

April 20, 2004

Jamieson Van Eaton
Town of Eatonville
PO Box 309
Eatonville, WA 98328

Dear Mr. Van Eaton:

Re: Showing of Compliance – Additional Well for Town of Eatonville (Water Right Certificate 5676-A)

This letter is to confirm that we've received your *Showing of Compliance with RCW 90.44.100(3)*. It is our understanding that you have constructed an additional well under the authorization of Ground Water Certificate 5676-A. The new well will be designated Well 7. You have asserted that the additional well complies with the provisions of the rule.

Your notarized statement will be made a part of the permanent water right record associated with the certificate. No further action is needed on your part.

Sincerely,

Jill Walsh
Water Resources Program
Southwest Regional Office

JW:th

Cc: John Ryding, Department of Health, Northwest Drinking Water Operations
Michael Klisch, Golder Associates

5676-A

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DEPARTMENT OF ECOLOGY

Showing of Compliance with RCW 90.44.100(3)

Water Right Certificate or Permit Number: G2-08408

Parcel tax identification number: Pierce County 0416231021

Landowner(s) name: Town of Eatonville

Part of complying with RCW 90.44.100(3) is for the project proponent to notify the Department of Ecology (Ecology) that the statutory criteria of RCW 90.44.100(3) have been satisfied. Please attach to this document the water well report for the additional or replacement well and any additional information you have to support your affidavit.

Affidavit:

I, Jamieson Van Eaton, do certify that I caused the well described in the attached water well report to be drilled as an additional ~~or replacement~~ well(s) for use under Water Right Number G2-08408. This notice and attached documents describe and support my assertion that the ~~replacement or~~ additional well(s) complies with RCW 90.44.100(3) (a-g) and RCW 90.44.100(4):

a. The well is an additional ~~or replacement~~ well(s) that will tap the same body of public ground water as the original well;

b. If a replacement well is constructed, the use of the original well(s) shall be discontinued and the original well(s) shall be properly decommissioned;

c. The combined withdrawal of water from the additional ~~or replacement~~ well(s) and the original well authorized by the water right certificate does not enlarge the water right conveyed by the original water right certificate to the extent the certificate has been developed (perfected) and maintained by use of water;

d. The construction and use of the additional ~~or replacement~~ well(s) does not interfere with or impair water rights with an earlier priority date;

e. The additional ~~or replacement~~ well(s) is located no closer than the original well to a well or surface water body it might interfere with;

f. A specified manner of construction for the additional ~~or replacement~~ well(s) has been complied with, if required, and the new well was constructed in compliance with chapter 18.104 RCW and chapter 173-160 WAC;

g. The additional ~~or replacement~~ well(s) is located within the area described as the point of withdrawal in the public notice published for the original application for water right, or the most current legal description published for the right. Both the original well and the additional or replacement well(s) are located in SW ¼ NE ¼ NE ¼ Sec 23, T16N, R4E WM
(legal description).

Therefore the well is in compliance with the requirements for a statutorily granted amendment to the water right permit or certificate.

I understand the acceptance of this affidavit, and any attachments, by the Department of Ecology shall not be construed as affirming the validity of any water right permit or certificate. The responsibility to comply with RCW 90.44.100(3) is with the water right permit or certificate holder asserting an amendment pursuant to RCW 90.44.100(3).

Jameson VanEaton — 4/2/04

Name — Date

Acknowledgement:

State of Washington
County of Pierce

I certify that I know or have satisfactory evidence that Jameson VanEaton *is the person who appeared before me, and said person acknowledged that (he/~~she~~) signed this affidavit and acknowledged it to be (his/~~her~~) free and voluntary act for the uses and purposes mentioned in the affidavit.*

Dated: 4-2-04

JACQUELINE L. LITTRELL
COMMISSION EXPIRES
NOTARY
PUBLIC
JUNE 3, 2006
STATE OF WASHINGTON

Jacqueline L Littrell
(Signature)
Jacqueline L Littrell
Residing in
Eatonville
Title Notary
My appointment expires : 6-3-06

If you have any questions please contact the Water Resources Section of the closest regional office. Please submit copies of new well logs and decommissioned well logs along with this completed and notarized form to the nearest regional office.

Northwest Regional Office
3190 – 160th Avenue SE
Bellevue, WA 98008-5452
(425) 649-7000; TDD (425) 649-4259

Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775
(360) 407-6300; TDD (360) 407-6306

Eastern Regional Office
N. 4601 Monroe, Suite 202
Spokane, WA 99205-1295
(509) 456-2926; TDD (509) 458-2055

Central Regional Office
15 W. Yakima Ave., Suite 200
Yakima, WA 98902-3452
(509) 575-2597; TDD (509) 454-7673

Vancouver Field Office
2108 Grand Boulevard
Vancouver, WA 98661-4622
(360) 690-7171; TDD (360) 690-7147

Nooksack Field Office
1204 Railroad Ave., Suite 200
Bellingham, WA 98225
(360) 738-6250; TDD (425) 649-4259

Please print, sign and return to the Department of Ecology

Water Well Report

Original – Ecology, 1st copy – owner, 2nd copy – driller

Construction/Decommission

☑ Construction

☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Current Notice of Intent No. WE01768

Unique Ecology Well ID Tag No. AKT 667

Water Right Permit No. _____

Property Owner Name Town of Eatonville

Well Street Address 401XX Weyerhauser Road South

City Eatonville County Pierce

Location NE 1/4-1/4 NE 1/4 Sec 23 Twn 16 R 4E EWM ☑ or WWM ☐ circle one

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. 0416231011

PROPOSED USE: ☐ Domestic ☐ Industrial ☑ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

TYPE OF WORK: Owner's number of well (if more than one) #7

☑ New well ☐ Reconditioned ☐ Deepened

Method: ☐ Dug ☐ Bored ☐ Driven ☐ Cable ☑ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 12 inches, drilled 97 ft.

Depth of completed well 93.5 ft.

CONSTRUCTION DETAILS

Casing Installed: ☑ Welded 12 " Diam. from +2 ft. to 73 ft.

☐ Liner installed _____ " Diam. from _____ ft. to _____ ft.

☐ Threaded _____ " Diam. from _____ ft. to _____ ft.

Perforations: ☐ Yes ☑ No

Type of perforator used _____

SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No ☑ K-Pac Location 69.5

Manufacturer's Name Nagaoka

Type Stainless Wire Wrap Model No. _____

Diam. 11 Slot size 90 from 73.5 ft. to 83.5 ft.

Diam. 11 Slot ~~size~~ sump from 83.5 ft. to 93.5 ft.

Gravel/Filter packed: ☐ Yes ☑ No ☐ Size of gravel/sand _____

Materials placed from _____ ft. to _____ ft.

Surface Seal: : ☑ Yes ☐ No To what depth? 18 ft.

Material used in seal Bentonite Chips

Did any strata contain unusable water? ☐ Yes ☑ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

PUMP: Manufacturer's Name _____

Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.

Static level 16.5 ft. below top of well Date 3/1/04

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☑ Yes ☐ No If yes, by whom? Golder w/T.P.D.

Yield: 430 gal./min. with 15 ft. drawdown after 24 hrs.

Yield: 430 gal./min. with 16 ft. drawdown after 48 hrs.

Yield: 430 gal./min. with 16.5 ft. drawdown after 72 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
Recovered	after	20 Minutes	80%		
1 hour	for	100%	recovery		

Date of test _____

Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.

Airtest 300+ gal./min. with stem set at 60 ft. for 1 hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water _____ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Dry brown, gray silty sandy cobbles with boulders.	0	9
Moist olive gray medium gravel, with olive black sandy silt.	9	15
Boulder.	15	17
Dark yellow brown silty sandy gravel with trace sticky clay.	17	21
Soft brown, orange sandy silt, trace medium gravel.	21	25
Soft light gray olive clay silt with trace sand. Gravel.	25	41
Wet, yellow, brown, orange silty medium sand with gravel.	41	80
Dark gray, boulder.	80	83
Wet gray silty sandy medium gravel.	83	87
Green gray silty medium to coarse gravel with light gray clay.	87	97
Soft sticky olive gray clay.	97	99
03-1052-11		

COPY

Start Date 1/20/04 Completed Date 3/4/04

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Driller/Engineer/Trainee Name (Print) Matthew Call

Driller/Engineer/Trainee Signature _____

Driller or trainee License No. 2571

Drilling Company Tacoma Pump & Drilling Co., Inc.

Address 30316 Mountain Highway

City, State, Zip Graham, WA 98338

Contractor's Registration No. TACOMPD203PF Date 3/8/04

If TRAINEE, Driller's Licensed No. _____

Driller's Signature _____

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 2/03)

S. F. H. 7331—OS—8-64

CERTIFICATE RECORD NO. 12 PAGE NO. 5676-A

STATE OF WASHINGTON, COUNTY OF Pierce

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 TOWN OF EATONVILLE

of E atonville, 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 well

located within [illegible]

Sec. 23, Twp. 16 N., R. 4 E. W.M.

for the purpose of municipal supply

under and subject to provisions contained in Ground Water Permit No. 7798 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 12 at page 5676-A; that the right hereby confirmed dates from November 29, 1966; 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 360 gallons per minute; 394 acre-feet per year, to supply Town of Eatonville

Special provisions required by the Supervisor of Water Resources: Issued as a supplemental supply to the claim of vested rights, the total annual withdrawal shall not exceed 394 acre-feet, less any amount diverted under existing rights.

A description of the lands to which such ground water right is appurtenant:

Town of Eatonville

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 28th day of April, 19 67

State Supervisor of Water Resources.

S. F. No. 1336—OS—1-63.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

Permit to Appropriate Public Ground Waters of the State of Washington

Book No. 16 of Ground Water Permits, on page 7798 under Application No. [illegible]

TOWN OF EATONVILLE

of Eatonville, Washington

is hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights, and to the limitations and provisions set out herein.

Priority date of this permit is November 29, 1966

Source of the proposed ground water appropriation is a well

within area, sub-area

zone. Name or number of works is

Quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 360 gallons per minute; 394 acre-feet per year, to be used for the following purposes: municipal supply

as more definitely set out below.

Location of the well, tunnel, or infiltration trench is 1150 feet south and 1100 feet west from northeast corner of Section 23

being within SW¼NE¼ of Sec. 23, T. 16 N., R. 4 E.W.M.

county of Pierce

Use, or uses to which water is to be applied:

For municipal supply: 360 gallons per minute; 394 acre-feet per year, to supply Town of Eatonville

For irrigation: gallons per minute; acre-feet per year, for the irrigation of acres.

For miscellaneous uses: gallons per minute; acre-feet per year, for

LEGAL DESCRIPTION OF PROPERTY ON [illegible]ICH WATER IS TO BE USED

Town of Eatonville.

DESCRIPTION OF WORKS FROM WHICH WATER IS TO BE WITHDRAWN

The well will be drilled (Dug or drilled) and have a diameter of 12 inches, and depth of ~~48~~ 52 feet.

Description of tunnel or infiltration trench:

(Please read carefully provisions below)

Particular specifications required by the Supervisor of Water Resources for the purpose of preventing waste of public waters: The installation of an access port as described in Ground Water Bulletin No. 1 shall be required prior to issuance of final certificate of water right. The applicant may, for his own convenience, wish to install an air-line and gage in addition to the access port.

Issued as a supplemental supply to the claim of vested rights, the total annual withdrawal shall not exceed 394 acre-feet, less any amount diverted under existing rights.

As provided under RCW 43.21.130, 90.03.360, 90.44.250 and 90.44.020, a meter meter shall be installed in this system to measure the total amount of the withdrawal.

Construction work shall begin on or before Started

and shall thereafter be prosecuted with reasonable diligence and completed on or before

March 1, 1968

and complete application of water to proposed use shall be made on or before

March 1, 1969

Given under my hand and the seal of this office at Olympia, Washington, this 21st day of March, 19 67

State Supervisor of Water Resources

AMENDED Report of Examination on Ground Water

Received date November 29, 1966 Date of exam. January 11, 1967 Appli. No. 8408

Name Town of Eatonville Address Town Hall, Eatonville, Washington

Type of works a well Dimensions 12" x 40'

Progress of works Well drilled (Project Started)

Quantity applied for 360 g.p.m. acre-feet per year

Legal sub. NW¼NW¼ Sec 23 Twp 16 N. Rge 4 E. County Pierce

Use municipal supply

Irrigation-acreage Present Planned Feasible

Municipal: Population 900 as of present time

Industrial

Time pump will be operated continuously

Other water rights appurtenant to this land None recorded - claim of vested rights from Mashell River

Proximity to existing works, springs, wells, or streams 50 feet from Mashell River, elevation approximately 10 feet above river

Area Sub-area Zone

RECOMMENDATIONS

Approved for 360 g.p.m. 394 acre-feet per year, subject to existing water rights. (1 acre-foot = 325,850 gallons)

The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final certificate of water right. The applicant may, for his own convenience, wish to install an air-line and gage in addition to the access port.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the State Director of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Department of Health, Fourth Floor, Public Health Building, Olympia, with regard to the need for compliance.

At present, the Town of Eatonville uses an average of 350,000 gallons of water per day. With a population of 900, the average per capita consumption is 390 gallons per day. This is well above average for a town of this size in western Washington. There are no individual meters and undoubtedly some of the waters are not utilized to their maximum. At 390 gallons per capita per day, the annual need would be 394 acre-feet.

Applicant claims vested rights from the Mashell River for municipal supply. Therefore, permit may issue as follows:

(Over)

"Issued as a supplemental supply to the claim of vested rights, the total annual withdrawal shall not exceed 3[illegible] acre-feet, less any amount diverted under existing rights."

As provided under RCW 43.21.130, 90.03.360, 90.44.050 and 90.44.080, a meter meter shall be installed in this system to measure the total amount of the withdrawal.

Signed at Olympia, Washington this 1 day of March, 1987.

Dean Wood

Dean Wood, Engineer
Division of Water Resources

Report of Examination on Ground Water

Received date November 29, 1966 Date of exam January 11, 1967 Appl. No. 4403

Name Town of Eatonville Address Town Hall, Eatonville, Washington

Type of works a well Dimensions 12" x 40'

Progress of works Well drilled (Project Started)

Quantity applied for 360 g.p.m. acre-feet per year

Legal sub. NE¼NE¼ Sec. 23 Twp. 16 N. Rge. 4 E. County Pierce

Use municipal supply

Irrigation-acreage: Present Planned Feasible

Municipal: Population 1200 as of 1985

Industrial

Time pump will be operated continuously

Other water rights appurtenant to this land None recorded - claim of vested rights from Nisqually River

Proximity to existing works, springs, wells, or streams 50 feet from Nisqually River, elevation approximately 10 feet above river

Area Sub-area Zone

RECOMMENDATIONS

Approved for 360 g.p.m. 202 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final certificate of water right. The applicant may, for his own convenience, wish to install an air-line and gage in addition to the access port.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the State Director of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Department of Health, Fourth Floor, Public Health Building, Olympia, with regard to the need for compliance.

An analysis of water use in Western Washington has shown the average water requirement for municipal supply to be 140 gallons per capita per day. Allowing for an increase in the water requirement, the recommended annual withdrawal is based on an average daily requirement of 150 gallons. Therefore, for the estimated population of 1200 as of 1985 to be served by this system, the requirement would be 202 acre-feet per year.

Applicant claims vested rights from the Nisqually River for municipal supply. Therefore, permit may issue as follows:

(Over)

"Issued as a supplemental supply to the claim of vested rights, the total annual withdrawal shall not exceed 282 acre-feet, less any amount diverted under existing rights."

As provided under RCW 43.21.130, 90.03.360, 90.44.250 and 90.44.020, a master meter shall be installed in this system to measure the total amount of the withdrawal.

Signed at Olympia, Washington
this 16 day of February, 1967.

DAN WOOD, Engineer
Division of Water Resources

Ground Water Certificate G2-01087C

Town of Eatonville
201 Center Street West
Eatonville, Washington 98328

WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE OF WASHINGTON
CERTIFICATE OF WATER RIGHT
SUPERSEDING

Document Title: Certificate of Water Right

Agency: Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Applicant: Town of Eatonville
201 Center Street West
Eatonville, Washington 98328

Reference Number:

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
August 18, 1967	8915	8355	G2-01087

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	TRIBUTARY OF (IF SURFACE WATERS)
4 Wells (Well 1, 2, 6 & 7)	

MAX. CUBIC FEET PER SECOND	MAX. GALLONS PER MINUTE	MAX. ACRE-FEET PER YEAR
	250	400 (non-additive)

QUANTITY/TYPE OF USE/PERIOD OF USE

400 Acre-feet per year Municipal supply Year-round, as needed

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼ NE¼	23	16	4E	11	Pierce

PARCEL # 033-1531-001-011

ADDITIONAL LEGAL IS ON PAGE 2

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
N/A	N/A	N/A	N/A	11	Pierce

PARCEL # N/A

ADDITIONAL LEGAL IS ON PAGE 2

CONTINUED LEGAL DESCRIPTION FOR LOCATION OF DIVERSION/WITHDRAWAL

Well 1: (ACV 530) 980 feet West and 1070 feet South of the Northeast corner of Section 23.
Well 2: (ACV 539) 920 feet West and 1090 feet South of the Northeast corner of Section 23.
Well 6: (AHG 991) 1060 feet West and 960 feet South of the Northeast corner of Section 23.
Well 7: (AKT 667) 780 feet West and 990 feet South of the Northeast corner of Section 23.

CONTINUED LEGAL DESCRIPTION FOR PROPERTY ON WHICH WATER IS TO BE USED

The service area described in the most recent water system plan approved by the Washington State Department of Health, as long as the Town of Eatonville remains in compliance with the criteria in RCW 90.03.386(2), this provision may have the effect of revising the place of use of this water right.

PROVISIONS

"Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307."

The certificate, when issued, supersedes that of same number issued on March 16, 1979, and is subject to the following provisions.

An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

(continued on page 3)

Given under my hand and the seal of this office at Olympia, Washington, this 22nd *day of* June, *2006.*

DEPARTMENT OF ECOLOGY STATE OF WASHINGTON

Jay Manning, Director
Department of Ecology

DATA OK JW

By Thomas Loranger
Thomas Loranger, Section Manager

If you need this publication in an alternate format, please call the Water Resources Program at 360-407-6300. Persons with hearing loss or speech disability can call 711 for Washington Relay Service.

Provisions Continued

Water use data shall be recorded weekly. The maximum rate of diversion/withdrawal and the annual total volume shall be submitted to Ecology by January 31st of each calendar year.

"The following information shall be included with each submittal of water use data:

1. Owner	2. Source name
3. Contact name if different	4. Annual quantity used including units
5. Mailing address	6. Maximum rate of diversion including units
7. Daytime phone number	8. Peak monthly flow including units
9. WRIA	10. Well tag number
11. Certificate No.	

In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information."

Chapter 173-173 WAC 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".

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.

The Water Resources Act of 1971 specifies certain criteria regarding utilization and management of the waters of the state in the best public interest. Use of water may be subject to regulation at certain times, based on the necessity to maintain water quantities sufficient for preservation of the natural environment.

POW

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
APPLICATION FOR CHANGE
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
August 18, 1967	8915	8355	G2-01087

NAME
Town of Eatonville

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
201 Center Street West	Eatonville	Washington	98328

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
4 Wells (Well 1, 2, 6 & 7)
TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	250	400 (non-additive)

QUANTITY, TYPE OF USE, PERIOD OF USE		
400 Acre-feet per year	Municipal supply	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL
Well 1: (ACV 530) 980 feet West and 1070 feet South of the Northeast corner of Section 23.
Well 2: (ACV 539) 920 feet West and 1090 feet South of the Northeast corner of Section 23.
Well 6: (AHG 991) 1060 feet West and 960 feet South of the Northeast corner of Section 23.
Well 7: (AKT 667) 780 feet West and 990 feet South of the Northeast corner of Section 23.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼ NE¼	23	16	4E	11	Pierce

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The service area described in the most recent water system plan approved by the Washington State Department of Health, as long as the Town of Eatonville remains in compliance with the criteria in RCW 90.03.386(2), this provision may have the effect of revising the place of use of this water right.

If you require this publication in an alternate format, please contact Water Resources at (360) 407-6300, or TTY (for the speech or hearing impaired) 711 or 800-833-6388.

DESCRIPTION OF PROPOSED WORKS

4 Wells

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	In-use

REPORT

BACKGROUND:

On July 1, 2005 Gary Armstrong on behalf of the Town of Eatonville submitted two Applications for Change of Water Right to modify ground water certificate 5676-A and G2-01087. The applicant proposes to add additional points of withdrawal to each certificate to facilitate the operation of a wellfield. The Town of Eatonville is located in the Nisqually River Watershed, Water Resource Inventory Area 11.

A public notice detailing this proposed change was published on January 25th and February 1, 2006 and no protests were received. This application was determined to be categorically exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW.

Chapter(s) 90.03 and 90.44 RCW authorize the appropriation of public water for beneficial use and describe the process for obtaining water rights including the process to amend or change existing rights. Laws specifically governing the water right permitting process are RCW 90.03.250 through 90.03.340 and RCW 90.44.060. Changes or amendments to these rights are covered under RCW 90.03.380 and RCW 90.44.100.

Based on my evaluation of this request, I recommend approval of these Applications for Change and issuance of superseding certificates.

INVESTIGATION:

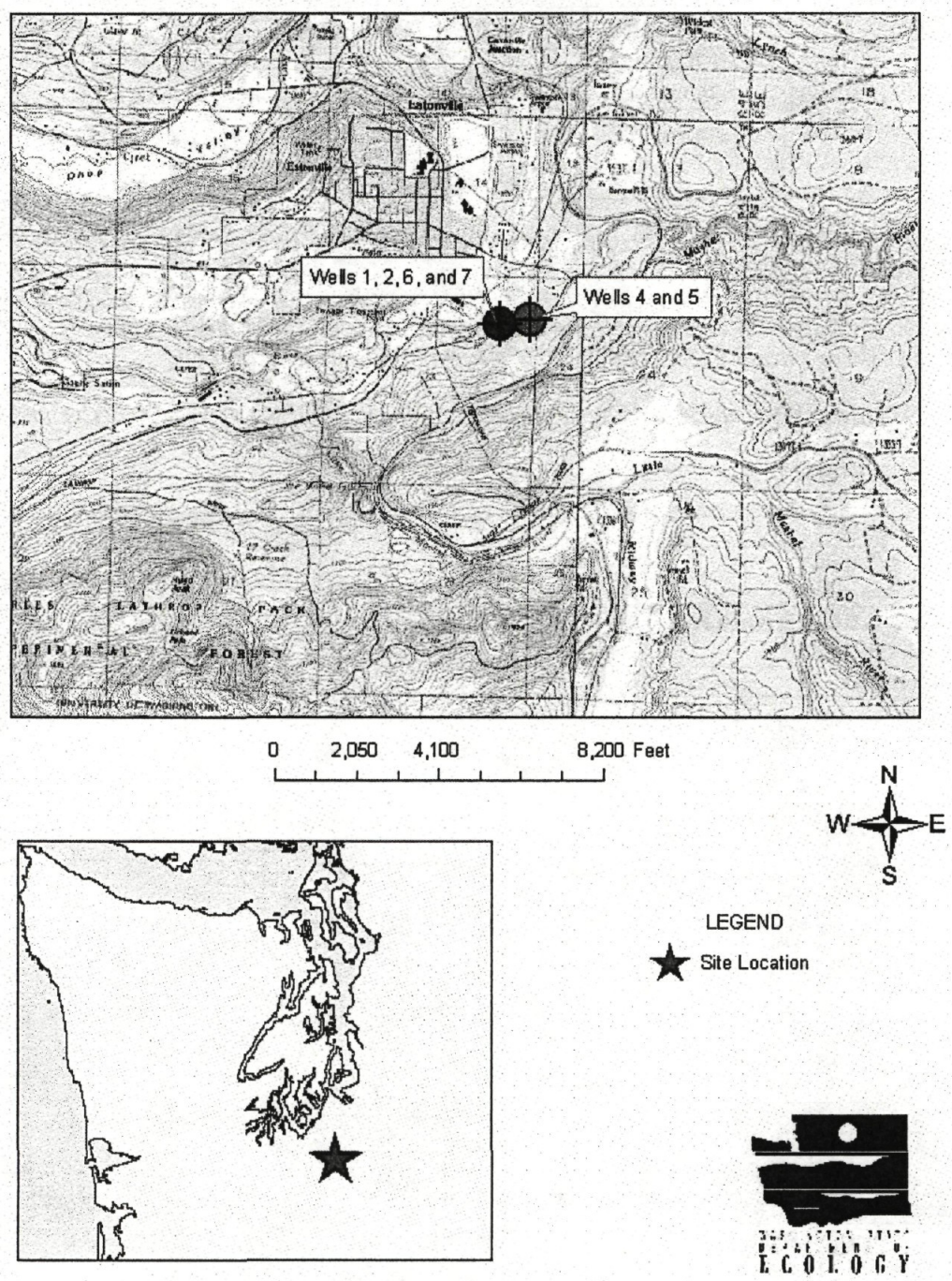
In considering this application, my investigation included, but was not limited to research and/or review of:

- The State Water Code
- SEPA Requirements
- Records of other water rights in the vicinity
- Technical memorandum prepared by Golder Associates dated May 20, 2005
- Hydrogeologic report by Tammy Hall (December 28, 2005)

The Town of Eatonville operates four wells and a surface water diversion on the Mashel River for municipal supply. The Town holds two ground water certificates, one surface water certificate and a surface water claim. The Town has recently drilled new wells.

The intent of this *Application for Change* is to add additional wells to each of the Town's groundwater certificates and eliminate use from two existing wells that do not produce adequate instantaneous volume to suit the Town's needs. The Town proposes to add Wells No. 1 and 7 as new points of withdrawal to certificate 5676 and Wells 2 and 6 to certificate G2-02087. Wells No. 4 and 5, currently unused due to low production capacity, will be decommissioned.

Figure 1. Map showing locations of two wellfields operated by the Town of Eatonville , located in the NE 1/4 NE 1/4, Section 23, of T6N, R4E.



Eatonville's Water Rights:

Source	WR. #	Date	Qi	Qa	
			GPM	*Additive*	*Non-additive*
Mashel River*	Claim 4455	File 1971	Undetermined	Undetermined	Undetermined
Mashel River	10307	8/18/1967	1,032	525	
Well 1 & 7**	5676-A	11/29/1966	360		394
Well 2, 5 & 6**	G2-01087	8/18/1967	250		400
Total				525 ac-ft/yr	

**The Town has a water right claim (4455), which was filed in 1971. At that time, the Town claimed a vested right for use of surface water that pre-dated the 1917 surface water code. The claim form indicates that surface water was first put to use in June 1908. Ecology does not have the authority to validate water right claims. Only the Courts may do so. However, it may be presumed that some portion of Eatonville's water use is likely to hold an earlier priority date than surface water certificate 10307. Accordingly, Eatonville's 1967 surface water right was issued as "Supplemental" to the quantities already claimed by the presumed vested right.*

***In April 2004 Wells 6 and 7 were added to the certificates as additional withdrawal point via a 90.44.100 Showing of Compliance.*

Attributes of Ground Water Certificate G2-01087

Priority Date	August 18, 1967
Purpose of Use	Municipal Supply
Sources	Wells 2, 4, 5, and 6
POW Location	NE ¼ NE ¼ Sec. 23, T. 16 N., R 4 EWM
Place of Use	Town of Eatonville
Period of Use	Continuously
Instantaneous Quantity	250 gpm
Annual Quantity	400 acre-feet (non-additive)

Proposed Change

Sources	Wells 1, 2, 6 and 7
POW Location	NE ¼ NE ¼ Sec. 23, T. 16 N., R 4 EWM

Attributes of Ground Water Certificate 5676

Priority Date	November 29, 1966
Purpose of Use	Municipal Supply
Sources	Wells 1 and 7
POW Location	NE ¼ NE ¼ Sec. 23, T. 16 N., R 4 EWM
Place of Use	Town of Eatonville
Period of Use	Continuously
Instantaneous Quantity	360 gpm
Annual Quantity	394 acre-feet (non-additive)

Proposed Change

Sources	Wells 1, 2, 6 and 7
POW Location	NE ¼ NE ¼ Sec. 23, T. 16 N., R 4 EWM

Hydrogeology

The hydrogeology of central Pierce County that includes the area surrounding the Town of Eatonville is discussed in *Ground-Water Occurrence and Stratigraphy of Unconsolidated Deposits, Central Pierce County, Washington* (Water Supply Bulletin No. 22, 1968, Kenneth L. Walters and Grant E. Kimmel, 1968) (Walters and Kimmel, 1968).

The hydrogeologic units in the general area are primarily unconsolidated Quaternary deposits and volcanic bedrock that underlies the glacial deposits and forms the upland areas west of the Town of Eatonville. The lateral extent of the unconsolidated units was governed by the extent of the four glacial advances and retreats that occurred during the Pleistocene and younger alluvial and mudflow deposits of the Holocene (Walters and Kimmel, 1968). The glacial deposits are collectively referred to as "drift" and consist of till over-lain by sand and gravel deposited as the glacier advanced, as well as the material that was deposited as the glacier retreated. These deposits tend to be heterogeneous and may be discontinuous in nature. The bedrock materials that underlie the glacial deposits and alluvium are associated with volcanic activity that predates the glaciation connected with the development of the Cascade Range and Mount Rainier.

The Town of Eatonville is located near the eastern fringe of the glacial drift plain, on the western flank of the Cascade Range. The Town is situated on a terrace with an approximate surface elevation of approximately 800 feet above mean sea level (msl) composed of undifferentiated Vashon age glacial drift (Walters and Kimmel, 1968). These glacial deposits are underlain by the bedrock that comprises the Cascade Range.

The Town of Eatonville's wells are completed in an alluvial aquifer, adjacent to the Mashel River. This alluvial aquifer is approximately 70 feet in thickness near the Town of Eatonville and is underlain by bedrock. Available information indicates that groundwater flow within this alluvial aquifer is controlled by the Mashel River. Groundwater in the shallow alluvial aquifer system is in direct hydraulic continuity with the surface water system.

Hydrogeologic Analysis

The Town of Eatonville's municipal water wells range in depth from 45 to 100 feet and are in two general wellfield locations. The well reports for all wells are similar and describe drilling through sandy and gravelly layers alternating with finer grained materials (clay and silt). All the Town's wells are completed in the same alluvial aquifer and draw water from the same body of public groundwater. The well locations are shown in Figure 1.

Wells 4 and 5 form one wellfield. Well 5 was drilled in 1976 to a completed depth of 71.5 feet below ground surface (bgs) and is screened from 61 to 71 feet. Well 5 has a static water level of 30 feet bgs, measured after drilling. A well report is not available for Well 4; however, it is assumed that Well 4 is completed at a similar depth and draws water from the same alluvial aquifer as Well 5.

Wells 1, 2, 6, and 7 forms the second wellfield, located west of Wells 4 and 5. Well 1 was drilled in 1966 and is 12 inches in diameter. Well 1 is completed at 52 feet bgs and is screened from 38.5 to 43.5 feet. A pump test conducted after drilling yielded 260 gpm with 5.4 feet of total drawdown measured after 4 hours of pumping, and 352 gpm with 10.7 feet of drawdown after pumping 3 hours. The static water level for Well 1 was 19 feet bgs, measured after drilling.

Well 2 was drilled in 1969 and is 10 inches in diameter. Well 2 is completed at 45.5 feet bgs and is screened from 38 to 44 feet bgs. A pumping test conducted indicated drawdown of 12.5 feet after pumping at a rate of 240 gpm for 4 hours.

Well 6 was drilled in 2003 and is 12 inches in diameter. Well 6 is completed at 73.5 bgs and is screened from 59.5 to 69.5 feet bgs, with a static water level of 19.4 feet bgs, measured after drilling. This well was pump tested at a rate of 230 gpm with 25 feet of drawdown measured after 72 hours of pumping.

Well 7 was drilled in 2004 and is 12 inches in diameter. The well is completed at a depth of 99 feet bgs and is screened from 73.5 to 93.5 feet bgs. Well 7 was pump tested at 430 gpm with 16.5 feet of drawdown measured after 72 hours of continuous pumping. Well 7 has a static water level of 16.5 feet bgs, measured after drilling.

Effects to Neighboring Water Users

The intent of this Application for Change is to replace two low producing wells (Wells 4 and 5) with two higher capacity wells (Wells 1, 2, 6 and 7), located less than 900 feet west. All four of the wells (Wells 1, 2, 6, and 7) will be operated as a wellfield. The locations of the wells involved in this change are identified in Figure 1.

Ecology's data bases were queried to determine the number of water right certificates, permits, claims, and wells located within ½ mile of the proposed change. A ½ mile radius was chosen for the ease of records retrieval. In addition, because the close proximity of the proposed points of withdrawal to the original points of withdrawal, it is not expected that area wells will be affected by this change.

Available information indicates a direct hydraulic relationship between groundwater and surface water; therefore, only the water rights issued downstream of the Town of Eatonville wells were evaluated, since upstream wells and diversions would not be affected.

The nearest documented well is located approximately 2,000 feet from the Town's wells. There are no wells or surface diversions located between the original and proposed points of withdrawal.

Following is a summary of all certificates, permits, claims, and wells located within ½ mile downstream of the Town of Eatonville wells:

- Six surface water certificates have been issued authorizing a combined instantaneous amount of 0.13 cubic feet per second (cfs) and 6 ac-ft per year. Water is used for domestic supply, irrigation, and fire protection.
- Three water right claims have been filed for surface water use from springs. One claim has been filed for domestic purposes from a well.
- Approximately twelve wells have been drilled in the area that surrounds the Town of Eatonville's wells. The wells range in depth from 35 feet to 225 feet bgs. All the wells, except two, are shallow and draw water from the alluvial aquifer.

Since the actual quantity of water being pumped from this wellfield is not increasing, this change is not anticipated to effect neighboring water users.

Effects to Surface Water

Minimum instream flows were established in 1981 for many streams in the WRIA through WAC 173-511, the Instream Resources Protection Program for the Nisqually River Basin Water Resource Inventory Area (WRIA) 11. Instream flows for the Nisqually River have been at four locations throughout its length. Gage # 12-0870-00 is located at the confluence of the Mashel and Nisqually Rivers. Instream flows have also been set for the Mashel River and the WAC closes the Mashel River from June 1 to October 31 each year to ground water withdrawals that would clearly have an adverse impact of the surface water system.

Because this application addresses a change of an existing water right, it represents no net increase in water quantity; this change will not result in any additional impairment to the Mashel or Nisqually Rivers, or other regulated surface water in WRIA 11.

Historical Water Use

With the passage of 2E2SHB 1338 - the Municipal Water Law, and subsequent updates to RCW 90.03, the Eatonville water system is designated as a municipal water system in good standing. The water right is eligible to be changed as requested.

These water right certificates are held by a municipal purveyor for municipal supply purposes and are considered to be in good-standing so long as the Town continues to manage their withdrawals in a manner consistent with the original intent of the water right application.

The Town of Eatonville began recording total water withdrawn and diverted from their combined system in 1989, and began metering ground water separately from surface water in 1999.

Service Area

The original place of use of each of the Town's water right certificates is defined as, "The area served by the Town of Eatonville".

Changes to the water code also affect the purveyor's legal requirement to file with the Department of Ecology to change the place of use on the original water right certificate. For all Class A municipal water systems future modification of the service area/place of use will need to be addressed through updates to their appropriate Water System Planning documents.

The 2003 Municipal Water Law defines the place of use as the area served within the retail and wholesale service of the Town of Eatonville as described within a Department of Health approved Water System Plan.

Ecology considers the Town of Eatonville to qualify as a municipal water purveyor. Accordingly, the place of use of this water right is governed by the service area described in the Water System Plan approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

The Town of Eatonville's service area has been defined and mapped within the purveyor's most recently approved State Department of Health water system plan.

The place of use of this water right is;

> *The service area described in the most recent Water System Plan approved by the Washington State Department of Health. As long as the Town of Eatonville remains in compliance with the criteria in RCW 90.03.386, this statute may have the effect of revising the place of use of this water right.*[1]

Conservation Planning

The Municipal Water Law amended sections of the State Board of Health Code, RCW 43.20; the laws governing Public Water Systems, RCW 70.119A; and sections of the state Water Code, RCW 90.03. These changes affect the Department of Health's water system planning process and include the development of new standards and requirements for water conservation and water use efficiency for public water systems such as Rainier View Water.

The Washington State Department of Health (DOH) is specifically tasked with the development of a conservation/water use efficiency rule. RCW 90.03.386 requires municipal water suppliers to implement cost-effective water conservation in accordance with the DOH conservation/water use efficiency rules, as part of their approved water system plan, and sets minimum conservation requirements for water system plans. It also requires municipal water suppliers to meet current conservation requirements and continue implementing their current programs. Draft conservation/efficiency regulations are currently being prepared by DOH's Drinking Water Program and its Water Use Efficiency Subcommittee. These regulations are expected to be adopted in 2006.

The current Conservation Planning Requirements published by the Departments of Ecology and Health in 1994 identifies the water use reporting, forecasting and conservation program requirements for public water systems. A water conservation plan meeting these requirements is a necessary element of a Water System Plan.

Currently, the elements of a Conservation Plan include 1) water use data collection, 2) water demand forecasting, 3) water conservation program. The Conservation Plan needs to identify goals and objectives, evaluate alternative conservation measures, and identify the selected measures including their schedule, cost, monitoring requirements, and estimated water savings. The Municipal Water Law adds additional requirements for conservation planning programs including increased evaluation of cost-effectiveness of conservation measures and through exploring opportunities for water reclamation.

Eatonville has a Water Conservation Plan and has been working to promote conservation and reduce unaccounted-for water. Their efforts include repair of leaking water mains, replacement of leaking and old service meters, and improved recording of water use.

RCW 90.54.030 directs the Department of Ecology to be informed with regard to all phases of water resources of the state, in order to make sound resource management decisions. This permit will include detailed provisions for the collection and submittal of water production data.

FINDINGS AND CONCLUSIONS:

- Given the area hydrogeology, well location, and well depth all the Town of Eatonville's wells are completed in the same body of public groundwater.
- The water will continue to be put to beneficial use for municipal supply.
- No detriment to the public interest could be identified during the investigation of this *Application for Change*. This transfer will be beneficial to the public interest by providing a reliable drinking water source. The Department of Ecology encourages the development of public water supply systems to provide water to regional areas and developments (RCW 90.54.020 (8)). Ecology recognizes the access to a reliable source of public water to benefit the public living within rural areas of Pierce County.
- The close proximity of the proposed points of withdrawal to the original points of withdrawal indicates that area wells will not be affected by this change. The nearest documented well is located approximately 2,000 feet from the Town's wells. There are no wells or surface diversions located between the original and proposed points of withdrawal.
- Because the new wells are not anticipated to have any greater impacts to the instream flows of the Mashel River than the original well, this change will not be detrimental to public interest or cause any detrimental environmental affect on the natural environment.
- The Town of Eatonville's certificates were issued for municipal purposes, and remain in good standing.

In accordance with Chapter 90.03 and 90.44 RCW, I find that water is available for appropriation from the source in question, the change would occur within the same body of public groundwater, and that the appropriation would not impair existing rights.

RECOMMENDATIONS:

I recommend approval of this application and issuance of two superseding certificates as follows:

- Superseding Certificate 5676-A for Wells 1, 2, 6 and 7 with an instantaneous quantity of 360 gallons per minute and 394 acre feet per year for municipal supply.
- Superseding Certificate G2-01087 for Wells 1, 2, 6 and 7 with an instantaneous quantity of 250 gallons per minute and 400 acre-feet per acre for municipal supply, year-round as needed.

PROVISIONS:

"Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307."

An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

Water use data shall be recorded weekly. The maximum rate of diversion/withdrawal and the annual total volume shall be submitted to Ecology by January 31st of each calendar year.

"The following information shall be included with each submittal of water use data:

1. Owner	2. Source name
3. Contact name if different	4. Annual quantity used including units
5. Mailing address	6. Maximum rate of diversion including units
7. Daytime phone number	8. Peak monthly flow including units
9. WRIA	10. Well tag number
11. Certificate No.	

In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information.

Chapter 173-173 WAC 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".

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.

The Water Resources Act of 1971, Chapter 90.54 RCW specifies certain criteria regarding utilization and management of the waters of the State in the best public interest. Favorable consideration of this application has been based on sufficient waters available, at least during portions of the year. However, it is pointed out to the applicant that this use of water may be subject to regulation at certain times, based on the necessity to maintain water quantities sufficient for preservation of the natural environment.

REPORTED BY: Jill Ewald Date: 3/22/06

FINDINGS OF FACT AND DECISION

Upon reviewing the above report, I find all facts, relevant and material to the requested Application for Change have been thoroughly investigated. Furthermore, I find water is available for appropriation and the appropriation as recommended is a beneficial use and will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER a superseding certificate be issued under Water Right Number G2-01087, subject to existing rights and indicated provisions, to allow appropriation of public water for the amount and uses specified in the foregoing report.

Signed at Olympia, Washington, this 22nd day of March, 2006.

Thomas Loranger

Thomas Loranger
Water Resources Section Manager
Southwest Regional Office

'06 FEB -6 10:38

AFFIDAVIT OF PUBLICATION

State of Washington, County of Pierce, ss: Judith A. East, being duly sworn on oath depose and say that they are publishers or publishers' authorized representatives of The Dispatch, a weekly newspaper. That said newspaper is a legal newspaper and it is now and has been for more than six months prior to the date of publication herein-after referred to, published in the English language continually as a weekly newspaper, in Eatonville, Pierce County, Washington, and is now and during all of said time was printed in an office maintained at the aforesaid place of said newspaper. That the annexed is a true copy of this legal advertisement as it was published in regular issues (not in supplement form) of said newspaper for 2 consecutive weeks. First publication was on the 25th day of Jan, 2006 and last publication was on the 1st day of Feb, 2006 and that such newspaper was regularly distributed to its subscribers during all of said periods.

Judith A East

Signature of Judith A. East

Subscribed and sworn to before me this 2nd day of Feb, 2006.

Michele K. Stoney

Notary public in and for the State of Washington, residing in Pierce County.
Michele K. Stoney
Commission Expires September 11, 2005

MICHELE K. STONEY
COMMISSION EXPIRES
NOTARY
PUBLIC
9-11-09
STATE OF WASHINGTON

State of Washington
DEPT. OF ECOLOGY
Notice of Application to add additional points of withdrawal to existing water rights

Take Notice: That Town of Eatonville has filed two applications to add additional points of withdrawal to existing water rights granted under Ground Water Certificates No. G2-01087C and 5676. Certificate No. G2-01087C was issued in the amount of 250 gpm, 400 acre-feet per year from 4 wells (2,4,5 & 6) located within the NE 1/4 NE 1/4 Section 23 T. 16 N., R. 4 E.W.M. Certificate No. 5676 was issued in the amount of 360 gpm, 394 acre-feet per year from 2 wells (1 & 7) located within the NE 1/4 NE 1/4 Section 23, T. 16 N., R. 4 E.W. M. Pierce Co. for the purpose of municipal supply.

Purpose of Applications: the Town has recently developed the new wells to increase the reliability of it's groundwater supply & to allow increased flexibility in the operation of all the wells.

Certificate No. G2-01087C -- request to add additional points of withdrawal (Wells 1, 2, 6 & 7) located within the NE Â1/4 NE 1/4 Section 23 T. 16 N., R. 4 E.W.M. Certificate No.5676' request to add additional points of withdrawal (Wells 1,2, 6 & 7) located within the NE 1/4 NE 1/4 Section 23 T. 16 N., R. 4 E.W.M. No other changes will be made to the certificates.

Protests or objections to approval of this application must include a detailed statement of the basis of objections and are subject to public disclosure. Protests must be accompanied by a $50.00 fee & filed with the Dept. of Ecology, at P.O. Box 47775 Olympia, WA 98504-7775 within (30) days.

Published January 25 and February 1, 2006
THE DISPATCH

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

April 20, 2004

Jamieson Van Eaton
Town of Eatonville
PO Box 309
Eatonville, WA 98328

Dear Mr. Van Eaton:

Re: Showing of Compliance – Additional Well for Town of Eatonville (Water Right Certificate G2-01087C)

This letter is to confirm that we've received your *Showing of Compliance with RCW 90.44.100(3)*. It is our understanding that you have constructed an additional well under the authorization of Ground Water Certificate G2-01087C. The new well will be designated Well 6. You have asserted that the additional well complies with the provisions of the rule.

Your notarized statement will be made a part of the permanent water right record associated with the certificate. No further action is needed on your part.

Sincerely,

Jill Walsh
Water Resources Program
Southwest Regional Office

JW:th

Cc: John Ryding, Department of Health, Northwest Drinking Water Operations
Michael Klisch, Golder Associates

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DEPARTMENT OF ECOLOGY

Showing of Compliance with RCW 90.44.100(3)

Water Right Certificate or Permit Number: G2-01087C

Parcel tax identification number: Pierce County 0416231021

Landowner(s) name: Town of Eatonville

Part of complying with RCW 90.44.100(3) is for the project proponent to notify the Department of Ecology (Ecology) that the statutory criteria of RCW 90.44.100(3) have been satisfied. Please attach to this document the water well report for the additional or replacement well and any additional information you have to support your affidavit.

Affidavit:

I, Jamieson Van Eaton, do certify that I caused the well described in the attached water well report to be drilled as an additional ~~or replacement~~ well(s) for use under Water Right Number G2-01087C. This notice and attached documents describe and support my assertion that the ~~replacement or~~ additional well(s) complies with RCW 90.44.100(3) (a-g) and RCW 90.44.100(4):

a. The well is an additional ~~or replacement~~ well(s) that will tap the same body of public ground water as the original well;
b. If a replacement well is constructed, the use of the original well(s) shall be discontinued and the original well(s) shall be properly decommissioned;
c. The combined withdrawal of water from the additional ~~or replacement~~ well(s) and the original well authorized by the water right certificate does not enlarge the water right conveyed by the original water right certificate to the extent the certificate has been developed (perfected) and maintained by use of water;
d. The construction and use of the additional ~~or replacement~~ well(s) does not interfere with or impair water rights with an earlier priority date;
e. The additional ~~or replacement~~ well(s) is located no closer than the original well to a well or surface water body it might interfere with;
f. A specified manner of construction for the additional ~~or replacement~~ well(s) has been complied with, if required, and the new well was constructed in compliance with chapter 18.104 RCW and chapter 173-160 WAC;
g. The additional ~~or replacement~~ well(s) is located within the area described as the point of withdrawal in the public notice published for the original application for water right, or the most current legal description published for the right. Both the original well and the additional or replacement well(s) are located in NE ¼ NE ¼ Sec 23, T16N, R4E WM (legal description).

Therefore the well is in compliance with the requirements for a statutorily granted amendment to the water right permit or certificate.

I understand the acceptance of this affidavit, and any attachments, by the Department of Ecology shall not be construed as affirming the validity of any water right permit or certificate. The responsibility to comply with RCW 90.44.100(3) is with the water right permit or certificate holder asserting an amendment pursuant to RCW 90.44.100(3).

Jamieson Van Eaton — 4/2/04

Name — Date

Acknowledgement:

State of Washington
County of Pierce

I certify that I know or have satisfactory evidence that Jamieson Van Eaton *is the person who appeared before me, and said person acknowledged that (he/she) signed this affidavit and acknowledged it to be (his/her) free and voluntary act for the uses and purposes mentioned in the affidavit.*

Dated: 4-2-04

JACQUELINE L. LITTRELL
COMMISSION EXPIRES
NOTARY
PUBLIC
JUNE 3, 2006
STATE OF WASHINGTON

Jacqueline L Littrell
(Signature)
Jacqueline L Littrell
Residing in
Cataroville
Title Notary
My appointment expires : 6-3-06

If you have any questions please contact the Water Resources Section of the closest regional office. Please submit copies of new well logs and decommissioned well logs along with this completed and notarized form to the nearest regional office.

Northwest Regional Office
3190 – 160th Avenue SE
Bellevue, WA 98008-5452
(425) 649-7000; TDD (425) 649-4259

Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775
(360) 407-6300; TDD (360) 407-6306

Eastern Regional Office
N. 4601 Monroe, Suite 202
Spokane, WA 99205-1295
(509) 456-2926; TDD (509) 458-2055

Central Regional Office
15 W. Yakima Ave., Suite 200
Yakima, WA 98902-3452
(509) 575-2597; TDD (509) 454-7673

Vancouver Field Office
2108 Grand Boulevard
Vancouver, WA 98661-4622
(360) 690-7171; TDD (360) 690-7147

Nooksack Field Office
1204 Railroad Ave., Suite 200
Bellingham, WA 98225
(360) 738-6250; TDD (425) 649-4259

Please print, sign and return to the Department of Ecology

Water Well Report

Original – Ecology, 1st copy – owner, 2nd copy – driller

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Construction/Decommission

☑ Construction

☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Current Notice of Intent No. WE01620

Unique Ecology Well ID Tag No. AHG 991

Water Right Permit No. _____

Property Owner Name Town of Eatonville

Well Street Address 401xx Weyerhauser Road South

City Eatonville County Pierce

Location NE 1/4-1/4 NE 1/4 Sec 23 Twn 16 R 4E EWM ☑ or WWM ☐ circle one

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. 0416231011

PROPOSED USE: ☑ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

TYPE OF WORK: Owner's number of well (if more than one) _____

☑ New well ☐ Reconditioned ☐ Deepened

Method: ☐ Dug ☐ Bored ☐ Driven ☐ Cable ☑ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 12 inches, drilled 73.5 ft.

Depth of completed well 73.5 ft.

CONSTRUCTION DETAILS

Casing Installed: ☑ Welded 12 " Diam. from +2 ft. to 68 ft.

☐ Liner installed _____ " Diam. from _____ ft. to _____ ft.

☐ Threaded _____ " Diam. from _____ ft. to _____ ft.

Perforations: ☐ Yes ☑ No

Type of perforator used _____

SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No ☑ K-Pac Location 55.4

Manufacturer's Name Johnson

Type V. Wire Model No. _____

Diam. 11 Slot size 0.090 from 59.5 ft. to 69.5 ft.

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: ☐ Yes ☐ No ☐ Size of gravel/sand _____

Materials placed from _____ ft. to _____ ft.

Surface Seal: ☑ Yes ☐ No To what depth? 18 ft.

Material used in seal Bentonite Chips

Did any strata contain unusable water? ☐ Yes ☑ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

PUMP: Manufacturer's Name _____

Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.

Static level 19.4 ft. below top of well Date 01/20

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☑ Yes ☐ No If yes, by whom? T.P.D.

Yield: 230 gal./min. with 25 ft. drawdown after 72 hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

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.

Airtest W/A gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water _____ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Loose brown silty cobbles with gravel.	0	9
Brown silty gravel with cobbles.	9	20
Moist brown rusty colored silty sandy gravel with cobbles.	20	40
Dark yellowish brown silty medium sand with fine gravel.	40	58
Light brown silty medium sand with gravel.	58	71.5
Dense dark gray with black basalt.	71.5	73.5
Screen Assembly:		
K-packer	55.4	56.1
10" riser	56.1	59.5
11" x 0.090 screen	59.5	69.5
10" sump	69.5	73.5
Notes: Drilling started 11/24/03		
Drilling completed 11/24/03		
03-1022-11		

COPY

Start Date 11/24/03 Completed Date 1/20/04

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Driller/Engineer/Trainee Name (Print) Matthew Call

Driller/Engineer/Trainee Signature _____

Driller or trainee License No. 2571

Drilling Company Tacoma Pump & Drilling Co., Inc.

Address 30316 Mountain Highway

City, State, Zip Graham, WA 98338

Contractor's Registration No. TACOMPD203PF Date 1/26/04

If TRAINEE,

Driller's Licensed No. _____

Driller's Signature _____

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 2/03)

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
August 18, 1967	8915	8355	G 2-01087 C

NAME
TOWN OF EATONVILLE

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
PO Box 309	Eatonville	Washington	98328

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.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
three wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	250	400

QUANTITY, TYPE OF USE, PERIOD OF USE		
400 acre-feet per year	municipal supply	continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
(2) 1135 feet south and 1000 feet east (4) 950 feet south and 950 feet east (5) 850 feet south and 200 feet east ALL from the Northeast corner of Section 23.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼NE¼	23	16	4 E	11	Pierce

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Town of Eatonville and local areas served by Town of Eatonville.

PROVISIONS

This certificate is issued as a supplemental supply to the existing rights, the total annual withdrawal shall not exceed 400 acre-feet, less any amount diverted or withdrawn under existing rights.

Said wells shall be constructed with a water tight casing down through and sealed into an impervious layer that will insure a break in hydraulic continuity with the surface waters of Mashell River.

As provided under RCW 43.21.130, 90.03.360, 90.44.250 and 90.44.020, a master meter shall be installed in this system to measure the total amount of this withdrawal.

The access port as required on your permit shall be maintained at all times.

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 Olympia *Washington, this* 16th *day of* March, *1979*

WILBUR G. HALLAUER, DIRECTOR
Department of Ecology

ENGINEERING DATA
OK P
NOES

by E.W. Asselstine
E.W. ASSELSTINE, Regional Manager

FOR COUNTY USE ONLY

S. F. No. 7354—OS—6-67.

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

Permit to Appropriate Public Ground Waters of the State of Washington

Book No. 17 of Ground Water Permits, on page 8355 under Application No. 8915

TOWN OF EATONVILLE

of Eatonville, Washington

is hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights, and to the limitations and provisions set out herein.

Priority date of this permit is August 18, 1967

Source of the proposed ground water appropriation is three (3) wells

within _____ area, _____ sub-area

_____ zone. Name or number of works is _____

Quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed ~~1000~~ 250 gallons per minute; ~~325~~ 400 acre-feet per year, to be used for the following purposes: municipal supply

as more definitely set out below. 2. 1135'S & 1000'W; 4 950'S & 950'E; 5 850'S & 900'E } of NE Corner of Sec 23

Location of the well, tunnel, or infiltration trench is (1) 1135 feet south and 1000 feet west; (2) ~~1205~~ 66 feet south and ~~895~~ 165 feet west; and (3) ~~1055~~ 1244 feet south and ~~875~~ 189 feet west; all from the northeast corner of Sec. 23 being within ~~NW¼NE¼~~ of Sec. 23, T. 16 N., R. 4 E.W.M.

county of Pierce

Use, or uses to which water is to be applied:

For municipal supply: ~~1000~~ 250 gallons per minute; ~~325~~ 400 acre-feet per year, to supply Town of Eatonville continuously each year

For irrigation: _____ gallons per minute; _____ acre-feet per year, for the irrigation of _____ acres.

For miscellaneous uses: _____ gallons per minute; _____ acre-feet per year, for _____

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Town of Eatonville and local areas served by Town of Eatonville

DESCRIPTION OF WORKS FROM WHICH WATER IS TO BE WITHDRAWN

The well will be drilled and have a diameter of 12 inches, and depth of 40 feet.
(Dug or drilled)

Description of tunnel or infiltration trench:

Please read carefully provisions below)

Particular specifications required by the Department of Water Resources for the purpose of preventing waste of public waters: 1) The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final Certificate of Water Right. 2) This permit is issued as a supplemental supply to the existing rights, the total annual withdrawal shall not exceed 525 acre-feet, less any amount diverted or withdrawn under existing rights. 3) Said wells shall be constructed with a water tight casing down through and sealed into an impervious layer that will insure a break in hydraulic continuity with the surface waters of Hamilt River. 4) As provided under RCW 43.21.130, 90.03.360, 90.44.250 and 90.44.020, a water meter shall be installed in this system to measure the total amount of this withdrawal.

Construction work shall begin on or before September 1, 1972

and shall thereafter be prosecuted with reasonable diligence and completed on or before 9-1-77 9-1-76 September 1, 1973 9-1-74 9-1-75

and complete application of water to proposed use shall be made on or before September 1, 1974 9-1-78

Given under my hand and the seal of this office at Olympia, Washington, this 23rd day of February, 1968

Glen H. Fiedler
Assistant Director
Division of Water Management
Department of Water Resources

Report of Examination on Ground Water

Received date August 18, 1967 Date of exam. November 3, 1967 Appli. No. 8915

Name Town of Eatonville Address Town Hall, Eatonville, Washington

Type of works three wells Dimensions 12" x 40'

Progress of works Not started

Quantity applied for 1000 g.p.m. acre-feet per year

Legal sub. NE¼NE¼ Sec. 23 Twp. 16 N. Rge. 4 E. County Pierce

Use Municipal supply

Irrigation-acreage: Present Planned Feasible

Municipal: Population 1200 as of 1985

Industrial

Time pump will be operated Continuously

Other water rights appurtenant to this land G. W. Cert. No. 5676; concurrent S. W. Appli. No. 20449; claim of vested rights from the Mashell River

Proximity to existing works, springs, wells, or streams Well #2 100± from Mashell River - Elev. 10' above river. Well #3 100± from Mashell River - Elev. 10' above river. Well #4 200± from Mashell River - Elev. 12' above river. All three proposed wells will be within 250' of Well #1 (G. W. Cert. No. 5676).

Area Sub-area Zone

RECOMMENDATIONS

Approved for 1000 g.p.m. 525 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final Certificate of Water Right. The applicant may, for his own convenience, wish to install an air-line and gage in addition to the access port.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the State Director of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Department of Health, 304 Public Health Building, Olympia, with regard to the need for compliance.

At present the Town of Eatonville uses an average of 350,000 gallons per day serving 900 people. This amounts to an average per capita consumption of 390 gallons per day which is well above average for a town of this size in Western Washington. There are no individual meters and undoubtedly some of the waters are not utilized to their maximum. At 390 gallons per capita/day, the annual need would be 525 acre-feet for the projected

(over)

population of 1200 by 1985. It is noted that municipal supply includes industrial use.

Applicants claim vested rights from the Mashell River for their present usage by virtue of continued use since prior to 1917. Applicants have Ground Water Certificate No. 5676 for 360 gallons per minute, 394 acre-feet per year, as a supplemental supply to the claim of vested rights. Applicants also have Surface Water Application No. 20449 which has been approved for 394 acre-feet per year supplemental to existing rights and 131 acre-feet per year as primary rights, giving applicants rights totaling 525 acre-feet per year. Therefore, permit will issue under this application as follows: "Issued as a supplemental supply to the existing rights, the total annual withdrawal shall not exceed 525 acre-feet, less any amount diverted or withdrawn under existing rights."

Data from well #1 (Certificate 5676), which is in the same area, indicates there probably would not be any hydraulic continuity between the proposed wells and Mashell River. However, in the event hydraulic continuity does exist, the following provision would be applicable: "Said wells shall be constructed with a water tight casing down through and sealed into an impervious layer that will insure a break in hydraulic continuity with the surface waters of Mashell River."

As provided under RCW 43.21.130, 90.03.360, 90.44.250 and 90.44.020, a master meter shall be installed in this system to measure the total amount of the withdrawal.

Signed at Olympia, Washington
this 16 day of January, 1968

Dean Wood

DEAN WOOD, Water Resources Inspector
Division of Water Management

Surface Water Certificate 10307

S.F. No. [illegible]—OB—1-67.

CERTIFICATE RECORD No. 21, PAGE No. 10307

STATE OF WASHINGTON, COUNTY OF Pierce

CERTIFICATE OF SURFACE WATER RIGHT

(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 Water Resources thereunder.)

This is to certify that TOWN OF EATONVILLE

of Eatonville, *State of* Washington, *has made proof to the satisfaction of the Department of Water Resources of Washington, of a right to the use of the waters of* Mashell River, *a tributary of* Nisqually River *with point or points of diversion within the* SW¼NW¼ *Sec.* 23, *Twp.* 16 *N., R.* 4 E., *W. M., under and subject to provisions contained in* appropriation *Permit No.* 15100 *issued by the Department of Water Resources, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Water Resources of Washington and entered of record in Volume* 21, *at Page* 10307, *on the* 24th *day of* April 1968 *that the priority date of the right hereby confirmed is* August 18, 1967, *that the amount of water under the right hereby confirmed, for the following purposes is limited to an amount actually beneficially used and shall not exceed* 2.3 cubic feet per second, 325 acre-feet per year during entire year to supply the town of Eatonville with a projected population of 1200 by 1985

A description of the lands under such right to which the water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

Town of Eatonville and local areas served by the Town of Eatonville

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 Sections 6 and 7, Chapter 122, Laws of 1929.

This certificate of surface water right is specifically subject to relinquishment for nonuse of water as provided in Section 18, Chapter 233, Laws of 1967.

WITNESS the seal and signature of the Assistant Director, Division of Water Management, Department of Water Resources affixed this 24th *day of* April, 19 68

Glen H. Lindley

Assistant Director
Division of Water Management
Department of Water Resources

Form 10. S.F. No. 370—OE—6-67.

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
Division of Water Management

Permit to Appropriate Public Waters of the State of Washington

Book No. 38 of Permits, on Page 15100 Under Application No. 20649

TOWN OF EATONVILLE

of Eatonville, Washington

is hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the following limitations and provisions: Permittee shall construct and maintain at his own expense a weir, or other suitable device, for measuring any water granted herein for irrigation purposes and such appropriation shall be subject to a reasonable rotation system if ordered by the Department of Water Resources. 1) Diversion intake shall be tightly screened at all times with wire mesh having openings with dimensions not greater than .125 (1/8) inch; 2) Any dam constructed must have approved fish passage facilities. 3) Issued as a primary right for 131 acre-feet per year, and as a supplemental right for 394 acre-feet per year, the total annual diversion shall not exceed 525 acre-feet, less any amount diverted or withdrawn under existing rights. 4) A master meter shall be installed in this system to measure the total amount of the diversion.

Priority date of this permit is August 18, 1967

Source of the proposed appropriation is Mashall River

tributary of Nisqually River

The quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 2.3 cubic feet per second, or its equivalent in case of rotation, to be used for the following purposes: Municipal supply

as more definitely set out below.

The approximate point of diversion is located 1250 feet south and 1000 feet west from the northeast corner of Sec. 23

being within SW¼NE¼ Sec. 23, Twp. 16 N., Rge. 4 E. W. M.,

county of Pierce

The use, or uses, to which water is to be applied:

For Domestic Supply and Miscellaneous Uses: ..... cubic feet per second during entire year for ..... to be used within ..... Sec. ....., Twp. ..... N., Rge. ..... W. M.,

For Irrigation: ..... cubic feet per second, ... acre-feet per year, from ..... to ..... each year, for irrigation of ..... acres, described as follows:

For Power: ..... cubic feet per second continuously each year. Total power to be developed ..... theoretical horse power. Total fall to be utilized ..... feet.

Nature of works by means of which power is to be developed .....

Works to be located in ..... Sec. ....., Twp. ..... N., Rge. ..... W. M.

Water to be returned to .....

Point of return ..... Sec. ....., Twp. ..... N., Rge. ..... W. M.

Use to which power is to be applied .....

For Municipal Supply: 1.3 cubic feet per second/525 acre-feet during entire year to supply the town of Katonville with a projected population of 1200 by 1985, and local areas served by the Town of Katonville.

DESCRIPTION OF DIVERSION WORK

Height of dam ..... ft.; Length on top ..... ft.; Length on bottom ..... ft.

Material to be used and character of construction .....

Description of headgate .....

CANAL SYSTEM

At Headgate: Width on top (at water line) ..... ft.; Width on bottom ..... ft.;

Depth of water ..... ft.; Grade ..... ft. fall per one thousand feet.

At ..... Miles From Headgate: Width on top (at water line) ..... ft.; Width on bottom ..... ft.; Depth of water ..... ft.; Grade ..... feet per one thousand feet.

(Please read carefully provisions below)

Construction work shall begin on or before Started

and shall thereafter be prosecuted with reasonable diligence and completed on or before Completed

and complete application of water to proposed uses shall be made on or before March 1, 1969

Given under my hand and the seal of this office at Olympia, Washington, this 26th day of February, 19 68

Glen H. Fields

Assistant Director
Division of Water Management
Department of Water Resources

REPORT OF EXAMINATION

Date of application August 18, 1967 Date of examination November 3, 1967 Application No. 20449

Name Town of Eatonville Address Town Hall, Eatonville, Washington

Quantity applied for 2.3 c.f.s. Use Municipal supply

Source of appropriation Nashell River Tributary of Nisqually River

Legal sub. NE¼NW¼ Sec. 23 Twp. 16 N. Rge. 4 E. County Pierce

Measured or estimated quantity See below Probable low flow See below

Quantity previously appropriated: W.T. See records CWT. E.T.

Other use made of water Domestic, irrigation, fish propagation, recreation

Diversion works ~~contemplated or~~ observed Ditch from river to timber control structure, 24" diameter outlet pipe, ditch to distribution system

Other equipment Filtering and chlorinating facilities

Irrigable acreage: Planned Present Feasible

Other water rights appurtenant to this land Ground Water Certificate No. 5676 and concurrent Ground Water Application No. 8915. Claim of vested rights from the Nashell River.

Progress of project Complete

Protests None

Quantity recommended (total) 2.3 c.f.s., 525 acre-feet per year Irrig. Dom.

Power Municipal 2.3 c.f.s., 525 acre-feet per year Other uses

Department of Fisheries and Game report See below

Special remarks and provisions:

In accordance with the recommendations of the Departments of Fisheries and Game, the permit shall be issued subject to the provisions that: 1) Diversion intake shall be tightly screened at all times with wire mesh having openings with dimensions not greater than .125 (1/8) inch; 2) A hydraulic approval will be required from the Departments of Fisheries and Game (Fisheries Code 75.20.100) prior to commencing work; and 3) Any dam constructed must have approved fish passage facilities.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the State Director of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Department of Health, 304 Public Health Building, Olympia, with regard to the need for compliance.

At present the Town of Eatonville uses an average of 350,000 gallons per day serving 900 people. This amounts to an average per capita consumption of 390 gallons per day which is well above average for a town of this size in Western Washington. There are no individual meters and

(over)

undoubtedly some of the waters are not utilized to their maximum. At 390 gallons per capita per day, the annual need would be 525 acre-feet for the projected population of 1200 by 1985. It is noted that municipal supply includes industrial use.

Applicants claim vested rights from the Mashell River for their present usage by virtue of continued use since prior to 1917. Applicants also have Ground Water Certificate No. 5676 for 360 gallons per minute, 394 acre-feet per year as a supplemental supply to the claim of vested rights. Therefore, permit will issue as follows: "Issued as a primary right for 131 acre-feet per year, and as a supplemental right for 394 acre-feet per year, the total annual diversion shall not exceed 525 acre-feet, less any amount diverted or withdrawn under existing rights."

Extreme recorded flows of the Mashell River at the gaging station approximately 2 miles downstream from applicants' point of diversion are as follows:

Maximum	- 7980.0 cubic feet per second	-	December 11, 1946
Minimum	- 4.5 cubic feet per second	-	September 24, 1952

As provided under RCW 43.21.130 and 90.03.360, a master meter shall be installed in this system to measure the total amount of the diversion.

In accordance with Section 90.03.290 RCW, I find that there is water available for appropriation from the source in question and that the diversion proposed in the application will not impair existing rights or be detrimental to the public welfare. Therefore, permit should issue as recommended above, subject to existing rights and indicated provisions.

Signed at Olympia, Washington
this 16 day of January, 1968

Dean Wood

DEAN WOOD, Water Resources Inspector
Division of Water Management

Surface Water Claim
S2-004455CL

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

WATER RIGHT CLAIM

RECEIVED
DEPARTMENT OF ECOLOGY
JUN -3 71 005889

CASH ___ OTHER ✓ NONE ___

1. NAME TOWN OF EATONVILLE
ADDRESS TOWN HALL EATONVILLE
WASHINGTON ZIP CODE 98328

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED: SURFACE (SURFACE OR GROUND WATER)
W.R.I.A. 11 (LEAVE BLANK)

A. IF GROUND WATER, THE SOURCE IS ___
B. IF SURFACE WATER, THE SOURCE IS MASHELL RIVER

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:
A. QUANTITY OF WATER CLAIMED 4.0 C.F.S. (CUBIC FEET PER SECOND OR GALLONS PER MINUTE) PRESENTLY USED 2.3
B. ANNUAL QUANTITY CLAIMED 1000 (ACRE FEET PER YEAR) PRESENTLY USED 588
C. IF FOR IRRIGATION, ACRES CLAIMED ___ PRESENTLY IRRIGATED ___
D. TIME(S) DURING EACH YEAR WHEN WATER IS USED: ALL YEAR

4. DATE OF FIRST PUTTING WATER TO USE: MONTH June YEAR 1908

5. LOCATION OF THE POINT(S) OF DIVERSION/WITHDRAWAL: 1250 FEET SOUTH AND 1000 FEET WEST FROM THE NORTHEAST CORNER OF SECTION 23
BEING WITHIN SW¼NE¼NE¼ OF SECTION 23 T. 16 N. ___ R. 4 E (E. OR W.) W.M.
IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT ___ BLOCK ___ OF ___
(GIVE NAME OF PLAT OR ADDITION)

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED: THE TOWN OF EATONVILLE AND ADJACENT SERVICE AREA
COUNTY PIERCE

7. PURPOSE(S) FOR WHICH WATER IS USED: MUNICIPAL SUPPLY

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED: PRIOR APPROPRIATION

DO NOT USE THIS SPACE
THE FILING OF A STATEMENT OF CLAIM DOES NOT CONSTITUTE AN ADJUDICATION OF ANY CLAIM TO THE RIGHT TO USE OF WATERS AS BETWEEN THE WATER USE CLAIMANT AND THE STATE OR AS BETWEEN ONE OR MORE WATER USE CLAIMANTS AND ANOTHER OR OTHERS. THIS ACKNOWLEDGEMENT CONSTITUTES RECEIPT FOR THE FILING FEE.
DATE RETURNED REGISTRY NUMBER
JUN -3 71 004455 < THIS HAS BEEN ASSIGNED WATER RIGHT CLAIM REGISTRY NO.
John H. Fiddes
ASSISTANT DIRECTOR, DIVISION OF WATER MANAGEMENT, DEPARTMENT OF WATER RESOURCES

I HEREBY SWEAR THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.
X Patrick J. Byrne
DATE May 7, 1971
IF CLAIM FILED BY DESIGNATED REPRESENTATIVE, PRINT OR TYPE FULL NAME AND MAILING ADDRESS OF AGENT BELOW
PATRICK J. BYRNE & ASSOC.
610 SO. COLUMBIA
OLYMPIA WASHINGTON
☐ ADDITIONAL INFORMATION RELATING TO WATER QUALITY AND/OR WELL CONSTRUCTION IS AVAILABLE

A FEE OF $7.00 MUST ACCOMPANY THIS WATER RIGHT CLAIM

RETURN ALL THREE COPIES WITH CARBONS INTACT ALONG WITH YOUR FEE TO
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT
UNION AVE. BUILDING, OLYMPIA, WASHINGTON 98501

ORIGINAL
DWR

APPENDIX K

Water Quality Monitoring Plan

Water Quality Monitoring Plan

INTRODUCTION

This Water Quality Monitoring Plan presents the requirements for monitoring water quality at the sources and in the distribution system in accordance with the drinking water regulations contained in *WAC 246-290-300*. This plan also provides a summary of the existing water system facilities and system operation.

Existing Water System Description

Water System Information

The Town of Eatonville (Town) is a municipal corporation that owns and operates a public water system within its water service area. Water system data on file at the Department of Health (DOH) for the Town's system is as follows.

Information Type	Description
System Type	Group A - Community - Public Water System
System Names	Eatonville Water Department
County	Pierce
DOH System ID Number	22300K
Owner Number	1666
Address	201 Center Street West, PO Box 309, Eatonville, WA 98328
Contact	Mr. Mike Tiller, Water Superintendent
Contact Phone Number	(360) 832-6110

Water System Operation and Control

The Town's sources of supply feed into the Town's water treatment plant and the treated water is routed to the Town's clear wells. Level monitoring equipment in the clear wells sends a signal to the Town's master telemetry unit to call the sources of supply on. When the level in the clear wells is low, Well Nos. 2 and 7 or Well Nos. 1 and 6 are turned on simultaneously. The Mashel River source is only used when turbidity levels are acceptable and the Town is experiencing high summer demand levels. The turbidity meters in the treatment plant read the turbidity of the raw water. When the turbidity level is higher than approximately 50 Nephelometric Turbidity Units (NTU), a motorized valve actuator on the river inlet is closed and water is diverted.

The Main Booster Pump Station (BPS) pumps water from the clear wells to the 996 Zone Reservoir. When the level of the 996 Zone Reservoir drops, a signal is sent to the BPS to start the pumps. The 996 Zone is served by the 996 Zone Reservoir and the pumps at the Main BPS turn off when the reservoir is full.

In a similar manner, the Center Street BPS is controlled by the level in the 1050 Zone Reservoir and the Hilltop BPS is controlled by the level in the Hilltop Reservoir. The pumps are turned on when the level in the controlling reservoir is drawn down, and the pumps are turned off when the controlling reservoir is full.

The four pressure reducing stations between the 1050 Zone and 996 Zone are not normally supplying water, but are set to supply water to the 996 Zone upon a suppressed level in the 996 Zone Reservoir or during a localized drop in pressure, such as during a fire flow situation.

The two pressure reducing stations between the 1077 Zone and the 996 Zone are each equipped with a large pressure reducing valve (PRV) that operates during suppressed levels in the 996 Zone Reservoir, or drops in pressure. Each of the pressure reducing stations between the 1077 Zone and the 996 Zone is also equipped with a small PRV that normally supplies water to the 996 Zone to facilitate turnover in the Hilltop Reservoir.

Pressure Zones

A list of the Town's existing pressure zones and their respective maximum hydraulic elevations is presented in **Table 1**. The table also shows the estimated connections and population in each pressure zone in 2011, based on a review of 2011 water supply data.

Table 1
Pressure Zones

Zone Name	Maximum Hydraulic Elevation	Water Demand Allocation	Estimated Connections	Estimated Population
996	996 feet	84.9%	879	2,472
1050	1,050 feet	10.7%	111	312
1077	1,077 feet	4.4%	45	127
Totals			1,036	2,912

Water Sources

A list of the Town's existing water sources is presented below in **Table 2**. All of the supply sources supply the Main BPS, which pumps into the 996 Zone.

Table 2
Water Sources

Source	Pressure Zone	Year Drilled	Existing Capacity (gpm)	Well Depth (feet)	Well Diameter (inches)	Pump Type	Pump Motor Size (hp)	Water Treatment[1]	Control Facility
Mashel River	996 Zone	n/a	400	n/a	n/a	n/a	n/a	MF/Cl_2/NaOH	Clear Wells
Well No. 1	996 Zone	1966	210	43	12	Submersible	5	MF/Cl2/NaOH	Clear Wells
Well No. 2	996 Zone	1969	220	44	10	Submersible	5	MF/Cl2/NaOH	Clear Wells
Well No. 6	996 Zone	2004	200	73.5	12	Submersible	7.5	MF/Cl2/NaOH	Clear Wells
Well No. 7	996 Zone	2004	325	99	12	Submersible	15	MF/Cl2/NaOH	Clear Wells

1 = MF: membrane filtration; Cl_2: chlorination; NaOH: caustic soda for pH

Water Storage

A list of the Town's existing water storage facilities is presented below in **Table 3**.

Table 3
Water Storage

Reservoir Name	Pressure Zone	Year Constructed	Material	Capacity (MG)	Diameter (feet)	Base Elevation (feet)	Overflow Elevation (feet)	Overall Height (feet)
996 Zone Reservoir	996 Zone	unknown	Concrete	0.28	40	966.0	996.0	30.0
1050 Zone Reservoir	1050 Zone	unknown	Steel	0.22	30	1,007.8	1,050.0	42.2
Hilltop Reservoir	1077 Zone	2004	Steel	0.50	48	1,040.0	1,077.0	37.0

Pump Stations

The Main BPS pumps water from the sources to the 996 Zone Reservoir. The Center Street BPS supplies the 1050 Zone by pumping water from the 996 Zone. The Hilltop BPS pumps water from the 996 Zone to the 1077 Zone. A summary of the existing BPS's is provided in **Table 4**.

Table 4
Booster Pump Stations

Booster Pump Station	Suction Pressure Zone	Discharge Pressure Zone	Year Constructed	Existing Pumping Capacity (gpm)	Number of Pumps	Pump Type	Pump Motor Size (hp)
Main BPS	Clear Wells	996 Zone	2006	2,250	3	Vertical Turbine	(3) 60
Center St BPS	996 Zone	1050 Zone	unknown	250	3	Centrifugal/Vertical Multi-stage	(2) 5, (1) 3
Hilltop BPS	996 Zone	1077 Zone	unknown	175	2	Centrifugal/Vertical Multi-stage	(1) 5, (1) 7.5

Pressure Reducing Stations

A list of the Town's existing pressure reducing stations is presented below in **Table 4**.

Table 4
Pressure Reducing Stations

Pressure Reducing Station	Upper Zone (From)	Lower Zone (To)	Current Status
Hilligoss Lane	1050	996	Active
Emerald Drive	1050	996	Active
Center Street BPS	1050	996	Active
Ridge Road	1050	996	Active
Lower Hamner Springs	1077	996	Active
Orchard Avenue	1077	996	Active

Water Treatment

The Town utilizes an automated membrane filtration plant for treatment of its water supply sources. The treatment plant was constructed in 2006 and replaced the slow sand filtration plant previously used for water treatment. The Town currently has four active well sources and a surface water source that are treated by the membrane filtration plant. The surface water source flows by gravity and the well sources are pumped to a raw water holding tank at the water treatment plant. The surface water source is monitored for turbidity and the source can be diverted if turbidity levels are high.

Prior to entering the raw water holding basin, the raw water from the wells and surface water source is injected with a coagulant. The coagulant is injected directly from the bulk storage container to the dosing point using a chemical metering pump. After injection of the coagulant, a flash mixing system rapidly mixes the chemical into the water supply prior to entering the raw water holding basin. The raw water basin provides a minimum of 10 minutes of contact time for the coagulant to react with the natural organic material. The basin is equipped with three submersible pumps that pump the raw water from the basin to the membrane filter skids located in the main treatment plant building.

The treatment plant facility is equipped with two 500,000 gallon per day (gpd) filter skids. Each skid contains a small raw water tank, variable speed permeate pump, membrane modules, permeate storage/backwash supply tank, air scrub system, controller, water quality monitoring equipment, and other miscellaneous piping, valves, and instrumentation required for a fully automatic system. The Town has the ability to add a third 500,000 gpd skid in the future for a total plant capacity of 1.5 million gallons per day (MGD).

During filtration, water is drawn through the membrane using the pressure differential developed from the suction of the filtrate pump. Particulate matter greater than 0.1 micrometer (μm) is removed at the surface of the membrane using a barrier filtration mechanism. As particulate matter accumulates on the membrane surface, the treatment system automatically performs a backwash process to remove the accumulated particles. The system also performs automatic cleans periodically with a phosphoric acid clean followed by a sodium hypochlorite clean. Citric acid is also used occasionally in the membrane cleaning process.

The filter water is disinfected utilizing an on-site sodium hypochlorite generation system. The system is capable of generating 24 pounds of chlorine per day. Chemical metering pumps are used to control the injection of chlorine. The pH of the filter water is also adjusted downstream of the filter system. Chemical metering pumps are used to control the amount of caustic soda added to the water for pH adjustment. The pH is adjusted to a level above 7.0, and the normal range is between 7.3 and 7.6. The treated water is routed through a baffled contact time (CT) basin, which is adjacent to the raw water basin, to provide adequate contact time. A chlorine residual analyzer analyzes the chlorine residual at three locations: pump station discharge, pre-CT basin downstream of injection and mixing, and post-CT basin. Approximately 1.0 milligrams per liter (mg/L) free residual is provided.

The treated water is routed to two on-site clear wells with a total storage of approximately 232,000 gallons. A third basin of 116,000 gallons will be available in the future. Water flows by gravity

through the clear wells into the Main BPS, where it is pumped through a transmission main to the 996 Zone.

SOURCE WATER QUALITY MONITORING

The Town is required to perform water quality monitoring at each of the active sources for inorganic chemical and physical substances, organic chemicals, unregulated inorganic and organic chemicals, and radionuclides. The monitoring requirements that the Town must comply with are specified in *WAC 246-290-300*. The Town must comply with the requirements for both surface water and groundwater under the influence of surface water. **Table 5** summarizes the source and distribution water quality monitoring requirements for the next several years. The table is based on information available at the time that this document was prepared and may change in the future.

Monitoring Requirements and Procedures

Inorganic Chemical and Physical – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source (i.e., the river and the well field). Monitoring for primary and secondary inorganic chemical and physical substances, except for nitrate and asbestos, shall be accomplished once for the well sources and the river source within the 2011 to 2019 monitoring period. If a maximum contaminant level (MCL) is exceeded, quarterly sampling is required for at least two quarters.

Monitoring for nitrate shall be accomplished once per year. Monitoring for nitrite shall be accomplished once every three years. The repeat monitoring frequency shall be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 50 percent of the MCL for nitrate or nitrite.

Monitoring for asbestos was required during the first 3-year compliance period of the 9-year compliance cycle which started January 1, 2011. Systems not vulnerable to asbestos contamination at the source or in the distribution system (due to asbestos cement pipe) may apply to the State for a waiver of the monitoring requirements. Since the Town's distribution system contains asbestos cement pipe, asbestos monitoring is required every 9-year compliance cycle. A sample must be taken at a tap served by an asbestos cement pipe where asbestos contamination is most likely to occur. If the MCL is exceeded, quarterly sampling is required for at least two quarters.

Table 5
Monitoring Schedule for 2012-2017

When	Monitor	Monitoring Group	Test Method	Upon Violation
2012				
March	Distribution	Stage 1 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
May	Distribution	Stage 1 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
July	All Active Sources	Herbicides	SOC	Quarterly for 2 Quarters
July	River Source	General Pesticides	SOC	Quarterly for 2 Quarters
July	All Active Sources	Nitrates	NIT	Quarterly for 1 Year
August	10 Homes	Lead and Copper	LCR	(2) - 6 Month Periods
August	Distribution	Stage 1 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
November	Distribution	Stage 1 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
2013				
March	Distribution	Stage 1 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
April	All Active Sources	Radionuclides	RAD	Quarterly
May	Distribution	Stage 1 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
July	All Active Sources	Nitrates	NIT	Quarterly for 1 Year
August	Distribution	Stage 1 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
October	Distribution	Asbestos	ASB	Quarterly for 2 Quarters
November	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
2014				
March	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
April	River Source	Volatile Organic Chemicals	VOC	Quarterly for 2 Quarters
May	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
July	All Active Sources	Nitrates	NIT	Quarterly for 1 Year
August	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
November	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
2015				
March	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
May	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
July	All Active Sources	Herbicides	SOC	Quarterly for 2 Quarters
July	All Active Sources	General Pesticides	SOC	Quarterly for 2 Quarters
July	All Active Sources	Nitrates	NIT	Quarterly for 1 Year
August	10 Homes	Lead and Copper	LCR	(2) - 6 Month Periods
August	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
November	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
2016				
March	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
April	All Active Sources	Radionuclides	RAD	Quarterly
May	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
July	Well Field	Volatile Organic Chemicals	VOC	Quarterly for 2 Quarters
July	All Active Sources	Nitrates	NIT	Quarterly for 1 Year
August	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
November	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
2017				
March	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
April	River Source	Volatile Organic Chemicals	VOC	Quarterly for 2 Quarters
May	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
July	All Active Sources	Nitrates	NIT	Quarterly for 1 Year
August	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters
November	Distribution	Stage 2 DBPs	TTHM & HAA5	Quarterly for 2 Quarters

Volatile Organic Chemicals – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Monitoring for volatile organic chemicals (VOC) shall be accomplished once every 3 years for each compliance period (2011-2013, 2014-2016, etc.) for the Mashel River source. The Town currently has a waiver for VOC testing of the well field through December 2013. If an MCL is exceeded, quarterly sampling is required for at least two quarters. The State may then allow annual monitoring, if the results are satisfactory. After three consecutive annual samples that comply with the MCLs, a waiver for reduced monitoring (once every 3-year compliance period) may then be applied for again.

Synthetic Organic Chemicals – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Monitoring for synthetic organic chemicals (SOC's) such as herbicides and pesticides shall be accomplished once every 3 years for each compliance period (2011-2013, 2014-2016, etc.), if a monitoring waiver is not provided by the State. If an MCL is exceeded, quarterly sampling is required for at least two quarters. The State may then allow annual monitoring, if the results are satisfactory. After three consecutive annual samples that comply with the MCL's, a waiver for reduced monitoring may then be applied for again. The Town currently has waivers through December 2013 which removes the responsibility to monitor for ethylene dibromide (EDB), other soil fumigants, dioxin, endothall, diquat, glyphosphate, and insecticides for all active sources. The well field has a waiver through December 2013 that removes the responsibility to monitor for general pesticides.

Unregulated Inorganic Chemicals – Sulfate is the only unregulated inorganic chemical that must be monitored under the current State regulations. A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Initial monitoring had to be completed prior to December 31, 1995. Monitoring, thereafter, is required at least once every 5 years, unless a waiver is granted by the State. The Town monitors for sulfate at least every 5 years when monitoring is done for regulated inorganic compounds.

Unregulated Volatile Organic Chemicals – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Initial monitoring had to be started no later than January 1, 1991. Monitoring, thereafter, is required at least once every 5 years. The Town monitors for unregulated VOCs when samples for regulated VOCs are taken.

Unregulated Synthetic Organic Chemicals – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Initial monitoring had to be completed prior to December 31, 1995. Monitoring, thereafter, is required at least once every 5 years, unless a waiver is granted by the State. The Town monitors for unregulated synthetic organic chemicals when samples for regulated synthetic organic chemicals are taken.

Radionuclides – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Initial monitoring for gross alpha particle radioactivity, radium-226, and radium-228 required four consecutive quarterly samples. Monitoring, thereafter, requires four consecutive quarterly samples at least once every 48 months. The analysis for radium-226 and radium-228 may be omitted, if the results from the gross alpha particle radioactivity analysis are less than 5 pCi/L. In addition, if the results of the initial analysis are less than half of the established MCL, the required monitoring may be reduced to a single sample collected every 48 months. The

initial radionuclide samples collected in 1998 and 1999 resulted in levels much less than the MCL, if detectable at all, and the Town may now monitor for radionuclides once every 3 years.

DISTRIBUTION SYSTEM WATER QUALITY MONITORING

The Town is required to perform water quality monitoring within the Eatonville distribution system for coliform bacteria, disinfectant (chlorine) residual concentration, lead and copper, and trihalomethanes in accordance with *WAC 246-290*.

Monitoring Requirements and Procedures

Coliform Bacteria Routine Sampling – Specific requirements are contained in *WAC 246-290-300*. A minimum of three distribution samples per month shall be taken from different locations throughout the system, based on the Office of Financial Management estimated population of 2,785 in 2011. The Town is required to obtain three distribution samples and samples shall also be taken from each source when it is in use (i.e., Mashel River and the well field). If a coliform presence is detected in a sample, three repeat samples must be taken. Five samples must be taken the following month. Currently the Town obtains four samples per month to obtain an adequate representation of distribution system. Source samples are also collected each month.

Table 6 lists the locations of the Town's routine sampling sites, including the upstream and downstream sampling locations in the event that repeat sampling is necessary. The sample sites are also shown in **Figure 1** and correspond to the assigned numbers in the table.

A total of four system samples and two source samples are collected each month.

Coliform Bacteria Repeat Sampling – In the event that a sample tests positive for coliform, a repeat sample shall be taken at the same location as the suspect sample, and two additional samples shall be taken within five service connections upstream and downstream of the suspect sample. These repeat samples shall be taken by the end of the next business day after receiving the unsatisfactory results. If the results conclude that a MCL is exceeded (i.e., coliform are present in two or more samples for the month, including repeat samples), the Town shall proceed with public notification in accordance with *WAC 246-290-495*.

Table 6
Coliform Monitoring Sampling Locations

Number	Routine (S) or Repeat (R)	Address	Pressure Zone
1	**S**	249 Mashel Avenue North	996
	R	233 Mashel Avenue North	996
	R	201 Lynch Cheek Road East	996
2	**S**	201 Center Street East	996
	R	205 Center Street East	996
	R	111 Center Street East	996
3	**S**	301 Antonie Avenue North	996
	R	303 Antonie Avenue North	996
	R	221 Antonie Avenue North	996
4	**S**	360 Center Street East	996
	R	388 Center Street East	996
	R	320 Center Street East	996

Disinfectant Residual Concentration – The Town must comply with disinfectant residual concentration requirements for treated surface water and groundwater under the influence of surface water. Disinfection requirements applicable to the Town are contained in *WAC 246-290-662* for filtered systems, which states that a minimum 0.2 mg/L disinfectant residual concentration shall be maintained at the point the water enters the system and that the disinfectant residual concentration in the distribution system is detectable in at least 95 percent of the samples taken each calendar month. The Town's chlorination target is to maintain a residual disinfectant concentration of at least 0.2 mg/L throughout the distribution system. Samples collected and submitted for coliform testing shall also be tested for disinfectant residual concentration to ensure the disinfectant residual meets the regulatory requirements and achieves the target levels set by the Town. Chlorine residual shall also be sampled daily at one location within the distribution system. Chlorine residual sampling results shall be sent to DOH by the 10th of each month.

Lead and Copper – Specific requirements are contained in Title 40, Parts 141.86, 141.87, and 141.88 of the Code of Federal Regulations (CFR). Initial monitoring, beginning in 1993, required 20 samples for each 6-month monitoring period for the Town's population. After two consecutive 6-month monitoring periods of meeting the lead and copper action levels, 10 samples taken during June, July, August, or September were required once per year. After three consecutive years of monitoring and meeting the lead and copper action levels, 10 samples taken during June, July, August, or September are required every 3 years. If the lead and copper action levels are exceeded during the first two consecutive 6-month monitoring periods, the system is required to implement corrosion control treatment. Within 36 months of optimal corrosion control installation, systems of the Town's size are required to monitor for lead and copper during two consecutive monitoring

periods. If the water quality parameters are met during the follow-up monitoring, the system may reduce monitoring to once per year or less frequently as required by the State.

The Town collected 20 samples for each of the two consecutive 6-month monitoring periods during 1993 and 1994. Approximately ten samples were also collected during two consecutive 6-month periods in 1995, and ten samples were taken during 2000 prior to treatment. The results indicated that the 90th percentile concentration of lead from each group of samples exceeded the action level, except for 1993 when the 90th percentile equaled the action level of 0.015 mg/L. The 90th percentile concentration of copper exceeded the action level in all sampling groups. The Town began adding sodium hydroxide to the water in 2000 for corrosion control purposes. Lead and copper monitoring completed in 2001 and 2002 indicates that lead and copper levels were below the action levels at the 90th percentile. Lead and copper monitoring was then completed annually for 3 years after source water treatment was installed, but at a reduced level of 10 homes rather than 20 homes. After the 3 years of annual monitoring, results indicated that the lead and copper action levels had been met, and monitoring requirements were reduced to 10 homes every 3 years.

Sample sites shall be selected based on the known existence of lead pipes, copper pipes, and copper pipes with lead solder in accordance with 40 CFR 141.86(a). All samples, except for lead service line samples, shall be "first draw tap samples" taken at a cold water tap in which water has not been drawn from the tap for at least 6 hours. Lead service line samples shall be collected in one of three ways in accordance with 40 CFR 141.86(b). The locations of future sample sites shall be the same as past sample sites, unless unavoidable conditions prevent sampling at the same locations.

Fluoride Concentration – Specific requirements are contained in *WAC 246-290-460* for systems that are fluoridating drinking water. The Town does not currently fluoridate its water. However, if the Town decides to fluoridate the water supply in the future, the concentration of fluoride shall be maintained in the range of 0.8 through 1.3 mg/L. Determinations of fluoride concentrations shall be made daily, and reports of the analyses shall be submitted to DOH within 10 days of the end of the reporting month. Monthly check samples shall be taken downstream of each fluoride injection point, at the first sample tap where adequate mixing has occurred.

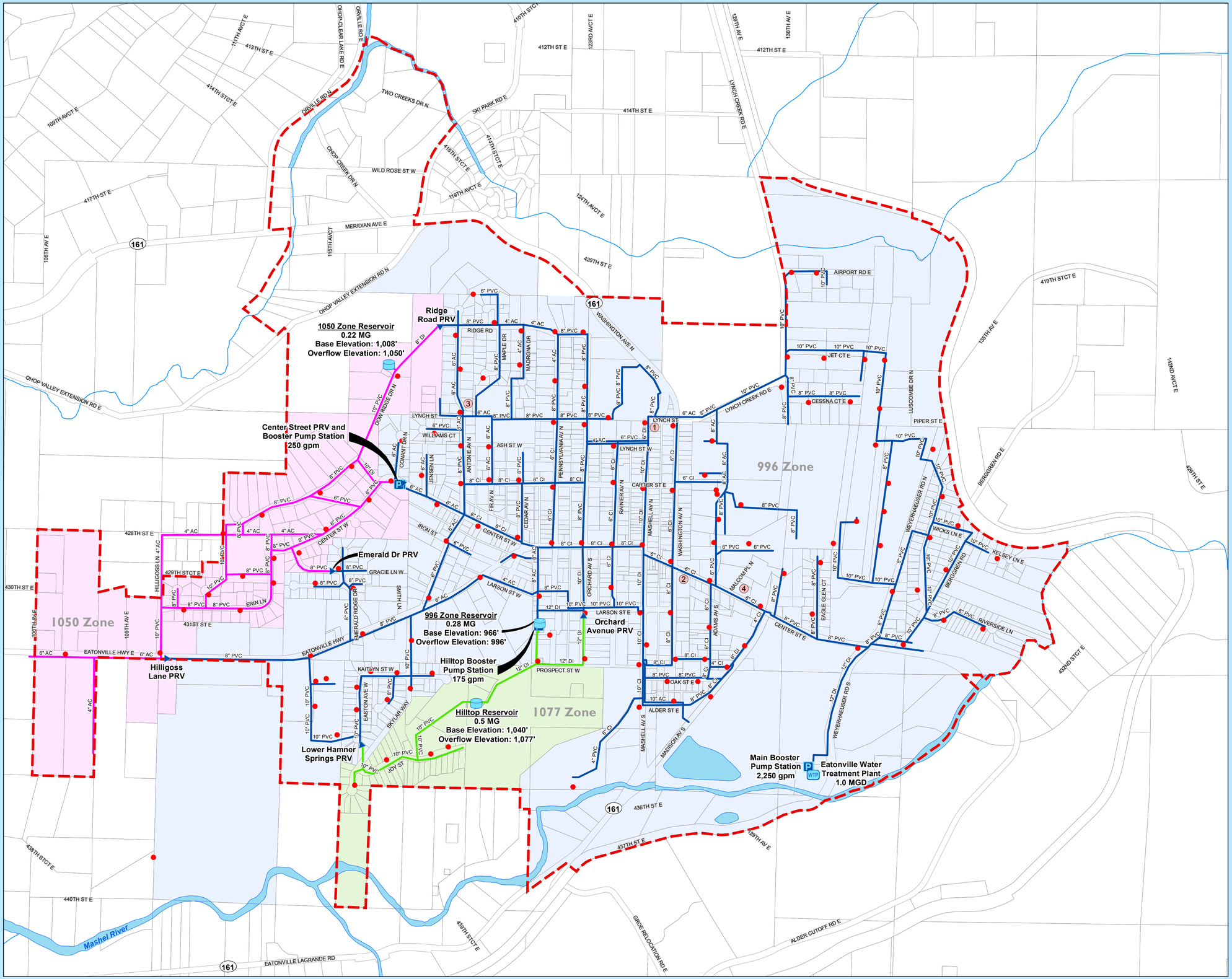
Disinfection Byproducts – Specific requirements are contained in *WAC 246-290-300*. The Stage I Disinfectants and Disinfection Byproducts Rule and the Interim Surface Water Treatment Rule were the first phases in rulemaking as part of the 1996 amendments to the Safe Water Drinking Act. Monitoring requirements for Stage I will be replaced with the implementation of the Stage II Disinfectants and Disinfection Byproducts Rule at the end of 2013 for the Town.

Under the Stage I and Stage II Disinfectants and Disinfection Byproducts Rule, the Town is required to monitor for total trihalomethanes (TTHM) and five haloacetic acids (HAA5) every 3 months. Based on the Town's water service population, two samples are required. The sample locations should be according to the Town's initial distribution system evaluation (IDSE), included as **Appendix O** of this Plan.

Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

FIGURE 1
COLIFORM MONITORING PLAN



Legend

- Coliform Monitoring Site
- Town Limits

Water Infrastructure

- Water Treatment Plant
- Reservoir
- BPS
- PRV
- Fire Hydrant

Water Main

- 996 Zone
- 1050 Zone
- 1077 Zone

Pressure Zone

- 996 Zone
- 1050 Zone
- 1077 Zone

N

1 INCH = 500 FEET

0 500 1,000

DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG

RH2 ENGINEERS PLANNERS SCIENTISTS

REV DATE: 10/11/2012

J:\Data\EAT\111-070\GIS\Maps\EAT-WSP-CMP.mxd By: KDS

APPENDIX L

Watershed Control Program

Watershed Control Program

INTRODUCTION

All federally defined Group A public water systems using surface water or groundwater under the direct influence of surface water (GWI) sources are required to develop and implement a watershed control program. The Town of Eatonville (Town) is subject to the watershed control program requirements since it withdraws water from the Mashel River and four GWI wells for supply. The following information serves as an initial watershed control program for the Town.

Watershed Control Elements

The Washington State Department of Health (DOH) administers the state wellhead protection and watershed control program and the required elements are contained in Washington Administrative Code (WAC) 246-290-135. Since the Town's water supply sources are either surface water or GWI, the wellhead protection elements, including wellhead protection area delineation, are not applicable.

The minimum required elements of a watershed control program are as follows.

- A description of the watershed that includes its location, hydrology, and land ownership, and the identification of activities that may have a negative impact on source water quality.
- An inventory of all potential sources of surface water contamination, including the locations of owners/operators located within the watershed that have a significant potential to contaminate the source water quality.
- Watershed control measures that include documentation of ownership and relative written agreements as well as monitoring activities and water quality.
- System operation and emergency provisions.
- Documentation of water quality trends.

EXISTING WATERSHED, WATER QUALITY, AND CONTROL

Watershed Description

The Town is located in southern Pierce County, Washington, in the Nisqually Watershed, west of Mount Rainier.

The Mashel River sub-basin of the Nisqually Watershed is located east of the Town, as shown in **Figure L-1,** has an area of approximately 52 square miles, and includes two major tributaries, Beaver Creek and Busy Wild Creek, which are upstream of the Town's drinking water diversions. The geology of the Mashel River Watershed upstream of Busy Wild Creek is made up of shallow soils above volcanclastic bedrock with andesitic outcroppings. The portion of the drainage basin between Busy Wild Creek and the Town is made up of the same materials partially buried under glacial drift (Nisqually Indian Tribe 2003).

The Town's water supply is obtained from surface water diverted from the Mashel River and a combination of four GWI wells. The Town's well field is located adjacent to the Mashel River and is considered a GWI source. According to a March 2010 study by Golder Associates titled, *Town of*

Eatonville Phase 1 Storage Evaluation, the evidence to support that the aquifer and river are directly connected include the following:

- The Mashel River loses about 2 to 3 cubic feet per second to groundwater recharge as the river flows out of Boxcar Canyon, approximately 1 mile upstream of the Town where the channel is on basaltic bedrock, onto the alluvial sediments in the Town's well field area.
- Groundwater levels increase rapidly in response to increases in stage in the river, indicating infiltration from the river, especially during storm events, is a major source of recharge to the alluvial aquifer.
- A rise in river stage of approximately 1 foot has been observed to lead to a rise in groundwater elevation of approximately 6 feet on multiple occasions.

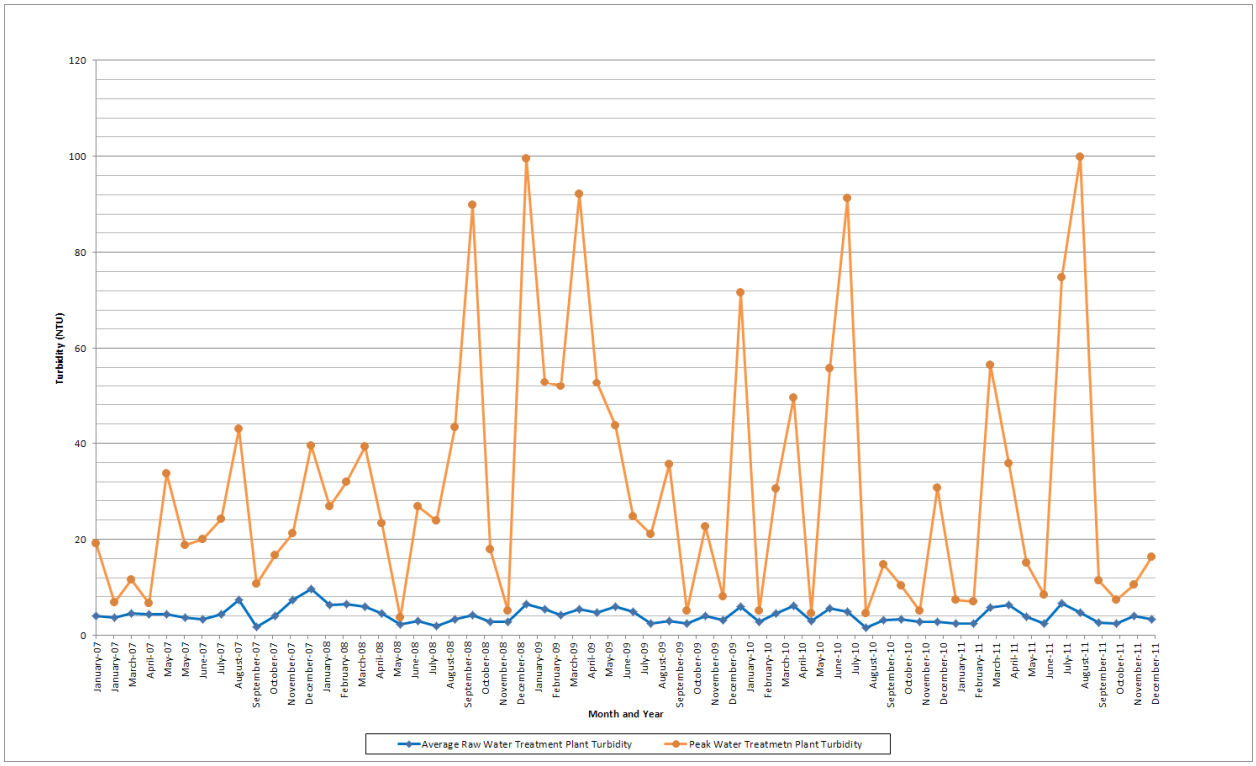
Turbidity of the groundwater is elevated and increases in response to high flow in the Mashel River when the aquifer is being recharged. This watershed's remote location on the flank of Mount Rainier decreases the likelihood of water quality impacts associated with development, but does not completely eliminate the threat of contamination. The major land use activity in the Mashel River Watershed upstream of the Town's water intake is forestry. Land is managed mostly by private timber companies and human activity is related primarily to forestry related pursuits. There are also some parcels of small private land ownership in the area directly to the east of the Town. The area is popular for recreational activities, including hunting, fishing, and hiking.

Water Quality Trends

The quality of the Town's sources has been good and meets or exceeds all drinking water standards. The Town monitored the Mashel River source annually for volatile organic chemicals (VOCs), inorganic chemicals (IOCs), and physical substances. The river source was monitored for synthetic organic chemicals (SOCs) once during the 2004 through 2006 and 2007 through 2009 monitoring periods. Monitoring IOCs, VOCs, and radionuclides for the Well Nos. 1, 2, 6, and 7 well field and river source was accomplished once per every 3-year monitoring period. Nitrate monitoring has been performed once per year since at least 1999. The results of IOC (including nitrate) monitoring and VOC monitoring for the Town's sources indicate that all primary and secondary standards were met. The results of radionuclide monitoring indicated that all of the Town's sources were in compliance with the regulations. SOC monitoring of the river source indicated that SOC levels were below the Maximum Contaminant level (MCL). In 2007, the Town sampled for arsenic and found that the levels were well below the MCL, per the arsenic rule.

Although turbidity is not regulated by the Environmental Protection Agency (EPA), turbidity is monitored at the water treatment plant intake. The Town's sources have historically had relatively high turbidity levels and the sources are filtered, in part, due to these levels. **Chart 1** displays the average monthly turbidity level and the peak monthly turbidity levels at the water treatment plant. Typically, the turbidity values are recorded for the river and well sources in the summer months and only the wells at other times of the year. Generally, the average turbidity is higher in the winter months than the summer month. Peaks in turbidity occur at various times of the year.

Chart 1
Influent Turbidity at the Water Treatment Plant



Susceptibility Assessment Summary

In 1994, DOH developed the Susceptibility Assessment Survey Form for water purveyors to complete for use in determining a drinking water source's potential for contamination. DOH assigned a high susceptibility rating to the Mashel River and the groundwater well field (Well Nos. 1 and 2), based on the results of the susceptibility assessment survey for each source. Copies of the susceptibility assessment forms are in **Appendix Q** of the Town's 2012 Comprehensive Water System Plan. Well Nos. 6 and 7 have not been rated, but are considered additions to the existing well field.

Sanitary Control Area

WAC 246-290-135 mandates, "The purveyor shall maintain a Sanitary Control Area (SCA) around all sources for the purpose of protecting them from existing and potential sources of contamination." It also states, "For wells....., the minimum SCA shall have a radius of one hundred feet." The Town does not presently own all of the land within the 100-foot radius of Well Nos. 6 and 7, as shown in **Figure L-2**, and taking action to ensure that the SCA requirement is met is a high priority. As the purveyor, the Town is required to maintain authority over construction, storage, and disposal of contamination within the SCA, as well as the right to complete sanitary control. In addition, the Town is required to submit legal documentation stating that the purveyor is

maintaining control of any sources of contaminants within the SCA. The Town should directly manage all SCAs to assure water supply protection.

WATERSHED CONTROL MEASURES

Existing Measures

The Town's existing efforts toward protecting its water resources include:

- Restricting access to well sites;
- Conducting daily inspection of all source of supply;
- Posting signage indicating the presence of a public water source;
- Purchasing property along the Mashel River;
- Being observant of potential harmful activities that can eventually affect the sources of supply; and
- Monitoring source water quality.

Potential Future Measures

In addition to the existing watershed control measures currently in place, the Town is considering the following additional measures to enhance the existing measures.

- Ownership or control of the Sanitary Control Areas.
- Increased monitoring of source water quality.
- Continued protection of Town-owned land along the Mashel River. Ensure that proposed improvements do not pose a water quality threat to the river and that best management practices are utilized during and after any construction. Ensure that the required buffers are met for all critical areas.
- Community Forestry Initiative – The Nisqually Community Forest is a community forest in the Upper Nisqually Watershed that is upstream of the Town's Mashel River diversion. The purpose of the community forest is to define 20,000 to 30,000 acres of the forest for forest production, employment, recreation, education, and conservation. The Town should continue to coordinate with the Nisqually Community Forest to ensure changes to the forest are beneficial to the Mashel River. The sustainable harvest techniques proposed should have a positive impact on the Mashel River as compared to existing forestry practices.
- Low Impact Development – Low Impact Development (LID) is a method of stormwater management that reduces impervious surface area, promotes infiltration, and utilizes best management practices to capture and treat stormwater runoff locally. LID benefits the water resources by more closely simulating predevelopment hydrologic characteristics. Per the Pierce County *Stormwater Management and Site Development Manual*, LID should be considered in areas that are adjacent to rivers and for sites underlain by a critical aquifer recharge area. All approved forms of LID best management practices are appropriate in a critical aquifer recharge area. The Town should encourage developers to utilize LID Best Management Practices, including but not limited to: minimizing impervious surface, retaining native

vegetation, roof downspout controls and infiltration, rainfall reuse, and alternative paving surfaces.

- Contact owners and operators of potential sources of contamination in the Town and upstream of the Town.

INVENTORY OF POTENTIAL CONTAMINANTION SOURCES

An essential element of watershed control is an inventory of potential sources of surface water contamination. The inventory should include the locations of owners and operators located within the watershed that have a significant potential to impact the source watery quality.

Inventory Approach

Since the Town's water supply is obtained directly from the Mashel River or indirectly from GWI wells adjacent to the river, the primary concern is to protect the Mashel River from contamination. The following initial steps were completed to inventory the potential sources of contamination within the Mashel subbasin of the Nisqually basin.

- Review of existing Mashel River water quality data from the Clean Water Act Section 303(d) list and miscellaneous other sources.
- Review of land ownership upstream of the Town's water supply sources.
- Review of the Washington State Department of Ecology (Ecology) maintained Facility/Site database and other databases that list facilities and operations that could pollute the air or water. These include spill cleanup sites; hazardous waste management facilities; hazardous waste generators; licensed laboratories; superfund sites; facilities with water quality permits; underground storage tanks (UST); leaking underground storage tanks (LUST); and solid waste and recycling centers.

Inventory Findings

Mashel River Water Quality

Section 303(d) of the Clean Water Act requires Washington State to maintain a list of surface waters throughout the state that are impaired by pollutants. In accordance with WAC 173-201A, Ecology assesses the water quality of the state's surface water bodies. All waters with available water quality data are assessed and placed into one of five categories. Category 5 represents the 303(d) listed waters where at least one characteristic or designated use is impaired as evidenced by failure to attain the applicable water quality parameter. Only the Category 5 waters require preparation of water quality improvement projects known as Total Maximum Daily Loads (TMDLs). Category 1 represents waters with available data showing attainment of the water quality standard for the parameter tested. Category 2 waters are waters with insufficient data for listing the segment as impaired, but a water quality concern remains. Category 3 waters lack sufficient data and Category 4 waters are impaired, but do not require a TMDL.

According to the 2008 Washington State Water Quality Assessment (Ecology, 2009), the only 303(d) listing for the Mashel River within the Town's boundary is a Category 5 listing for temperature. This

listing encompasses a segment of the river near the Town's source of supply diversion. Temperatures are elevated in this section of the river, typically during the low-flow season, which contributes to a general decrease in viability for salmonid populations using the river at this time, including Endangered Species Act-listed species. Temperature impairment is caused by a variety of factors, including development adjacent to the river, wastewater treatment plant return flow, water diversion, the geomorphology of the river, complexity in the river column, amount and type of vegetative cover in the riparian zone, and various other factors. Assessment data for the Mashel River from 2008 water quality assessment is included in **Appendix 1**.

Upstream of the diversion and before the confluence with Beaver Creek, the river segment is also considered Category 5. Upstream of the confluence with Beaver Creek, the Mashel River segment is classified as Category 1. Further upstream near the confluence with Busy Wild Creek, the Mashel River segment at this location is classified as Category 2. Beyond the Catergory 2 segment of the river in the northeast reaches of the river, the Mashel River is again classified as Category 1.

The development of a TMDL is required for water segments placed on the 303(d) list. A TMDL has not been prepared for the segments of the Mashel River on the 303(d) list.

Stream Channel Assessment of the Mashel Watershed Administration Unit, prepared for the Nisqually Tribe, located sources of sediment loading in the watershed. Sources identified included natural landslides, bank and channel erosion, soil creep, and surface erosion. Forest roads were also cited as a large contributor in some basins. High sediment loads may have a negative impact on the capabilities of the water treatment facility. Primary concerns for contaminant transport into the river are related to landslides and erosion causing high sediment loads, Giardia lamblia cysts, coliform bacteria, and spills related to the road access or forestry practices.

Land Ownership

Land ownership along the Mashel River and Busy Wild Creek upstream of the Town's supply sources was reviewed to determine other potential sources of contamination in the upstream portion of the watershed. Along the Mashel River in the Town limits, the Town owns a significant portion of the land along the river allowing protection of the sources of supply. A few properties are owned by single-family owners and land developers. As that land develops, the Town must coordinate with the developers regarding allowed activities along the riverfront. Beyond the Town limits, the land is primarily owned by various forestry and land conservation groups as shown in **Figure L-3**. The Nisqually Land Trust owns a swath of land along the Mashel River and the trust plans to manage the land while ensuring positive environmental benefits. Land that is properly conserved or protected will benefit source water quality. Generally, forestry practices have the potential to increase the amount of sediment entering the river, which can impact the turbidity of the source water, but conservation groups plan to redefine the community forest and provide positive impacts to the watershed.

Ecology Databases

The inventory efforts involving the review of various Ecology databases revealed multiple potential sources of contamination within the Mashel River subbasin of the watershed. Approximately 26 potential contamination sources were identified, including leaking underground storage tanks, hazardous waste generators, toxic waste cleanup sites, and facilities with water quality permits. A

summary of the sites is provided in **Appendix 2**. A majority of the sites are located within the Town's corporate limits or just beyond the limits and are shown in **Figure L-2**. Further upstream from the Town, along the Mashel River and Busy Wild Creek, there were no potential contaminant sources identified within Ecology's databases.

Although most of the identified potential contaminant sites present a risk to groundwater and soil rather than directly to surface water, the risk to surface water is not negligible and should be further evaluated. These results are the result of preliminary database research and a more exhaustive field inventory and assessment is necessary in the future. Once a more detailed evaluation of the potential sources of contamination is completed, contact should be made with owners to ensure they are aware that the potential sources of contamination are located within the watershed for the Town's drinking water supply.

Other Potential Sources of Contamination

Other potential sources of contamination that were not inventoried at this time include:

Septic Systems – Septic systems for wastewater disposal and treatment may be found in areas of the Town that are not served by the Town's sewage collection system. The ability to remove pollutants from the discharge of these systems depends on the type of the surrounding soil. In addition, septic systems may be unlawfully used for disposal of toxic materials.

Home Oil Furnace Tanks – Some residents in the Town area may be using oil furnaces to heat their homes. The fuel for oil furnaces can be stored in above-grade or buried tanks.

Hazardous Household Materials – Almost all households have hazardous materials that are commonly used for a variety of cleaning and maintenance purposes, including cleaning solvents, paint, antifreeze, and engine oil.

Private Wells – Improperly abandoned wells may pose a threat to the Town's sources. Wells with insufficient seals can provide a pathway for contaminants to enter the aquifer used by the Town's sources. A list of completed wells with reports is available on Ecology's website.

Stormwater – Stormwater runoff can potentially contaminate the Town's sources if it is not properly treated. Runoff from industrial and commercial areas can contain high levels of metals and hydrocarbons. Runoff from residential areas is typically high in nutrients, pesticides, and metals. The Town's consideration of regional detention and infiltration facilities could potentially impact the aquifers.

Creeks – Creeks located within the watershed can carry contaminants that may pose a threat to the Town's sources. The Town discharges stormwater into Lynch Creek, which is within the Ohop Creek Watershed.

Agricultural Practices – Agricultural activities within the watershed can be a threat to the Town's sources.

Wastewater Treatment Facility – The Town's wastewater treatment plant is located approximately 0.6 miles downstream of the water system intake in the Mashel River. The probability of contamination from effluent released by the treatment plant is reduced because it discharges to the

Mashel River downstream of the well field and the river intake. However, upland activities at the treatment plant need to be carefully evaluated and monitored to avoid source contamination.

EMERGENCY PROVISIONS

An Emergency Response Plan was developed as a part of the Town's 2005 Comprehensive Water System Plan. The Emergency Response Plan includes a contingency operation plan for the sources and other water system facilities. The contingency operation plan for the sources in the event of contamination is as follows.

Emergency Condition: Surface Water Contamination

Impact on System: Potentially major impact. Water not suitable for potable use – major loss of supply. The Town currently uses the Mashel River for surface water supply and one GWI well field.

Emergency Response:

1. Shut down the river intake and wells.
2. Notify DOH of the surface water contamination.
3. Notify all customers of the problem and instruct them to boil all water to be used for consumption and cooking, if boiling is effective for this type of contamination and the contamination is not isolated within the treatment facility.
4. Analyze water quality of water within reservoirs and dispose of properly if contaminated.
5. Disinfect reservoirs and water mains, as necessary, to remove contaminated residuals.
6. Adjust control of system facilities, as necessary, to provide supply from storage facilities if water within them is not contaminated.
7. Monitor water quality at affected intakes and investigate cause of contamination.
8. Implement water use reduction measures, as necessary, to ensure an adequate supply of water.

RECOMMENDED WATERSHED CONTROL MEASURES

The Town's Watershed Control Program is an on-going effort that requires resources to ensure its effectiveness in protecting the source of drinking water that is supplied to the Town's customers. The following tasks are recommended, by relative priority, for on-going watershed control.

Highest Priority

- Seek ownership, limit development, and manage all SCAs for protection of water supply sources. If purchase of the land is not an option, the Town must obtain a duly recorded restrictive covenant restricting the use of the land.
- Properly abandon Well No. 5 due to low flow rates and limited wellhead protection.
- Initiate and coordinate with the upstream landowners, timber operators, the Community Forestry Initiative, and the Washington State Department of Natural Resources to address management of spills, landslides, road erosion and related issues that impact water quality in the Mashel River upstream of the water supply intake and well field.

- Develop and implement a more protective water quality monitoring program to evaluate seasonal changes in the surface water quality, especially total suspended solids, bacteria and turbidity.
- Actively monitor and participate in the TMDL (total maximum daily load) process.

Medium Priority

- Develop an accurate delineation of critical aquifer recharge areas and potential wellhead protection area boundaries utilizing aquifer water level monitoring and mapping.
- Develop relationships with major upstream landowners and timber operators and provide contact information to promote early notification of upstream contaminant spills. Review forest project applications submitted to the Washington State Department of Natural Resources for projects in the Mashel River Watershed.
- Develop signage at access points to the Mashel River to inform people that they are entering an area that contains the Town's drinking water source and is vulnerable to surface activities.
- Develop a program that encourages LID within the Town.

Lower Priority

- Develop a watershed control ordinance that addresses permitted uses and performance standards for land use management and activities within designated watershed areas, critical aquifer recharge areas, and potential wellhead protection areas. Facilities that pose a high risk to source of supply contamination, such as gas stations; oil recycling; dry cleaners; fuel storage facilities; high-density animal keeping; high-density septic systems; and golf courses should be addressed. Coordinate these efforts with Pierce County.
- If the aquifer water level monitoring and mapping indicates that the Town has specific wellhead protection areas that must be protected to a higher degree than required by watershed control, fulfill the requirements of WAC 246-290-135 for wellhead protection including:
    - Perform a more detailed inventory and assessment of all potential sources of groundwater contamination within the identified wellhead protection areas. Especially review leaking underground storage tanks, fuel/petroleum (large quantity) storage facilities, septic systems, and agricultural practices.
    - Confirm location, condition, and proper closure of abandoned wells and identified Leaky Underground Storage Tanks, especially those within 1-year time of travel zones.
    - Inventory, map, and evaluate septic systems within all identified wellhead protection areas.
    - Develop signage at the perimeter of and at strategic locations around the wellhead protection areas to inform people that they are entering an area that contains the Town's drinking water source and is vulnerable to surface activities.
    - Distribute the required notifications as a result of updated delineations and inventory findings.

- Develop and distribute public education materials within the wellhead protection areas to address groundwater protection and household, landscape, and gardening practices that could affect groundwater quality.

SCHEDULE

The Town has completed a majority of the minimum watershed control requirements in accordance with WAC 246-290-135. The Town will seek ownership, limit development, and manage all SCAs for protection of water supply sources by December 2013. All other high-priority recommended watershed control measures are planned for 2013 and 2014. Medium and low-priority tasks will be completed as budget is available.

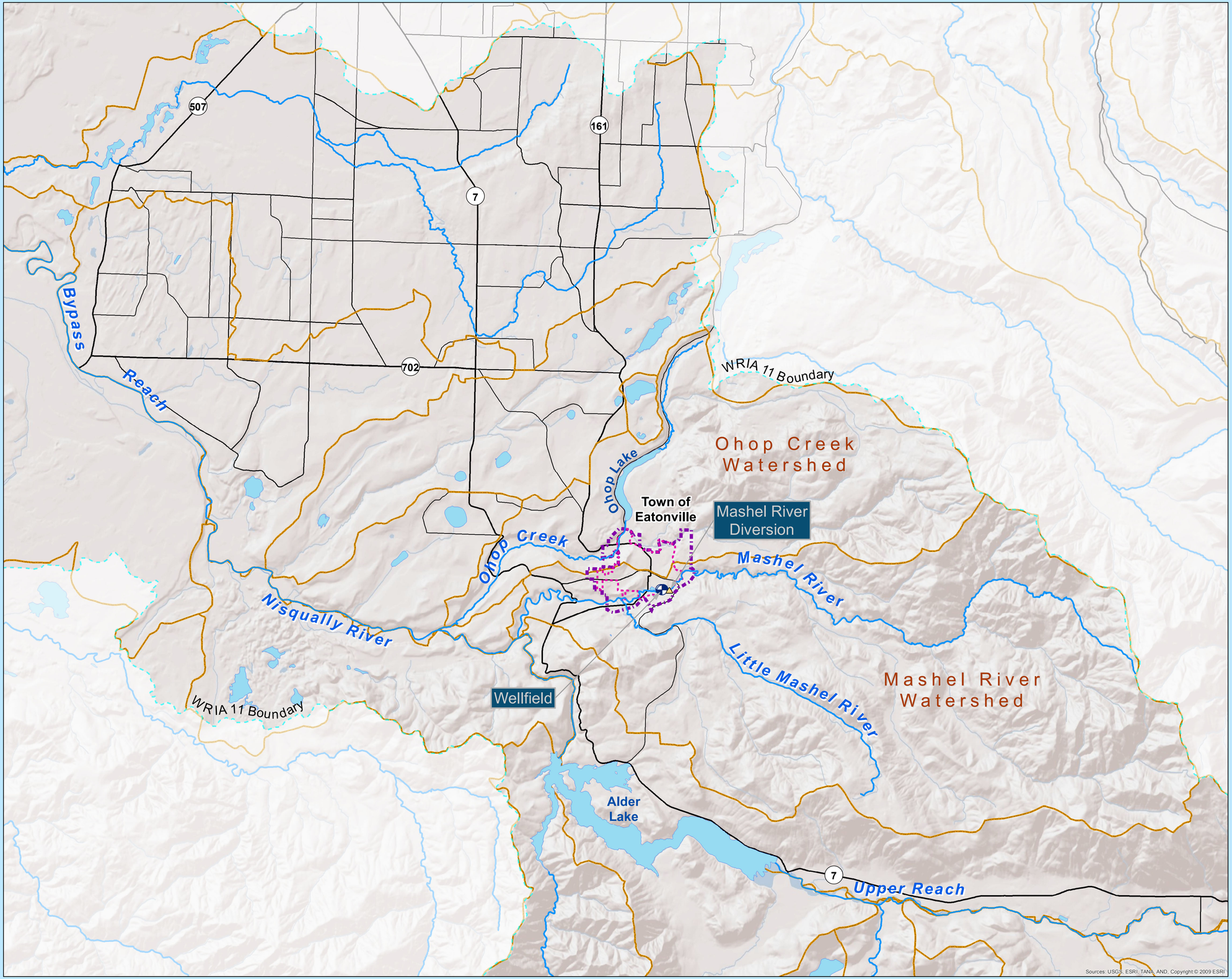
REFERENCES

Washington State Department of Ecology, 2008 Washington State Water Quality Assessment and 303(d) List, 2009.

Golder Associates, Phase I Storage Evaluation, Town of Eatonville, March 2010.

Nisqually Indian Tribe, Nisqually Watershed Management Plan, October 2003, 165 pp.

Nisqually Indian Tribe, Draft Stream Channel Assessment of the Mashel Watershed Administrative Unit.



Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

FIGURE L-1
WATERSHED AREA

Legend

Town's Existing Infrastructure
- Mashel River Diversion
- Wellfield

Boundaries
- Town of Eatonville
- UGA Boundary
- WRIA 11 Boundary
- Watershed Boundary

N

1 INCH = 6,000 FEET
0 6,000 12,000

DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG

RH2 ENGINEERS PLANNERS SCIENTISTS

REV DATE: 11/27/2012

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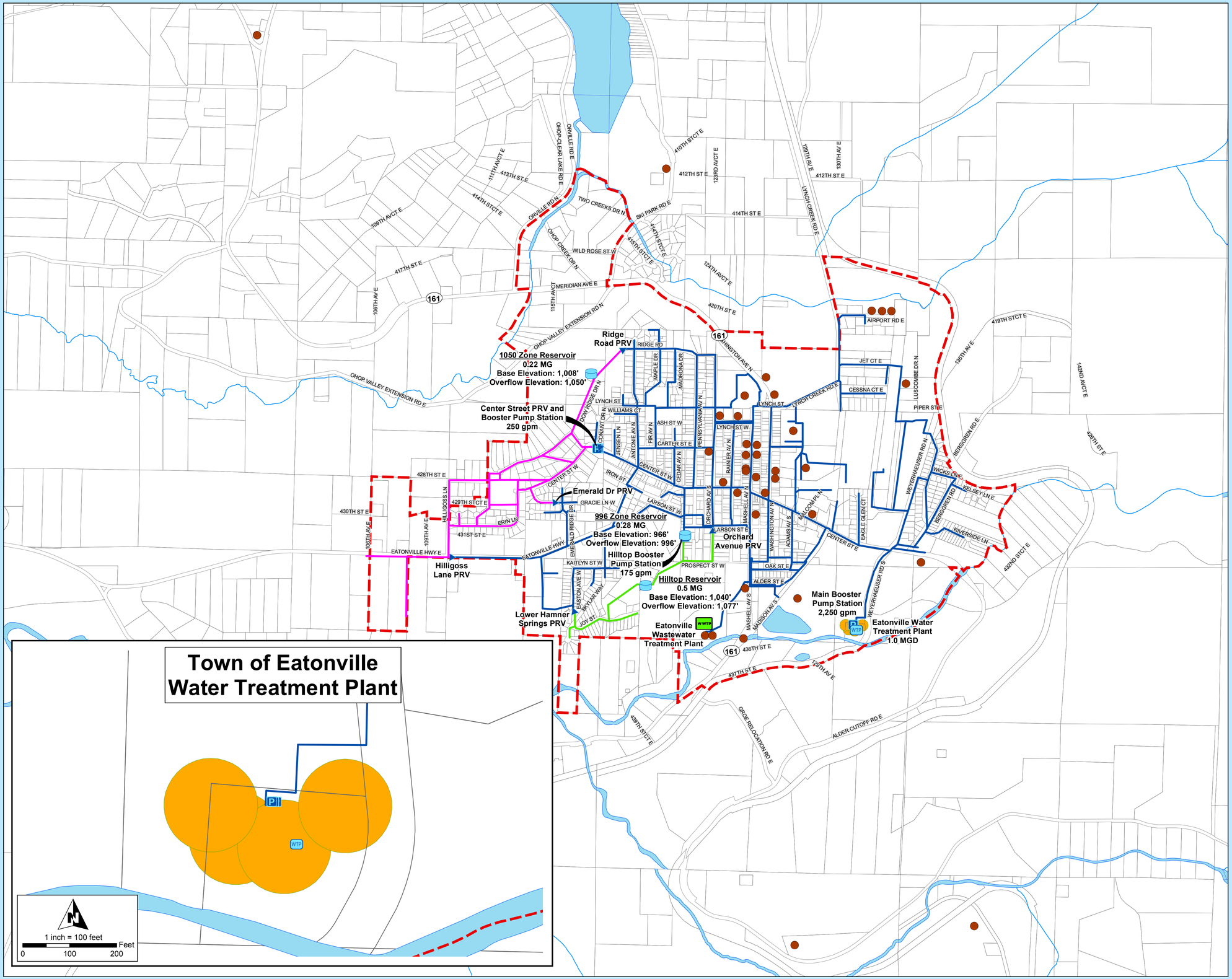
Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

FIGURE L-2
SANITARY CONTROL AREA AND POTENTIAL CONTAMINATION SOURCES



Legend

- Town Limits
- Potential Source Contaminant
- 100' Sanitary Control Radius
- Wastewater Treatment Plant

Water Infrastructure

- Water Treatment Plant
- Reservoir
- BPS
- PRV

Water Main

- 996 Zone
- 1050 Zone
- 1077 Zone

1 INCH = 800 FEET

0 800 1,600

DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG

RH2 ENGINEERS PLANNERS SCIENTISTS

REV DATE: 11/29/2012

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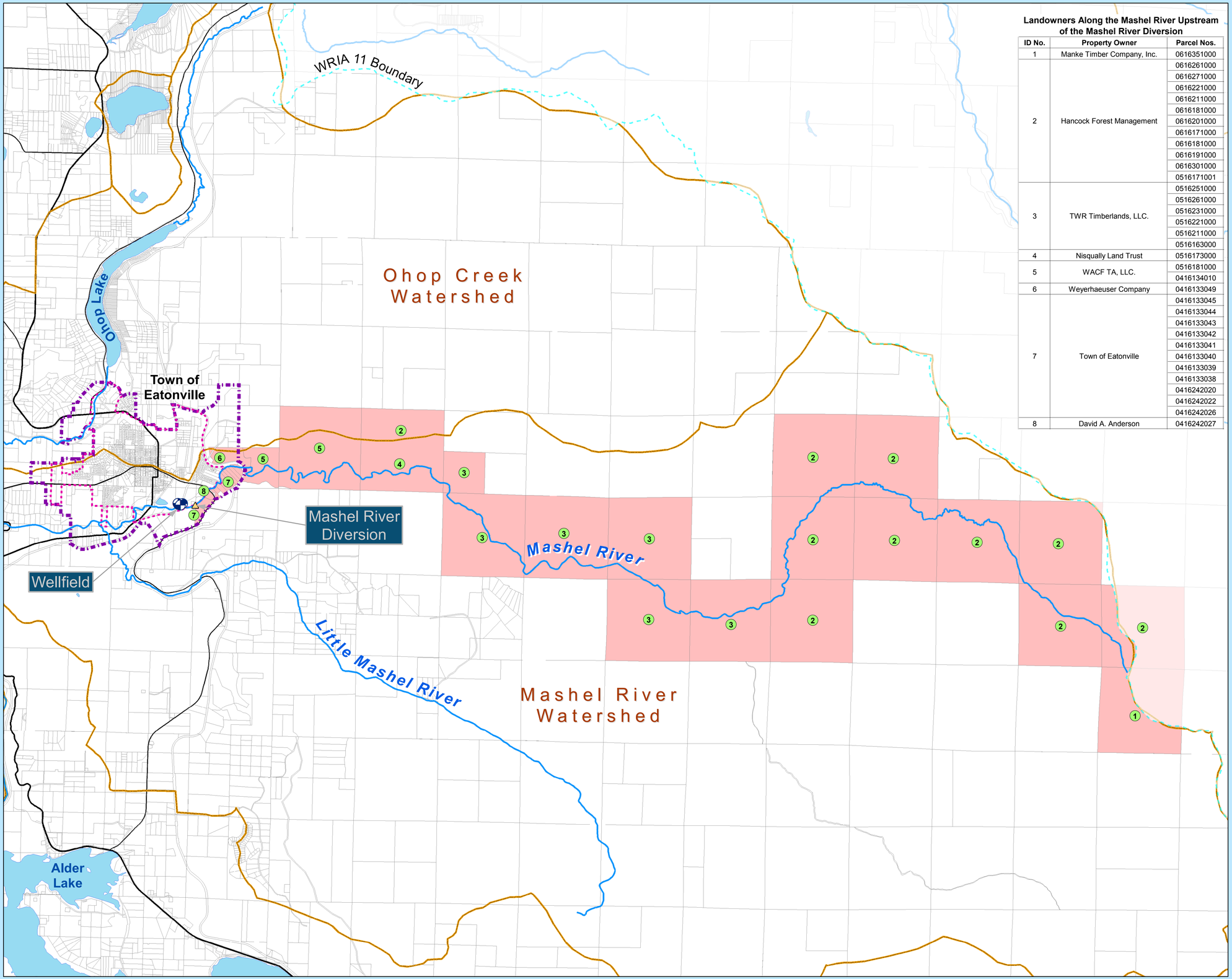

Landowners Along the Mashel River Upstream of the Mashel River Diversion

ID No.	Property Owner	Parcel Nos.
1	Manke Timber Company, Inc.	0616351000
2	Hancock Forest Management	0616261000
		0616271000
		0616221000
		0616211000
		0616181000
		0616201000
		0616171000
		0616181000
		0616191000
		0616301000
		0516171001
3	TWR Timberlands, LLC.	0516251000
		0516261000
		0516231000
		0516221000
		0516211000
		0516163000
4	Nisqually Land Trust	0516173000
5	WACF TA, LLC.	0516181000
		0416134010
6	Weyerhaeuser Company	0416133049
7	Town of Eatonville	0416133045
		0416133044
		0416133043
		0416133042
		0416133041
		0416133040
		0416133039
		0416133038
		0416242020
		0416242022
		0416242026
8	David A. Anderson	0416242027

Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

FIGURE L-3
LANDOWNERS ALONG THE MASHEL RIVER

Legend

Town's Existing Infrastructure
- Mashel River Diversion
- Wellfield

Boundaries
- Town of Eatonville
- UGA Boundary
- WRIA 11 Boundary
- Watershed Boundary
- Landowners Along the Mashel River Upstream of Mashel River Diversion

N

1 INCH = 3,000 FEET
0 3,000 6,000

DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG

RH2 ENGINEERS PLANNERS SCIENTISTS

REV DATE: 11/30/2012

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APPENDIX 1

Listing ID:	34848		
Water Body Name:	MASHEL RIVER		
Water Body Type:	River/Stream		
Parameter:	Temperature	**2008 CATEGORY:**	5
Sample Medium:	Water	**2004 Category:**	5
WRIA:	11 - Nisqually	**1998 303(d) List?:**	N
		1996 303(d) List?:	N
County:	Pierce		
Puget Sound Action Area:	South Puget Sound		
Township Range Section:	16.0N - 04.0E - 23		
LLID:	1223333468421		
Lower Rte:	7.712	**Upper Rte:**	9.823
WASWIS:	KU71FS		
Lower Rte:	7.771	**Upper Rte:**	9.753

2008 Basis

*** 2008 Basis Statement (carried forward from 2004) ***

Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR52 show a 7-day mean of maximum daily temperature of 19.4 degrees C, with a maximum daily temperature of 20.7 degrees C from continuous measurements collected in 1993. Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR52 show a 7-day mean of maximum daily temperature of 24.1 degrees C, with a maximum daily temperature of 25.8 degrees C from continuous measurements collected in 1994. Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR52 show a 7-day mean of maximum daily temperature of 23.7 degrees C, with a maximum daily temperature of 24.4 degrees C from continuous measurements collected in 1996. Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR52 show a 7-day mean of maximum daily temperature of 22.5 degrees C, with a maximum daily temperature of 23.7 degrees C from continuous measurements collected in 1997.

Nisqually River Education Project station Mashel River @ Eatonville show no excursions beyond the criterion from measurements collected in 2001 and 2002.

Listing ID:	34849		
Water Body Name:	MASHEL RIVER		
Water Body Type:	River/Stream		
Parameter:	Temperature	**2008 CATEGORY:**	5
Sample Medium:	Water	**2004 Category:**	5
WRIA:	11 - Nisqually	**1998 303(d) List?:**	N
		1996 303(d) List?:	N
County:	Pierce		
Puget Sound Action Area:	South Puget Sound		
Township Range Section:	16.0N - 05.0E - 18		
LLID:	1223333468421		
Lower Rte:	12.362	**Upper Rte:**	15.163
WASWIS:	KU71FS		
Lower Rte:	12.115	**Upper Rte:**	14.736

2008 Basis

*** 2008 Basis Statement (carried forward from 2004) ***

Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR75 show a 7-day mean of maximum daily temperature of 16.8 degrees C, with a maximum daily temperature of 17.6 degrees C from continuous measurements collected in 1993. Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR75 show a 7-day mean of maximum daily temperature of 20.3 degrees C, with a maximum daily temperature of 22 degrees C from continuous measurements collected in 1994. Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR75 show a 7-day mean of maximum daily temperature of 21.6 degrees C, with a maximum daily temperature of 22.6 degrees C from continuous measurements collected in 1996. Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR75 show a 7-day mean of maximum daily temperature of 19.9 degrees C, with a maximum daily temperature of 21.2 degrees C from continuous measurements collected in 1997.

Listing ID:	34850		
Water Body Name:	MASHEL RIVER		
Water Body Type:	River/Stream		
Parameter:	Temperature	**2008 CATEGORY:**	5
Sample Medium:	Water	**2004 Category:**	5
WRIA:	11 - Nisqually	**1998 303(d) List?:**	N
		1996 303(d) List?:	N
County:	Pierce		
Puget Sound Action Area:	South Puget Sound		
Township Range Section:	16.0N - 05.0E - 17		
LLID:	1223333468421		
Lower Rte:	15.163	**Upper Rte:**	17.227
WASWIS:	KU71FS		
Lower Rte:	14.736	**Upper Rte:**	16.611

2008 Basis

*** 2008 Basis Statement (carried forward from 2004) ***

Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR85 show a 7-day mean of maximum daily temperature of 19.6 degrees C, with a maximum daily temperature of 20.7 degrees C from continuous measurements collected in 1994.

Listing ID:	34851		
Water Body Name:	MASHEL RIVER		
Water Body Type:	River/Stream		
Parameter:	Temperature	**2008 CATEGORY:**	1
Sample Medium:	Water	**2004 Category:**	1
WRIA:	11 - Nisqually	**1998 303(d) List?:**	N
		1996 303(d) List?:	N
County:	Pierce		
Puget Sound Action Area:	South Puget Sound		
Township Range Section:	16.0N - 05.0E - 21		
LLID:	1223333468421		
Lower Rte:	17.591	**Upper Rte:**	19.795
WASWIS:	KU71FS		
Lower Rte:	16.967	**Upper Rte:**	19.173

2008 Basis

*** 2008 Basis Statement (carried forward from 2004) ***

Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR115 show a 7-day mean of maximum daily temperature of 16 degrees C, with a maximum daily temperature of 16.8 degrees C from continuous measurements collected in 1993.

Remarks

The data for this listing was reviewed and found to meet Category 1 requirements in accordance with Policy 1-11 (Sept. 2006)

Listing ID:	34852		
Water Body Name:	MASHEL RIVER		
Water Body Type:	River/Stream		
Parameter:	Temperature	**2008 CATEGORY:**	2
Sample Medium:	Water	**2004 Category:**	2
WRIA:	11 - Nisqually	**1998 303(d) List?:**	N
		1996 303(d) List?:	N
County:	Pierce		
Puget Sound Action Area:	South Puget Sound		
Township Range Section:	16.0N - 05.0E - 25		
LLID:	1223333468421		
Lower Rte:	24.101	**Upper Rte:**	25.949
WASWIS:	KU71FS		
Lower Rte:	23.336	**Upper Rte:**	25.160

2008 Basis

*** 2008 Basis Statement (carried forward from 2004) ***

Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR146 show a 7-day mean of maximum daily temperature of 15.5 degrees C, with a maximum daily temperature of 16.5 degrees C from continuous measurements collected in 1993. Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR146 show a 7-day mean of maximum daily temperature of 17.5 degrees C, with a maximum daily temperature of 18.4 degrees C from continuous measurements collected in 1994. Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR146 show a 7-day mean of maximum daily temperature of 17.9 degrees C, with a maximum daily temperature of 19.1 degrees C from continuous measurements collected in 1996.

Listing ID:	34853		
Water Body Name:	MASHEL RIVER		
Water Body Type:	River/Stream		
Parameter:	Temperature	**2008 CATEGORY:**	1
Sample Medium:	Water	**2004 Category:**	1
WRIA:	11 - Nisqually	**1998 303(d) List?:**	N
		1996 303(d) List?:	N
County:	Pierce		
Puget Sound Action Area:	South Puget Sound		
Township Range Section:	16.0N - 06.0E - 19		
LLID:	1223333468421		
Lower Rte:	26.637	**Upper Rte:**	28.653
WASWIS:	KU71FS		
Lower Rte:	25.805	**Upper Rte:**	27.703

2008 Basis

*** 2008 Basis Statement (carried forward from 2004) ***

Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR157 show a 7-day mean of maximum daily temperature of 16.4 degrees C, with a maximum daily temperature of 17.2 degrees C from continuous measurements collected in 1993. Nisqually Indian Tribe unpublished data (submitted by Sayre Hodgson on 6 February 2003) at RM MR157 show a 7-day mean of maximum daily temperature of 16.4 degrees C, with a maximum daily temperature of 17.2 degrees C from continuous measurements collected in 1994.

Remarks

The data for this listing was reviewed and found to meet Category 1 requirements in accordance with Policy 1-11 (Sept. 2006)

APPENDIX 2

Town of Eatonville
Potential Contaminant Sources - October 2012
Source - DOE Facility/Site Database

Facility/Site Name	Facility/Site ID	Program Facility Names	Type	Address	City	State	Zip Code
ASSOCIATED PETROLEUM EATONVILLE	14751692		Toxics/UST	713 WASHINGTON AVE	EATONVILLE	WA	98328
ASSOCIATED PETROLEUM PRO EATONVILLE	36651329	ASSOCIATED PETROLEUM PRO EATONVILLE	Toxics/Water Quality/Hazardous Waste	117 WASHINGTON AVE	EATONVILLE	WA	98328
BARNEYS CORNER	73362117		Toxics/UST	40512 MERIDIAN AVE E	EATONVILLE	WA	98328
Baydo Chevrolet	69871683	Eatonville Auto Ctr	Hazardous Waste/Toxics/UST	203 MASHELL AVE N	EATONVILLE	WA	98328
BUFFALO DON MURPHY EATONVILLE	1200	BUFFALO DON MURPHY EATONVILLE	Toxics/State Cleanup Site	SCOTT TURNER RD	EATONVILLE	WA	98328
EATONVILLE AIR FORCE ASSC	32166511		Toxics/UST	SWANSON FIELD	EATONVILLE	WA	98328
Eatonville Automotive Towing	38545734		Hazardous Waste	116 MASHELL AVE N	EATONVILLE	WA	98328
Eatonville Buffalo DO	74127587		Hazardous Waste	338 N WASHINGTON	EATONVILLE	WA	98328
Eatonville Drug Lab	94932119		Hazardous Waste	122 ORCHARD AVE	EATONVILLE	WA	98328
EATONVILLE ELEMENTARY SCHOOL	21755	EATONVILLE ELEMENTARY SCHOOL	Water Quality/Construction	209 LYNCH CREEK RD	EATONVILLE	WA	98328
Eatonville Ford	8879752		Hazardous Waste	113 MASHELL AVE N	EATONVILLE	WA	98328
EATONVILLE HIGH SCHOOL MOD & ADD	15379	EATONVILLE HIGH SCHOOL MOD & ADD	Water Quality/Construction	302 MASHELL AVE N	EATONVILLE	WA	98328
EATONVILLE MIDDLE SCHOOL	11458	EATONVILLE MIDDLE SCHOOL	Water Quality/Construction	207 CARTER ST E	EATONVILLE	WA	98328
Eatonville Power & Light	88671249		Hazardous Waste	402 MASHELL AVE	EATONVILLE	WA	98328
Eatonville School Dist 404	51339228		Hazardous Waste	203 LYNCH ST	EATONVILLE	WA	98328
EATONVILLE STP	8081567	EATONVILLE STP	Water Quality	370 MASHEL AVE S	EATONVILLE	WA	98328-0309
EATONVILLE TOWN	47939472	EATONVILLE WWTP	Toxics/UST/Biosolids	201 CENTER ST W	EATONVILLE	WA	98328
EATONVILLE TRANSPORTATION DEPARTMENT	61569475		Toxics/UST	211 LYNCH ST	EATONVILLE	WA	98328
ELWYN R RAHIER	12735825	RAHIER CHEVRON	Toxics/UST/LUST	100 WASH AVE N	EATONVILLE	WA	98328-0217
GRACE KNEIP	4888599		Toxics/UST	125 MASHELL AVE	EATONVILLE	WA	98328
Hamilton Centerpoint	20314	Hamilton Centerpoint	Toxics/LUST/Cleanup Site	351 MADISON AVE S	EATONVILLE	WA	98328
HAROLD W BURLINGAME	67152675		Toxics/UST	13117 419TH E SWANSON FIELD	EATONVILLE	WA	98328
Hope International	35624111		Hazardous Waste	41008 SKI PARK RD	EATONVILLE	WA	98323
JERRY NYBO CONSTRUCTION EATONVILLE	1575	NYBO REDI-MIX CONCRETE	Water Quality	675 CENTER ST E	EATONVILLE	WA	
Machine Shop Muellers Eatonville Napa	33789688		Hazardous Waste	103 CENTER ST E MACHINE SHOP	EATONVILLE	WA	98328
MASHELL WAREHOUSE & GARAGE	2618895		Toxics/UST/Hazardous Waste	215 EATONVILLE HWY	EATONVILLE	WA	98328-9335
MILL PARK TOWNHOMES	8431	MILL PARK TOWNHOMES	Water Quality/Construction	204 MASHELL AVE N	EATONVILLE	WA	98328
MILL TOWN GROCERY	14773355		Toxics/UST	360 CENTER ST E	EATONVILLE	WA	98328
Motor Worx	7037	Motor Worx	Hazardous Waste	116 MASHELL AVE N	EATONVILLE	WA	98328
RANDLES S & G LYNCH CREEK	23748	LYNCH CREEK QUARRY	Water Quality	14515 419 ST CT E	EATONVILLE	WA	98328
RJ SWANSON INC	39694934		Toxics/UST	ALDER CUTOFF RD	EATONVILLE	WA	98328-9449
TIMS TEXACO	81899783		Toxics/UST	144 MASHELL AVE N	EATONVILLE	WA	98328-0665
VAN CLEVE MOTORS INC	71436538		Toxics/UST/LUST	135 MASHELL AVE N	EATONVILLE	WA	98328-0040
Venture Bank	204996	Venture Bank	Toxics/UST/LUST/Cleanup Site	121 WASHINGTON AVE	EATONVILLE	WA	98328
WA DOT Machel River Bridge Scour	18596	WA DOT Mashel River Bridge Scour	Water Quality/Construction	SR 161 MP 2.26-2.52	EATONVILLE	WA	65.05
WEYERHAEUSER CO EATONVILLE OHOP	16756	LYNCH CREEK QUARRY WEYERHAEUSER PIT	Water Quality	14500 419 ST CT E	EATONVILLE	WA	98328

APPENDIX M

Consumer Confidence Report

QUALITY ON TAP REPORT
TOWN OF EATONVILLE
CALENDAR YEAR 2011

We are pleased to present to you this year's Annual Quality Water Report. This report is designed to inform you about the quality water and services we deliver to you every day. Our constant goal is to provide you with a safe and dependable supply of drinking water. We want you to understand the efforts we make to continually improve the water treatment process and to protect our water resources. We are committed to ensuring the quality of your water.

Our water sources are the Mashell River and four ground water wells under the influence of surface water. I'm pleased to announce that all of the drinking water constitutes that are tested are below state Maximum Contaminant Levels, and The Town of Eatonville has not had any Coliform positive samples taken from the distribution system by Water Management. Since the new Water Treatment Plant was put into service in 2006 the Disinfection Byproducts are averaging half the States Maximum Contaminant Level allowed. Past testing before the plant exceeded MCL in both HAA's and THM's. If you have any question about this report or concerning your water utility, please contact Mike Tiller at 360-832-8524. We want our valued customers to be informed about their water utility. If you want to learn more, please attend any of our regularly scheduled council meetings. They are held on the 2nd and 4th Mondays of the month at 7:00 pm. at the Community Center.

The Town of Eatonville routinely monitors for constituents in you drinking water according to Federal and State Laws. This table shows the results of our monitoring for the period of January 1st to December 31, 2011. All drinking water, including bottled drinking water, may contain at least small amounts of some constituents. It's important to remember that the presence of these constituent does not necessarily pose a health risk.

Maximum Contaminant Level

The "Maximum Allowed" (MCL) is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the Maximum Contaminant Level Goal as feasible using the best available treatment technology.

Maximum Contaminant Level Goal

The "Goal" (MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791or the Department of Health at 1-800-525-2536.

MCL's are set at very stringent levels. To understand the possible health effects described for many regulated constituent, a person would have to drink two liters of water every day at the MCL level for a lifetime to have a one-in-a-million chance of having the described health effect. This is not true for coliform and nitrate.

Immuno Compromised Persons

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/ AIDS or other immune system disorder, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

The Town of Eatonville is proud to announce that they are also working hard to stay in compliance with the new Water Efficiency Rule. Unaccountable potable water loss for the year of 2011 averaged 16%. Percentages have been as low 4% depending on water leaks and staff to repair them. This is a large improvement over 46%. This program is ongoing on a daily basis of finding and repairing leaks when they occur. The Town of Eatonville has not had any water quality violations for the year 2011. The Town's Cross Connection Control program has every commercial and residential premise up to date on assembly testing, and the proper assemblies installed as required.
Town of Eatonville works around the clock to provide top quality drinking water to every tap. We ask that all our customers help us protect our water sources, which are the heart of our community, our way of life and our children's future.

Town of Eatonville
Water Department
360-832-8524

Water Treatment Plant

WATER MANAGEMENT LABORATORIES INC.

RADIONUCLIDE ANALYSIS REPORT

1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

System ID No.: 22300K
Lab Sample No.: 08931619
Multiple Source Nos.: S05 & S06
Date Received: 04/08/11
County: Pierce
Sample Location: Mashall River - 50/50 Blended Surface Water and GWI Well
Send To: Town of Eatonville, Water Department
Box 309
Eatonville, WA 98328

System Name: Town of Eatonville
Date Collected: 04/08/11
Sample Type: B
Date Reported: 05/04/11
Group: A
Analyst: TA
DOH Source No: S96
Sample Purpose: I
Supervisor: [illegible]

Comments:

DOH #	ANALYTES	ANALYSIS DATE	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS Trigger	EXCEEDS MCL	METHOD
			EPA REGULATED							
155	Gross Alpha	04/28/11	ND	pCi/L	3.0					EPA 900.0; RL-GPC-001
42	Gross Beta	04/28/11	ND	pCi/L	4.0					EPA 900.0; RL-GPC-001
	Gross Gamma	04/25/11	ND	pCi/L						EPA 901.1; RL-GAM-001
	Cesium 134	04/20/11	ND	pCi/L	10*					
	Cesium 137	04/20/11	ND	pCi/L	10*					
	Iodine 131	04/20/11	ND	pCi/L	40*					

NOTES:
SRL (State Reporting Level): indicates the minimum reporting level required by the Washington Department of Health (DOH).
MDL (Minimum Detection Level): Lowest valid detection level.
MCL (Federal Maximum Contaminant Level): Levels found above this amount should take steps to mitigate levels and/or conflict with DOH.
NA (Not Analyzed): In the RESULTS column indicates this compound was not included in the current analysis.
ND (Not Detected): In the RESULTS column indicates this compound was analyzed and not detected at a level greater than or equal to the SRL.
* THIS IS A LABORATORY ADVISORY LEVEL.

Comments:

TA NO: J1D110439-1
WA LAB NO: 028

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NOT WRITE IN SHADED AREAS

WATER MANAGEMENT LABORATORIES INC.

1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

INORGANIC CHEMICALS (IOCS) REPORT

ystem ID No: 22300K | System Name: Town of Eatonville
ab/Sample No: 08936822 | Date Collected: 04-04-11 | DOH Source No: S05
ultiple Source Nos: N/A | Sample Type: A | Sample Purpose: C
ate Received: 04-04-11 | Date Reported: 04-08-11 | Supervisor: [illegible]
ounty: Pierce | Date Digested: 04-04-11 | Group: (A) B Other
ample Location: Mashell River Sample bib
end Results & Bill To: Town of Eatonville, Po Box 309, Eatonville, WA 98328 | Remarks: AE055R

OH#	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS Trigger?	EXCEEDS MCL?	Method/Analyst	
	EPA REGULATED									
4	Arsenic	<0.001	mg/L	0.001	0.01	0.01	No	No	200.8	[illegible]
5	Barium	<0.01	mg/L	0.01	2	2			200.8	[illegible]
6	Cadmium	<0.0001	mg/L	0.0001	0.005	0.005			200.8	[illegible]
7	Chromium	<0.007	mg/L	0.007	0.1	0.1			200.8	[illegible]
11	Mercury	<0.0002	mg/L	0.0002	0.002	0.002			200.8	[illegible]
12	Selenium	<0.002	mg/L	0.002	0.05	0.05			200.8	[illegible]
110	Beryllium	<0.0003	mg/L	0.0003	0.004	0.004			200.8	[illegible]
111	Nickel	<0.005	mg/L	0.005	0.1	0.1			200.8	[illegible]
112	Antimony	<0.003	mg/L	0.003	0.006	0.006			200.8	[illegible]
113	Thallium	<0.001	mg/L	0.001	0.002	0.002			200.8	[illegible]
116	Cyanide	<0.01	mg/L	0.01	0.2	0.2			4500-CNF	[illegible]
19	Fluoride	<0.2	mg/L	0.5	2	4			300.0	[illegible]
114	Nitrite - N	<0.1	mg/L	0.1	0.5	1			300.0	[illegible]
20	Nitrate - N	1.0	mg/L	0.2	5	10			300.0	[illegible]
161	Total Nitrate/Nitrite	1.0	mg/L	0.5	5	10			300.0	[illegible]
	EPA REGULATED (Secondary)									
8	Iron	0.19	mg/L	0.1	0.3	0.3	No	No	3111B	[illegible]
10	Manganese	<0.01	mg/L	0.01		0.05			200.8	[illegible]
13	Silver	<0.01	mg/L	0.1		0.1			200.8	[illegible]
21	Chloride	3	mg/L	20		250			300.0	[illegible]
22	Sulfate	2	mg/L	50		250			300.0	[illegible]
24	Zinc	<0.2	mg/L	0.2	5	5	No		200.8	[illegible]
	STATE REGULATED									
14	Sodium	<5	mg/L	5					200.8	[illegible]
15	Hardness	31	mg/L	10					2340C	[illegible]
16	Conductivity	47	umhos/cm	70		700		No	2510B	[illegible]
17	Turbidity	4.9	NTU	0.1					2130B	[illegible]
18	Color	25	color units	15		15		Yes	2120B	[illegible]
26	Total Dissolved Solids	NA	mg/L	100		500		—	2540C	—
	STATE UNREGULATED									
9	Lead	0.003	mg/L	0.001					200.8	[illegible]
23	Copper	0.05	mg/L	0.02					200.8	[illegible]

OMMENTS: FC-28

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WATER MANAGEMENT LABORATORIES INC.

1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

INORGANIC CHEMICALS (IOCS) REPORT FOR NITRATES

System ID No: 22300K | System Name: Town of Eatonville
Lab/Sample No: 08938444 | Date Collected: 07-18-11 | DOH Source No: S06
Multiple Source Nos: NA | Sample Type: B | Sample Purpose: C
Date Received: 07-18-11 | Date Reported: 07-20-11 | Supervisor: [illegible]
Date Analyzed: 07-19-11 | Analyst: [illegible]
County: Pierce | Group: (A) B Other
Sample Location: well #1 sample tap
Send Report To: Town of Eatonville, P O Box 309, Eatonville WA 98328 | Bill To:

DOH#	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS Trigger?	EXCEEDS MCL?	Method/Analyst	
	EPA REGULATED									
114	Nitrite - N	NA	mg/1	0.5	0.5	1			4110B	
20	Nitrate - N	0.3	mg/1	0.5	5.0	10	No	No	4110B	[illegible]
161	Total Nitrate/Nitrite	NA	mg/1	0.5	5.0	10			4110B	

NOTES:
SRL (State Reporting Level): indicates the minimum reporting level required by the Washington Department of Health (DOH).
Trigger Level: DOH Drinking Water response level. Systems with compounds detected at concentrations in excess of this level are required to take additional samples. Contact your regional DOH office for further information.
MCL (maximum contaminent level): If the contaminent amount exceeds the MCL, immediately contact your regional DOH office.
NA (Not Analyzed): in the results column indicates this compound was not included in the current analysis.
ND (Not Detected): in the results column indicates this compound was analyzed and not detected at a level greater than or equal to the SRL.
< (0.001): indicates the compound was not detected in the sample at or above the concentration indicated.

COMMENTS:
Nitrate

Test Address	THM Results	Stage One or Two	Date Collected
303 Antonie Ave. N	8.3	Stage 1	2/7/2011
650 Joy Street	30	Stage 2	2/7/2011
10920 Eatonville Highway	17.8	Stage 2	2/7/2011
Avg	18.6		
Test Address	**HAA Results**	**Stage One or Two**	**Date Collected**
303 Antonie Ave. N	4.9	Stage One	2/7/2011
650 Joy Street	10.1	Stage Two	2/7/2011
10920 Eatonville Highway	9.6	Stage Two	2/7/2011
Avg.	8.2		
Test Address	**THM Results**	**Stage One or Two**	**Date Collected**
303 Antonie Ave N.	12.9	Stage One	5/12/2011
10920 Eatonville Highway	27.6	Stage Two	5/12/2011
650 Joy Street	32.5	Stage Two	5/12/2011
Test Address	**HAA Results**	**Stage One or Two**	**Date Collected**
303 Antonie Ave N	11.4	Stage One	5/12/2011
10920 Eatonville Highway	21.4	Stage Two	5/12/2011
650 Joy Street	16.6	Stage Two	5/12/2011
Test Address	**THM Results**	**Stage One or Two**	**Date Collected**
DOH said I have meet reduced monitoring for Stage Two for now. Will have to start again la			
303 Antonie Ave N	16.5	Stage One	8/1/2011
Test Address	**HAA Results**	**Stage One or Two**	**Date Collected**
303 Antonie Ave. N	24.2	Stage One	8/1/2011
Test Address	**THM Results**	**Stage One or Two**	**Date Collected**
303 Antonie Ave. N	12.6	Stage One	1/7/2011
Test Address	**HAA Results**	**Stage One or Two**	**Date Collected**
303 Antonie Ave. N	16.7	Stage One	1/7/2011
Test Address	**THM Results**	**Stage One or Two**	**Date Collected**

APPENDIX N

Sanitary Survey

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
NORTHWEST DRINKING WATER REGIONAL OPERATIONS
20435 72nd Avenue South, Suite 200, Kent, Washington 98032-2358

June 7, 2011

(1) Water plan run out
(2) Staffing
(3) Water loss control action plan

MR. MIKE TILLER
TOWN OF EATONVILLE
PO BOX 309
EATONVILLE WA 98328

Subject: Eatonville Water Department; ID #22300K
Pierce County
Results of 2011 Sanitary Survey

Dear Mr. Tiller:

Thank you for taking the time to meet with me on my recent Sanitary Survey of the Eatonville Water Department water system. The survey took place on May 12, 2010 and involved a review of O&M procedures and a walk through of the treatment plant, reservoirs, and booster pump stations. The purpose of a sanitary survey program is to support you in your effort to improve the overall reliability and sanitary integrity of your facilities.

In 2007, the Town was recognized as the Most Improved Water System during the Washington State Drinking Water Week as noted in the previous survey. It appears you are continuing to make gradual improvement. A summary of the results of my survey and a detailed review of the treatment facility are included with this letter. The comments are ranked in order of my perception of your greatest priorities.

1. **Clearwell and Monitoring Basin Seals** - During the survey, several inches of water was observed in the monitoring basin between the raw water detention basin and the CT basin. The monitoring basin should be dry because it is a barrier between raw and filtered water. Water may be entering from either cracks in the concrete walls adjoining the CT and raw water basins or from the access hole lid. *The water must be removed from the basin and the operators will need to keep an eye on the monitoring basin to determine the source of water entering the basin. If the access hole lid is the source of the water entering the monitoring basin then the lids on the monitoring basin and clearwells should be replaced with hatch covers that do not leak.*

2. **Reservoir Overflow** - The 996 Zone reservoir (300,000 gallon concrete) was in good condition. The overflow outlet could not be located. *The overflow outlet should be located and the presence of a screen on the outlet should be verified.*

3. **Well Vents** –The vent for Well 2 was upward facing and the one for Well 6 was in a horizontal configuration. *Both should be converted to downturned vents.*
4. **Water System Plan** - The current water system plan expires next month, July 2011. Please contact Jennifer Kropack, the DOH Regional Planner who covers your water system, to start the process for preparing a new or updated water system plan.
5. **Staffing and Succession Planning** - At the time of this survey, the backup operator was out on sick leave following surgery. As a result, you have been working seven days per week. At least one additional qualified and certified operator should be available to operate the treatment facility and maintain the water system. As you near retirement, please work to ensure that any individuals that replace you are adequately trained to operate the facility.
6. **Water Loss Control** – The amount of apparent distribution system leakage has been greatly reduced in the past few years. However, the water system has exceeded 10 percent distribution system leakage for the past three years. As a result, a water loss control action plan is required. *Please prepare a brief water loss control action plan as required under WAC 246-290-820(4).*

Drinking Water Regulations require that all Group A systems with surface water treatment plants have a routine sanitary survey once every three years. To receive credit for the survey, a sanitary survey fee must be paid. Enclosed is an invoice for $1,836.00. Please send complete payment in the form of a check or money order within 30 days of the date of this letter to: **DOH, Revenue Section, P.O Box 1099, Olympia, WA 98507-1099**.

Thanks for your efforts. Please feel free to contact me at (253) 395-6755 if I can be of any assistance to you in answering any questions or in addressing any of these issues and recommendations.

Sincerely,

Samuel A. L. Perry, PE
WSDOH Water Treatment Engineer

Enclosures

cc: Tacoma-Pierce County Health Department
John Ryding, WSDOH Regional Engineer
Jennifer Kropack, WSDOH Regional Planner

Washington State Department of Health

WATER SYSTEM SANITARY SURVEY REPORT

STATE OF WASHINGTON DEPARTMENT OF HEALTH (DOH)

-- NORTHWEST DRINKING WATER OPERATIONS --

WATER SYSTEM:	**Eatonville Water Department**	**SYSTEM MANAGER / OPERATOR:**	Mike Tiller, Manager, (360) 832-8514
COUNTY:	Pierce	**SYSTEM OWNER:**	**Eatonville, Town of**
PWS ID#:	**22300K**	**INSPECTED BY:**	Sam Perry (in support of John Ryding)
SYSTEM TYPE:	Group A - Community	**INSPECTION DATE:**	**5/12/2011**

APPROVAL STATUS:	The System is served by one permanent surface water source and 4 groundwater sources that are classified as a wellfield (S06). The System serves approximately 875 total residential connections and 130 non-residential connections (as listed on their Water Facilities Inventory, WFI). The water system serves a full-time residential population of approximately 2,012 (unchanged since 2008). The number of open accounts is roughly the same as in 2008 (1044 accounts). The water system maintains a membrane filtration plant which treats their surface water and groundwater sources. The water system has approved capacity to serve 1,486 Equivalent Residential Units (ERUs) and has a current Water System Plan. The Town's water system was awarded the "Most Improved" water system award in 2007 by DOH as part of the annual Drinking Water Week observances.
OPERATING PERMIT STATUS:	Green – The system is in substantial compliance.

	ADEQUATE (YES/NO)	OBSERVATIONS/*RECOMMENDATIONS*
		CAPACITY
Source capacity	Yes	The Water System Plan (WSP) update indicates that there is adequate source capacity from the surface water (Mashel River, S05) and groundwater sources (Wells 1, 2, 6, and 7). The membrane filtration plant has a current capacity of 1 MGD and has the space available to add another membrane filter skid, which would bring the capacity of the plant to 1.5 MGD. The 2010 MDD was 0.67MGD. The system appears to have sufficient source and treatment plant capacity.

	ADEQUATE (YES/NO)	OBSERVATIONS/*RECOMMENDATIONS*
Storage capacity	Yes	The Town maintains three storage reservoirs with a total capacity of approximately 1 million gallons. The newest reservoir, Hilltop, was completed in 2005, serves the highest pressure zone, and has a capacity of 500,000 gallons. The WSP update indicates that in general, the water system has adequate storage but there is a localized shortage in the 1050 pressure zone. The Capital Improvement Plan in the WSP plans for a 170,000 to 230,000 gallon reservoir in the 1050 zone in the year range of 2011 to 2016.
Distribution	Yes	It was reported that 30 psi can be maintained in the distribution system at all service meters at all times. The hydraulic model in the WSP update indicates that this will be true in the 6-year planning horizon.
WATER QUALITY MONITORING	→	The System has kept up well with source monitoring requirements. The surface water source (S05, Mashel River) is required to take annual samples for IOCs and VOCs and once every three years for SOCs. There have been no exceedances of primary or secondary MCLs. There is a slight upward trend in nitrate concentration, with the sample collected on 4/4/2011 measuring 1.0 mg/L up from 0.3 mg/L in 2010 and 0.2 mg/L in 2009. The wellfield (S06) is required to take VOCs and SOCs once every three years and has an IOC waiver with 1 sample required every nine years. IOCs were collected for Wells 6 and 7 in 2007. The following table summarizes the nitrate, iron and manganese results for this period.

Source	NO_3^- (mg/L)	Fe (mg/L)	Mn (mg/L)
Well #6 (S08)	0.2	1.4	0.09
Well #7 (S09)	0.2	0.69	0.03

It appears that Wells #6 and #7 exceed the secondary MCL for iron (0.3 mg/L) and that Well #6 exceeds the secondary MCL for manganese (0.05 mg/L). However, there were no reported aesthetic problems in the distribution system. The Town uses a number of sources and the iron and manganese concentrations will vary depending on the blending ratios used for the surface water and the four wells that make up the wellfield (Wells 1, 2, 6, and 7).

Lead and Copper - The System adds soda ash at the treatment plant after filtration to increase pH and alkalinity. The System's most recent lead and copper 90th percentile levels for the 2007-2009 compliance period are 2 ppb and 0.35 mg/L respectively, well below their respective action levels. It appears that the System is in compliance with the Lead and Copper Rule and is due to collect 10 compliance samples before December, 2012.

Coliform – The System has had an excellent coliform history for the last two years with no positive routine coliform samples in the last two years. The System has a coliform monitoring plan (CMP) with a map which resides in the WSP update. This CMP includes routine and repeat sample locations.

	ADEQUATE (YES/NO)	OBSERVATIONS/*RECOMMENDATIONS*
		DBPs – Historically, the System exceeded the MCL for HAAs and THMs prior to completion of the new WTP in November 2006. However, since then, RAAs have been well below the MCLs. The RAA for HAAs has remained below the MCL of 60 ug/L since the 1st quarter of 2007. For the Stage 1 D/DBP Rule, the water system began collecting monthly source water TOC data in 2010 to qualify for reduced monitoring. This reduced monitoring will be 1 TTHM/HAA5 sample per year at a location representing maximum residence time (303 Antonie Ave). For the Stage 2 D/DBP Rule, the water system has completed the Initial Distribution System Evaluation (IDSE). When the required Stage 2 monitoring starts (in November 2013), they will have to go back to quarterly monitoring with the new sample location (650 Joy Street) to then qualify reduced monitoring under Stage 2 (again, after a year's worth of sampling for TTHM/HAA). For Stage 2, the TTHM sample must be collected at the location identified with the highest TTHM locational running annual average (650 Joy Street) and the HAA5 sample collected at the location identified with the highest HAA5 locational running annual average (303 Antonie Ave.).
SURFACE WATER TREATMENT RULE/GWI	Yes	The Town operates a membrane filtration plant which treats all of their surface water and groundwater sources. Wells 1 and 2 are classified as GWI (Groundwater Under the Influence of Surface Water) sources. Wells 6 and 7 have not been formally classified as GWI sources but since they are drilled in the same geologic formation as Wells 1 and 2, it is presumed that the wells are also GWI. The membrane filtration plant meets the requirements of the Surface Water Treatment Rule.
OPERATIONS AND MAINTENANCE		
Routine O & M	Yes	The System has made significant improvements since the last sanitary survey including a new treatment plant, new clearwell, new main pump station, and new telemetry and monitoring systems. These improvements have improved operations of the water system by improving water quality, reliability, consistency, and monitoring. Water mains are flushed twice annually with spot flushing conducted as necessary due to water quality issues. The Town's maintenance staff flushes annually and the new Fire Department for the Town typically flushes hydrants annually during hydrant testing. The reservoirs are cleaned and inspected every five years, the last such cleaning occurring three years ago. Remote read service meters are being installed in the Town, which will significantly shorten the labor requirements for meter reading. Currently, approximately 393 meters (up from 350 in 2008) have been installed and the radio signal receiver equipment has been placed in the budget. The Fire Department now exercises valves on a routine basis.

	ADEQUATE (YES/NO)	OBSERVATIONS/*RECOMMENDATIONS*
Complaints	Yes	There have been no complaints registered with DOH in the last 3 years. Typically, internal complaints are registered at Town Hall and Mr. Tiller or one of the other operators addresses the concerns.
Operator Certification	Yes	The System is required to have a certified operator at the WDM2 level or higher and a treatment plant operator at the WTPO2 level or higher. Mike Tiller (certification number 4271) is the certified WDM2 and WTPO2 operator of record (He is also certified as a CCS). The System appears to meet the minimum Operator Certification requirements. Mike is currently working seven days a week due to an extended illness by the other certified operator.
Consumption/ Production Data	Yes	The source meters are recorded on a daily basis. Service meters are read monthly. The Town has also been aggressive in implementing conservation methods and leak detection. Both total production and distribution system leakage (DSL) have generally been declining in the past few years.

Year	Water Produced (BGal)	DSL (%)	DSL – Volume (BGal)
2007	138	26%	34.3
2008	106	19%	20.1
2009	105	13%	13.2
2010	98	16%	15.9

The *Water Use Efficiency Rule* became effective in January 2007. As outlined above, significant improvements have been made in minimizing. **Since the average DSL for past three years has exceeded 10%, the system must develop a water loss control action plan.** The action plan can be as simple as a one page description that establishes goals, schedule and a budget to better control DSL. Please use the information and examples in the *Water Use Efficiency Guidebook* (Pub #331-375) as guide and contact Mike Dexel at michael.dexel@doh.wa.gov or (360) 236-3154 for further support in achieving DSL goals.

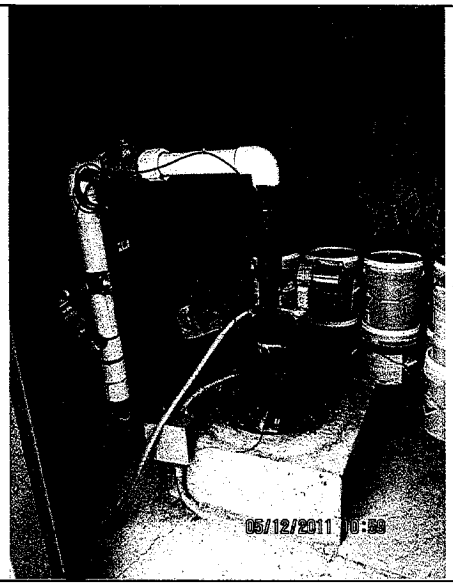
Water Rights	Yes	Water rights were reported to be sufficient to meet current system demands. The WSP indicates there should be sufficient water rights for the next 6-years given strong conservation and leak detection programs.
Cross-Connection Control	Yes	The Town has a Cross Connection Control Plan that has been in place for the last 10 years. The System is responsible for determining backflow assembly requirements for new buildings and remodels in coordination with the Town's building department. Staff also conduct drive-by inspections. Assemblies are tracked using specialized software (Cross-Track 5.2). Annual testing is required of all assemblies. There are up to three reminder letters for testing. The final letter warns of service disconnection for noncompliance with testing requirements. Several of these final warning letters have been issued but no service interruption has been necessary. There are approximately 91 assemblies being tracked of which 9 are RPBAs.

	ADEQUATE (YES/NO)	OBSERVATIONS/*RECOMMENDATIONS*
		FACILITIES
Source	Yes	Wells 6 and 7 appeared to be in excellent condition. They were metered, protected with check valves, and had adequate screened venting. ***However, the vent for Well 6 was in a horizontal configuration and should be converted to a downturned vent.*** Two of the older wells (1 and 2) were in fairly good condition. Screened vents were installed, but not downward facing on Well 1. **All screened vents should be downward facing**. Well 5 has been disconnected from the water system and is now classified as an inactive emergency well. All wells had sample taps. The four active wells are classified as a wellfield (S06). All of the wells discharge to the rapid mix basin of the treatment plant. It was reported that the surface water intake in the Mashel River was operating well and was in good condition. Water levels were fairly low in the river during the survey. These levels are typical of late summer conditions. The condition and operation of the treatment plant is described below.
Sanitary Control Area / Watershed Protection	Yes	The Sanitary Control area of the groundwater sources is adequate and restrictive covenants have been submitted to DOH for the Town's two newest wells, 6 and 7. The WSP update contained a wellhead and watershed protection program. The generator at the membrane filter plant is powered by diesel fuel and it was not clear whether the diesel storage tank in the generator assembly was double walled.
Storage	Yes	The Hilltop and the 1050 Zone (250,000 gallon steel) reservoirs appear to be in excellent condition. The reservoir rooftops were not accessed during the survey. It was reported that the reservoirs had screened vents and locking hatches with gasketed seals. Both reservoirs had screened overflows. The 996 Zone reservoir (300,000 gallon concrete) was in good condition. The vent for the reservoir runs around the entire circumference of the reservoir and has been repaired and improved since the last sanitary survey. The overflow outlet could not be located. ***The overflow outlet should be located and the presence of a screen on the outlet should be verified.*** Since the last survey, the roofs and hatches have all been inspected annually. New level transmitters have also been installed within the past year. It is recommended that the roofs of all reservoirs continue to be accessed at least once per year and the condition of the vents and hatches verified.
Distribution	Yes	The distribution system was reported to be in fairly good condition. Approximately 50 percent of the distribution mains are PVC with the remainder consisting of equal amounts of AC and cast iron pipe. Either PVC or ductile iron pipe is used for main replacement projects. A major main replacement is scheduled for approximately 2000 lineal feet of the old cast iron 10-inch diameter main on Mashel Avenue in 2011.

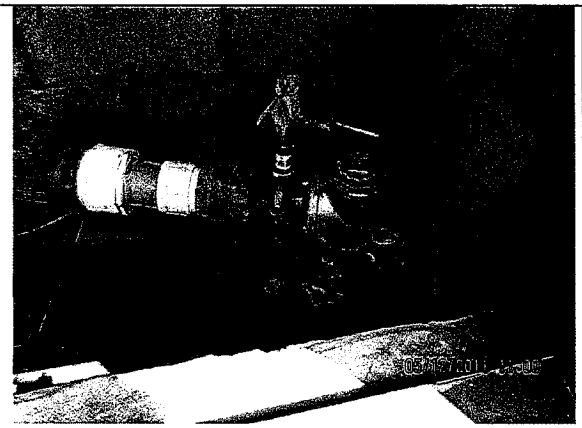
	ADEQUATE (YES/NO)	OBSERVATIONS/RECOMMENDATIONS
Pumping	Yes	The distribution system booster pump stations (BPSs) appeared to be in fairly good condition and the WSP update indicated that there was sufficient redundancy for them. There are plans to replace the BPS at the concrete reservoir to improve water flow and use in the distribution system. The Main High Service BPS, which pumps water from the treatment plant to the Town, is less than three years old and is in excellent condition. There is adequate capacity and redundancy for the BPS. Water pumped by the main BPS has met all CT requirements at the time of pumping.
Treatment	Yes	The Town operates a membrane filtration plant that treats all of their groundwater and surface water sources. Sodium hypochlorite is injected after filtration for disinfection purposes and soda ash is added after filtration prior to the CT basin for pH adjustment. Additional detailed information is provided in the separate membrane filtration plant field data sheet. Filtration Aluminum Chlorohydrate (ACH) is injected into raw water entering the rapid mix basin. The filters can tolerate a maximum concentration of 5 mg/L ACH before they show signs of plugging. ACH is injected for the primary purpose of organics and DBP precursor removal by the membrane filter units. From the rapid mix basin, water moves to a detention basin and is then pumped to the filter units. The filter system is a vacuum membrane filtration system as water is drawn into the filter fibers by low head vacuum pumps. This membrane filtration process has been granted 3-log *Giardia* and 0-log virus removal credit. The membrane units are two 500,000 gallon per day US Filter Axia Filtration Systems. A third filtration unit (Axim Filtration System) treats the backwash of the Axia units and the filter effluent discharges to the head of the Axia units. During the survey, a few inches of water was observed in the monitoring basin between the raw water detention basin and the CT basin. The monitoring basin should be dry because it is a barrier between raw and filtered water. The monitoring basin lid seals were in fair condition and may need to be replaced. Reportedly, the water in the monitoring basin is leaking in from this lid, but this could not be verified. ***The water must be removed from the basin and the operators will need to keep an eye on the monitoring basin to determine the source of water entering the basin.*** A pressure decay test (PDT) is conducted daily on active filter skids. The PDTs have been trending up as more fibers break. Each skid is taken out of service about every 5-6 months to repair membrane fibers and replace seals. A maintenance cleaning is conducted daily. The daily CIP consists of a phosphoric acid wash with a chlorine wash used every three days. The maintenance CIPs take approximately 2 hours and multiple CIPs may be run during high demand periods when using large volumes of Mashel River water. A standard and more extensive CIP is conducted when the TMP exceeds 7 psig, which is about 3 times per year.

	ADEQUATE (YES/NO)	OBSERVATIONS/RECOMMENDATIONS
		Post Filtration Following filtration water flows to the CT basin where it is chlorinated (see below). Soda ash solution is injected prior to the CT basin to raise pH. The soda ash mix tanks have an adequate air gap on the fill lines. The soda ash and coagulant injection systems also have backpressure sustaining valves to prevent accidental overfeed. Water flows from the CT basin to two finished water basins which supply the main high service pumps leaving the plant. The finished water basins are retrofitted sand filter cells. Disinfection Sodium hypochlorite is generated on-site using a ChlorTec system using two electrodes. The ChlorTec system uses a brine solution and electrolysis to produce a 0.8% solution of NaOCl and hydrogen gas. The hydrogen is vented from the storage tank using a passive ventilation system. The 0.8% NaOCl solution is pumped to the head of the CT basin where it is injected into the filter unit effluent. The CT basin has a volume of 81,000 gallons. An empirical T_{10}/T value of 0.5 is used to determine CT contact time. At a flow of 600 gpm the contact time of the basin is 135 min with a T_{10} of 67.5 min. The plant is required to provide 0.5 log inactivation of Giardia cysts. Inactivation ratios are typically greater than 5.0 and rarely less than 4.0.
Reliability	Yes	The Town has made significant strides in reliability in the last several years. The Hilltop reservoir has been constructed, a new treatment plant has been constructed with adequate capacity, and there have been significant improvements in telemetry and monitoring systems. The treatment plant and well pumps can be operated by an on-site automatic start generator. The System has added a small generator to run a radio telemetry transmitter on the roof of the concrete reservoir to relay reservoir levels to the treatment plant. The water level in the concrete reservoir dictates the operation of the Main BPS. There is adequate standby storage and multiple sources that serve the WTP. There appears to be adequate reliability for the water system.

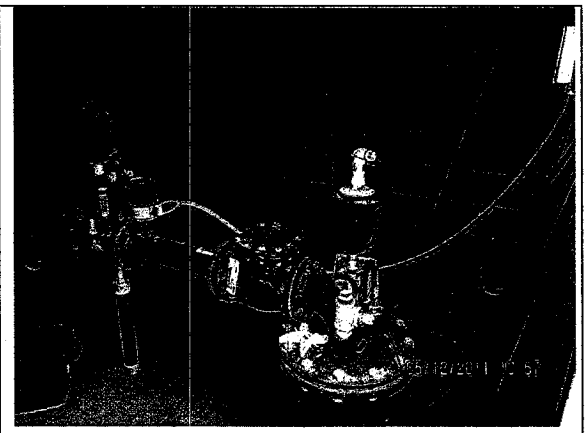
Photographs



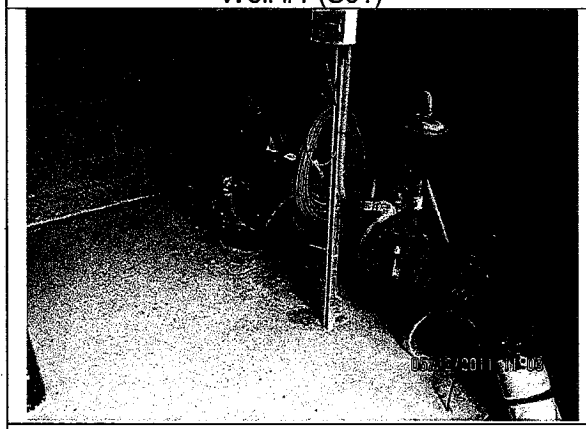
Well #1 (S01)



Well #2 (S02)

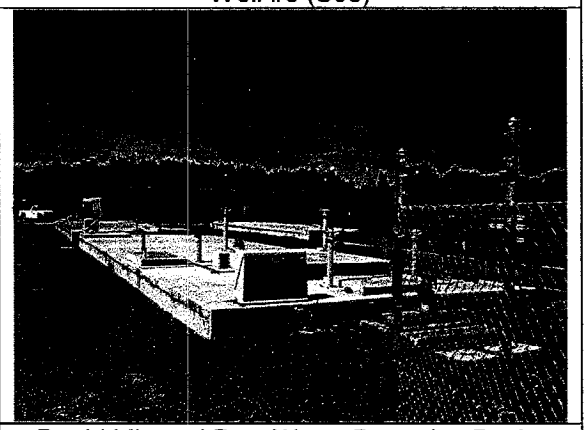


Well #6 (S08)



Well #7 (S09)

Mashel River Intake Location (9/2008)



Rapid Mix and Raw Water Detention Basin, Monitoring Basin and CT Basin (9/2008)

Town of Eatonville
Incorporated October 28, 1909
P.O. Box 309 • 201 Center St. W.
Eatonville, WA 98328
360-832-3361 • Fax: 360-832-3977

TOWN OF EATONVILLE 2011 LEAKAGE CONTROL PLAN

June 15, 2011

On May 12, 2011 Samuel Perry PE representing the Department of Health performed the required Sanitary Survey for the Eatonville Water System. The surveys are required every three years by the department.

As requested by the above survey and in accordance with WAC 246-290-820(4) a Water Leakage Control Plan must be completed. The following is the continued measures to hopefully reduce the difference between production and sales below the required 10%. It should be noted this difference does not have to be leakage.

The Town of Eatonville has been and will continue to be proactive in the attempt to reduce the distribution leakage or whatever is causing the remaining difference between Production and Sales. Presently the Town is not totally convinced it is leakage alone. Timing of meter reading, Un-identified services not accounted for or other possibilities may exist. Leak detector companies have been repeatedly contracted stating the system is tight when finished. Nevertheless the Town will continue to try and reduce the unaccountable water. In this ongoing process the Town of Eatonville is doing the following.

The Town is presently replacing 1,900 feet of 10 inch leaded joint cast iron water main that could be leaking.

Continue leak detection with both professional contractors and in house with the Town's employees.

Continue replacing aged water meters.

Provide training for the Fire Department about shutting off fire hydrants correctly when they are older hydrants.

Providing reviews on the Comprehensive Water Plan on a continual basis.

Auditing the sales meter list to make sure meter reading are recorded correctly either gallons or cubic feet.

Continue looking for unauthorized water services not metered.

The Town of Eatonville is taking this project very seriously and placing all the resources it can to reduce the difference between sales and production.

Sincerely

Mike Tiller
Town of Eatonville Water Department

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

Sanitary Survey of Membrane Filter Plant

Field Data Sheet

System Name	I.D. Number	Date	Evaluation By
Eatonville Water Department	22300 K	5/12/2011	Sam Perry

Operator(s) Present	WTPO#	Certification Level	Title	Phone Number
Mike Tiller (Lead Operator)	004271	WTPO2, WDM2, CCS	Water Superintendent	360-832-8514
Steve McKasson (Out on leave)	011617	WTPO2		

Identify lead operator/WTP supervisor above.
Is lead operator new since the last survey? N
Does this person sign the reports? Y Present during the survey? Y

Source Water & Watershed Information *(Review Watershed Risk Report from Surface Water Database (SWDB); Gather information needed if incomplete) Intake: Protection provided to Intake facilities; adequate screening; adjustable levels of withdrawal; pumped or gravity (reliability concerns)? Frequency and location of raw water turbidity and fecal coliform samples.*

There is one intake from the Mashel River (S05) and four GWI wells (#1, 2, 6 and 7) that provide raw water to the treatment plant. The GWI wells are classified as a wellfield (S06). The Mashel River intake is typically not used during periods of high turbidity (>25NTU). The watershed is primarily unprotected forested land with some limited residential development. Monthly raw water fecal coliform averaged 17/100 mL for 2007-2010 with a peak of 210/100 mL. Fecal coliform are low during the winter and peak during the summer.

Plant Schematic *– Use schematic from Comprehensive Performance Evaluation (CPE) report, if available; Show actual compliance monitoring locations for Combined Filter Effluent (CFE) turbidity, Concentration of Residual x Time of Contact (CT), and residuals @ entry point to Distribution System (DS); Place arrow and letter at chemical addition points and identify in tables below.*

(See separate page)

Pre-Filtration Chemical Addition - Coagulant(s), pH Adjustment, Preoxidant:

Coagulant:
None ☐ ACH/PACl ☒ Alum ☐ Ferric Cl/SO_4 ☐ Other☐:_____

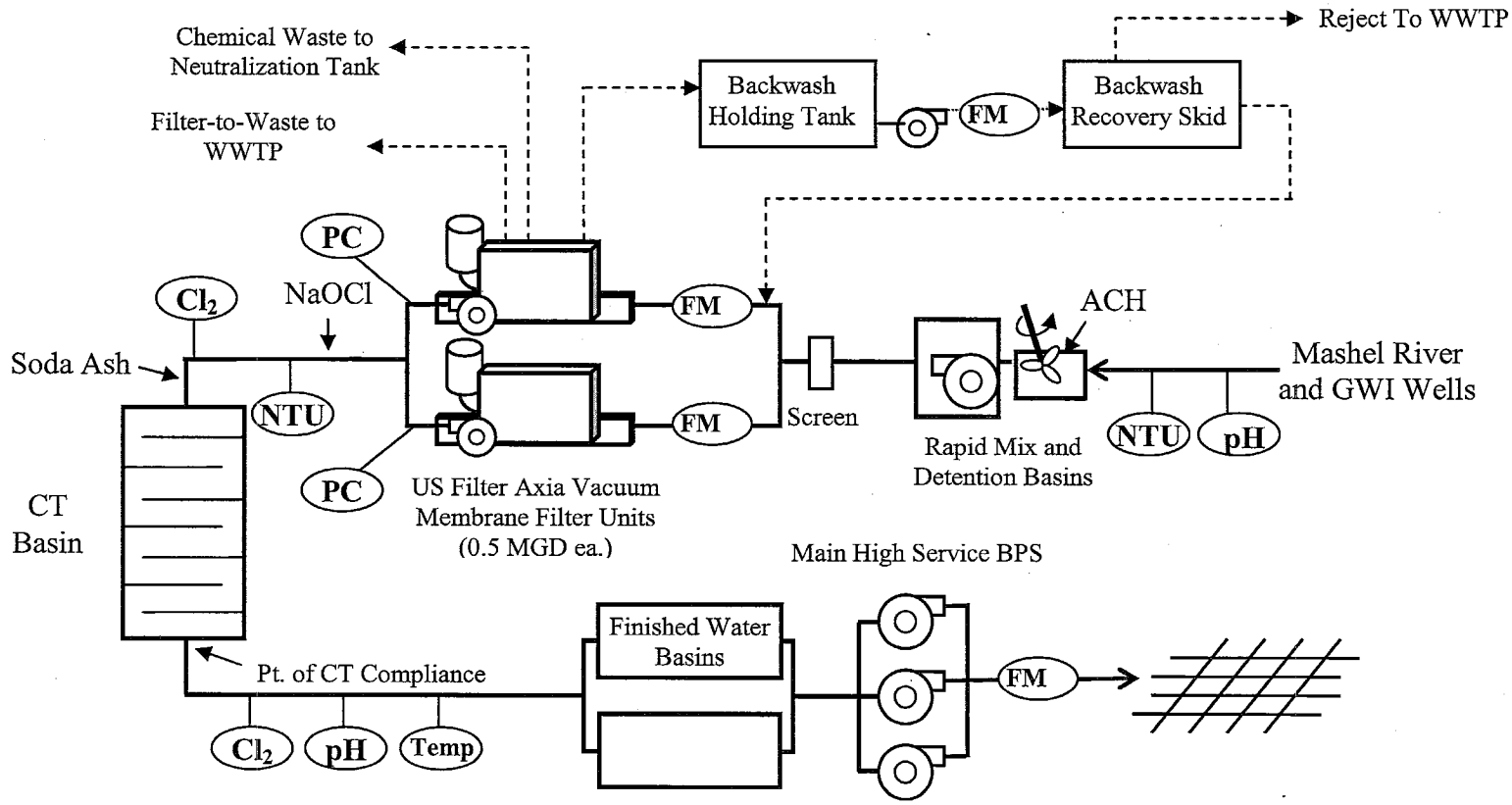
Brand name: Kemira PAX-XL-19 NSF Standard 60 Approved: ☒

Dose (mg/L): (Min; Max; Typical) 3 mg/L (on wells); 4 mg/L (on Mashel River Water); 5 mg/L (max)

Location: Rapid Mix Chamber

Note: ACH=Aluminum Chlorohydrate; PACl = Polyaluminum Chloride
How are dosages determined; how are they controlled? (Jar tests, Visual floc formation, streaming current monitor historical, monitoring data, etc.); what water quality variation triggers a change? (Compare monthly chemical usage to dosage.) Bulk storage? Day tanks? How are chemical stockpiles managed?

The coagulant dose used was established during the pilot testing for the WTP in 2005. The doses haven't been adjusted or experimented with since then. In addition, there are concerns about disinfection byproducts that make the operator appropriately reluctant to modify the coagulant dose.



ACH – Aluminum Chlorohydrate
NTU – Turbidity Monitoring
Cl_2 – Free Chlorine Residual
Temp – Temperature Monitoring

NaOCl – Sodium Hypochlorite
PC – Particle Count Monitoring
pH – pH Monitoring

(US Filter Axim Pressure Membrane Backwash Filter Unit not shown. Axim effluent is reintroduced before the Axia units.)

pH Adjustment:
None ☒ Caustic (NaOH) ☐ _____Acid: ☐ Other☐: _____

pH Target: _____ NSF Standard 60 Approved: ☐

Location:_____

How is pH control provided? How much bulk storage is provided? Is there a day tank?

Preoxidant:
None ☒ Chlorine ☐ Permanganate ☐ Other☐: _____

Target Dose: _____ NSF Standard 60 Approved: ☐

Location: _____

How is dose control provided? How much bulk storage is provided? Is there a day tank?

Rapid Mix Type: Static Mixer ☐ Mechanical Mixers [X] Injection Mixers ☐ In-line Blender Mixers ☐

Mixing Energy (G or GT): Specified as Lighnin Model X5Q75, ¾ HP mixer. A specific G is not mentioned.

Operational?
Yes

Sedimentation/Clarification:

NONE (Direct Filtration) [X] Horizontal-flow rectangular ☐ Tube Settlers ☐ Dissolved Air Flotation ☐
Adsorption Clarifier ☐ Horizontal-flow round ☐ Inclined-plate ☐ Other _____ ☐

Basin Dimensions: Length: _____ Width: _____ Depth: _____

Number of basins _____ Total Basin Volume: _____ Gallons

Contact clarifier media type? Cleaning frequency?

Pre-Filtration Screening

Type/Screen Size: Motorized self cleaning. Screen size not available. Provided by membrane manufacturer.

Number of Units: 1

Frequency of Cleaning: Multiple times a day (Automatically on pressure differential)

Basis for Cleaning (Time, Pressure Differential; Other): Pressure differential.

Filtration:

Equipment Supplier:
GE/Zenon 500 ☐ Pall☐ Siemens/US Filter M10C☐ Siemens/US Filter S10V☒ Other☐: _____

Number of Membrane Filter Units: 2 Modules/Filter Unit: 48

Plant Flow Rate (min, max, avg): 250-600 gpm (typical); 700 gpm (max) Flux Rate (min, max, avg): 25-35 gfd

TMP (min, max, current): 2-3 psi (typical); 9 psi (max); 10 psi (shutdown)

Permeability/Specific Flux (min, max, target): (Not tracked) gfd/psi at 20°C.

Operational Mode: Dead end☒ Crossflow☐

Recovery (%): Not tracked

Backflush:

Frequency: Every 30 minutes; Secondarily on TMP (9 psi)

Backflush Disposal: The backwash water is sent to a spate holding sump where it is pumped through a backwash water recovery skid. The permeate from this skid is sent to the rapid mix chamber at the head of the water treatment plant and the reject is sent to the city WWTP.

How often is backflush frequency changed? What is the basis for adjustments (Changes in turbidity, permeability, other)?
The backwash frequency is has not been changed since start-up.

Maintenance Clean:

Frequency: Daily

Chemicals Used: Chlorine ☒ Citric Acid☒ Phosphoric Acid☒ Other☐: _____

Dose: _____ Soak Time: _____
A maintenance clean is conducted daily using either hypochlorite or acid (Never both acid and hypochlorite in the same day). Acid washes are usually conducted two days in a row followed by a hypochlorite wash on the third day. For the acid wash, after the tank is isolated, acid, primarily phosphoric, is added to drop the pH to 1.8. The membranes are then cycled between a few minutes of air sour followed by a 15 minute soak period. The process is similar for the hypochlorite maintenance wash except that there is a chlorine residual target instead of one for pH. Overall, a maintenance clean is about a 2.5 hour process. This process is automated.

Recovery Clean (Clean-in-Place):

Frequency: About 3 times/year (Prior to peak summer demand; Prior to winter; one other time)

Chemicals Used: Chlorine ☒ Citric Acid☒ Phosphoric Acid ☒ Other☐: _____
A recovery clean is similar to doing two maintenance cleans in the same day with the addition of heating the water used in the cleaning process. After the membrane skid is isolated, hot water (32C) is added to the skids. Then acid, primarily phosphoric, is added to drop the pH to 1.8. Following a series of air agitation and soak cycles, the spent acid is sent to the chemical neutralization basin, the membranes go through a 5 minute filter to waste cycle and the process is repeated with a concentrated hypochlorite solution. Overall, the process takes about 6-8 hours with operators present the entire time.

What are procedures for bringing membrane filtration units on-line after a recovery clean? What is done for waste disposal?
The acid and hypochlorite used to clean the membrane are sent to the neutralization tank where they are first neutralized and then sent to the WWTP.

Indirect Integrity Monitoring:
Method: Particle Counters ☒ Laser Turbidity ☐ None ☐

Threshold: 30 counts/ml

Model: Hach PCX 2000

Number of exceedences in the past year: 0

Direct Integrity Testing:

Frequency: Daily Initial Test Pressure and Hold Time: 12 psi for 2 min

Range: 0.25-0.5 psi/min Trending: Yes ☐ No ☒

Approach: Fixed Upper Control Limit (UCL) ☒ Calculated LRV ☐
The current UCL is 0.8 psi/min. A membrane skid is taken off line and repaired when the direct integrity test reaches 0.5 psi/min.

Membrane Maintenance:

How often are membrane fibers repaired? When was the last repair and how extensive was it (fibers pinned, seals replaced, etc . . .)? Are there any other maintenance issues? When was the last time membrane modules were replaced?

The membranes are taken down for repairs every 5-6 months. The process takes 3 to 4 people one day to complete for each skid. During the last repair, approximately 0 to 40 fibers were repaired/module, averaging about 20-25 fibers pinned per module. During the most recent repair, the o-rings for each module were also replaced which significantly lowered the direct integrity test values.

Chemical Addition – Disinfection:

Chemical		Location	Dose	Chemical		Location	Dose
Gas Chlorine				UV*			
NaOCl	X	After filters, before CT basin	Residual: 1.9 mg/L at entrance to CT basin; 1.2 mg/L at exit.	Ozone			
ClO_2				Other:			

* *For UV, request records on bulb cleaning/replacement; check sensors and readings; dose = fluence, mJ/cm²*

Clearwell Dimensions: Width: 20 ft Length: 42 ft T_{10}/T: 0.5(assumed)

High/Low Levels: 11.5 ft to 13.0 ft (normal) No. Basins: 1 Total Volume: 81,000 gals (nominal)

Parameter Monitored	Location	When/ Frequency
pH	After clearwell	Continuously
Temperature	After clearwell	Continuously

Disinfectant Residual	After clearwell	Continuously
Disinfectant Residual		
Peak Hourly Flow (PHF)	Combined value from both filters	Continuously
Other:		

Redundancy of equipment; Contact time (T) evaluation – how derived, variable or constant; How is Peak Hourly Flow (PHF) determined – compare to value used for T in CT calcs; Check CT Summary Report in database, complete as necessary (If CT summary Report is not available, review CT determination in system files); Clearwell vents and screens; Calibration of pH meters and disinfectant residual monitors

It appears that the T is based upon the nominal clear well volume of 81,000 gallons. There is a weir box at the outlet that ensures a depth of at least 12.17 feet in the basins (803.45 ft elev.-791.28 ft elev). The nominal clearwell volume is based on 13 feet of depth.

Chemical Addition – Corrosion Control/Stability/Other:

Chemical		Location	Dose	Chemical		Location	Dose
Soda Ash	X	After filters	Target pH 7.2 to 7.4	Orthophosphate			
Caustic Soda				Polyphosphate			
Lime				Other:			

Target finished optimal water quality parameters:

pH: Not identified Alk: Not identified Phosphorus: _____ Other: _____

Fluoridation: None ☒ Hydrofluosilicic Acid ☐ Sodium Fluoride (Saturator) ☐ Sodium Silicofluoride (Dry Feed) ☐
NSF Standard 60 Approved: ☐

Location and Dose:

General Plant Operations/ Cross-Connection Protection (CCP)

Has purveyor had plant hazard evaluation by a Cross Connection Control Specialist (CCS)? If so, when?

Internal CCP – chemical makeup; use of day tanks; chemical feed/ makeup interconnections; split chemical feeds? Submerged inlets in chemical feed tanks? Protection from overfeed? Clean-in-place chemical disconnect? Connections to pumps? Hoses/ hose bibs? Any other treatment provided?

There is a double check valve assembly for the water supply to the building and air gaps on the make up water to the soda ash feed system. The facility was designed without double block-and-bleed valving, which is now typical, to isolate the membrane skids during chemical cleaning cycles.

Is plant staffed during all times of operation? No [X] Yes [ ]

Hours of operation: Start: _____ Stop: _____ Number of Shifts ____1____
The WTP starts and stops automatically based upon the water level in the 300,000 gallon reservoir. During the summer, the WTP runs 24 hours a day. Basic WTP monitoring can be performed remotely.

Plant staffing – plant rating/mandatory level; certification levels of operators; coverage, shift operation; vacations/ weekends/holidays.
Currently the Mike Tiller, the lead operator is working 7 days/week while the assistant operator is recovering from surgery. These two operators possess the necessary certification to operate the facility.

If unattended or operated remotely, how many hours a day is an operator at the WTP?

An operator is at the WTP a minimum of 1-2 hours per day. There are usually two checks of the facility each day.

What type of security is provided for the facility and operators?

The facility is protected by two locked gates and entirely fenced. There are intrusion alarms on all the doors and other security measures as well.

Critical Water Quality Alarms:

Parameter	Monitoring Point	Alarm Level	Shutdown Level	Response
Turbidity - Raw	Raw - River Only Raw – River and Wells	25 NTU	NA	At 25 NTU the valve to the river is closed.
Indirect Integrity	Permeate from each membrane skid	25 counts/mL	30 counts/mL	Both alarm and shutdown levels result in auto-dialer alerts to the operators.
Direct Integrity	Each membrane skid	0.8 psi/min	0.8 psi/min	Both alarm and shutdown levels result in auto-dialer alerts to the operators.
Chlorine Residual	Outlet of CT Basin	High 3.0 Low 0.7	NA	Both alarm and shutdown levels result in auto-dialer alerts to the operators.
pH - Finished	Outlet of CT Basin	High 8.5 Low ----	NA	Alarm level results in auto-dialer alert to the operators and local notification.
Turbidity - Finished		0.15 NTU	0.15 NTU	Both alarm and shutdown levels result in auto-dialer alerts to the operators.
Clearwell Level	Clearwell	NA	High 13.5' Low 2.5'	At 2.5', the booster pumps shut down. At 13.5', the WTP shuts down.

When was the last time critical water quality alarms were tested? What was done?

They have not been tested.

Version 01b; April 2011.

APPENDIX O

Initial Distribution System Evaluation

TOWN OF EATONVILLE

PIERCE COUNTY, **WASHINGTON**

Town Of Eatonville

INITIAL DISTRIBUTION SYSTEM EVALUATION: STANDARD MONITORING PLAN

RUSSELL L. PORTER
STATE OF WASHINGTON
35688
REGISTERED
PROFESSIONAL ENGINEER
3/20/08
EXPIRES: 11-26-2009

G&O #07608
MARCH 2008

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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PROPOSED STANDARD MONITORING SCHEDULE 8

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INTRODUCTION AND OBJECTIVES

The Environmental Protection Agency (EPA) has published its Stage 2 Disinfectant/ Disinfection By-Product (D/DBP) Rule. The new rule requires additional monitoring locations for D/DBPs and requires the Town to meet more stringent criteria than the previous regulations. Additional requirements include the preparation of an Initial Distribution System Evaluation (IDSE) Plan, monitoring additional locations for a full year, and completion of the IDSE Report. In order to fulfill the EPA planning requirements, the Town of Eatonville Water Department (the Town) has authorized Gray & Osborne, Inc. to prepare the Town's Initial Distribution System Evaluation: Standard Monitoring Plan.

The purpose of this Standard Monitoring Plan (SMP) is to fulfill the EPA requirement of preparing an IDSE Plan by April 1, 2008. The SMP provides general system information, requirements of IDSE, SMP site selection, justification of site selection, identification of the peak historical month, and the proposed SMP monitoring schedule.

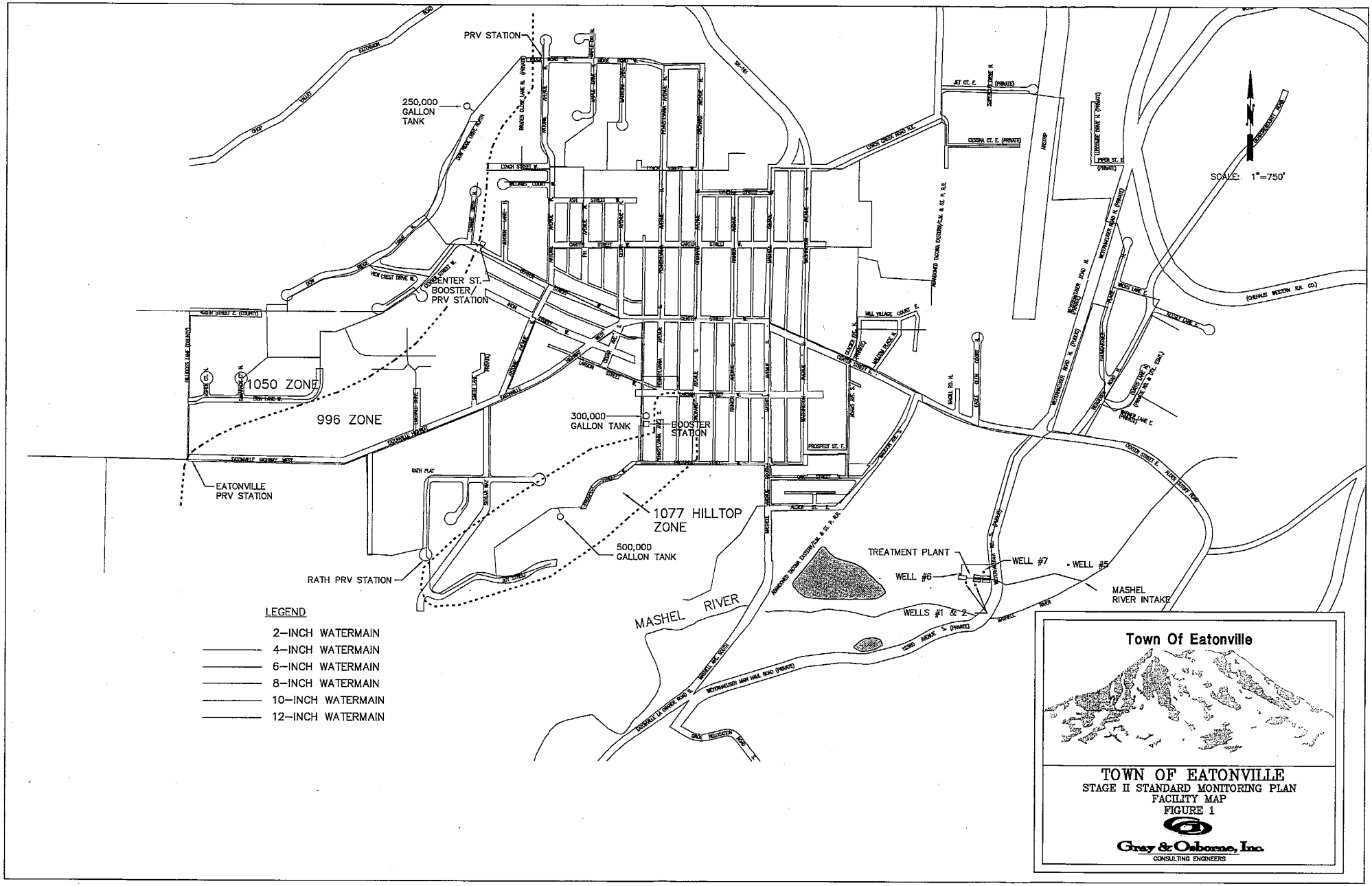
GENERAL SYSTEM INFORMATION

The Town of Eatonville is located in southern Pierce County approximately 30 miles southeast of Tacoma, between the western foothills of the Cascade Mountains near Mt. Rainier. The Washington State Department of Health (DOH) water system identification number for the Town is 22300K. Contact information for the Town is:

Mike Tiller
Eatonville Water Department
P.O. Box 309
Eatonville, Washington 98328
Phone: (360) 832-6110
Fax: (360) 832-3977

The Town of Eatonville has a municipal water system that currently serves approximately 2,380 people as estimated by the Washington State Office of Finance Management (2007). The Town's water source is surface water from the Mashell River and groundwater from five wells located near the membrane filter plant and river intake. Water from the river is treated by membrane filtration and disinfected with chlorine at the treatment plant located southeast of the downtown area near the river. Figure 1 depicts the Town's water supply system.

The Town's water system is relies on pumping to move water from the treatment plant to the pressure zones at higher elevations. Pressure reducing valves (PRVs) are used to control the water pressure in the lower pressure zones. Figure 1 also provides a representation of the major components comprising the Town's water system.


PRV STATION
250,000 GALLON TANK
CENTER ST. BOOSTER/ PRV STATION
1050 ZONE
996 ZONE
300,000 GALLON TANK
BOOSTER STATION
EATONVILLE PRV STATION
1077 HILLTOP ZONE
500,000 GALLON TANK
RATH PRV STATION
MASHEL RIVER
TREATMENT PLANT
WELL #7
WELL #6
WELL #5
WELLS #1 & 2
MASHEL RIVER INTAKE
SCALE: 1"=750'
LEGEND
2-INCH WATERMAIN
4-INCH WATERMAIN
6-INCH WATERMAIN
8-INCH WATERMAIN
10-INCH WATERMAIN
12-INCH WATERMAIN
Town Of Eatonville
TOWN OF EATONVILLE
STAGE II STANDARD MONITORING PLAN
FACILITY MAP
FIGURE 1
Gray & Osborne, Inc.
CONSULTING ENGINEERS

The Town is divided into three distinct pressure zones – 1077, 1050 and 996. The pressure zones are based on reservoir overflow elevations or the hydraulic pressure of the water provided to each zone. A master meter following the main pump station records the volume of water entering the system.

IDSE REQUIREMENTS

BACKGROUND

WAC 246-290-300 mandates that purveyors of public water systems that provide water treated with chlorine or other halogenated disinfectants must monitor the system for disinfection by-products. The Disinfectants/Disinfection By-Products (D/DBP) Rule establishes residual disinfectant concentrations and maximum contaminant levels for disinfection by-products.

Trihalomethanes (THMs) and five haloacetic acids (HAA5) are a group of organic compounds that can be formed as a result of drinking water disinfection by chlorine and are, therefore, referred to as disinfection byproducts. Total trihalomethanes (TTHMs) include the sum of the concentrations of four disinfection by-products: chloroform, bromoform, bromodichloromethane, and dibromochloromethane.

Stage 1 of the D/DBP Rule was published in November 1998 and became effective in 2000. Under Stage 1 of the D/DBP Rule, the Maximum Contaminant Levels (MCLs) for TTHM and HAA5 are 80 μg/L and 60 μg/L, respectively, and are based on the running annual average of four quarterly samples taken at various locations throughout the system. The Stage 1 D/DBP Rule will remain in effect for compliance through October 1, 2013.

STAGE 2 D/DBP

Stage 2 of the D/DBP Rule was published in January 2006 and compliance with the new regulations begins in 2012, although some provisions begin to apply to water systems of this size as early as April 1, 2008. Under Stage 2 of the D/DBP Rule, the MCLs for TTHM and HAA5 remain unchanged at 80 μg/L and 60 μg/L. Where Stage 1 D/DBP Rule is based on the running annual average of all sites, the Stage 2 D/DBP Rule is based on locational running annual average (LRAA) at mostly new sites that include high TTHM, high HAA5, and existing Stage 1 locations. This means that the running annual average at each site must be below the MCL. Additionally, the Stage 2 D/DBP Rule monitoring requirements and compliance schedule are now population based.

EPA has set deadlines for compliance with the Stage 2 D/DBP Rule based on the population of the system or the largest system in a regional water system. The Town must submit an IDSE monitoring plan to DOH by April 1, 2008 that states how the monitoring locations will be determined. By April 1, 2009, EPA will approve the monitoring plan and the Town will begin sampling according to the IDSE plan.

Sampling must be completed by March 31, 2010, and a report detailing the results of the IDSE must be submitted to DOH by July 1, 2010. The IDSE report will establish the Town's permanent D/DBP monitoring sites. EPA has published a guidance document for compliance with the IDSE requirements and it is located on the EPA website at www.epa.gov/safewater/disinfection/stage2/compliance_idse.html.

Each water system must select one of two options for an IDSE Plan: Standard Monitoring Plan (SMP) or a system specific study. The SMP option consists of testing for TTHM and HAA5 at two sampling locations for 1 year at 3-month intervals. The system specific study option requires one round of testing coupled with a hydraulic modeling analysis. This document serves as the Town's SMP. EPA has twelve months to review and comment on the IDSE Plan before it is considered approved.

The following table summarizes the Town's compliance schedule and deadlines.

TABLE 1

Town of Eatonville Compliance Schedule and Deadlines

Deadline	Task
April 1, 2008(1)	Submit IDSE Plan to EPA
March 31, 2010	Complete IDSE Standard Monitoring
July 1, 2010(2)	Submit IDSE Report to EPA
October 1, 2013	Compliance Required

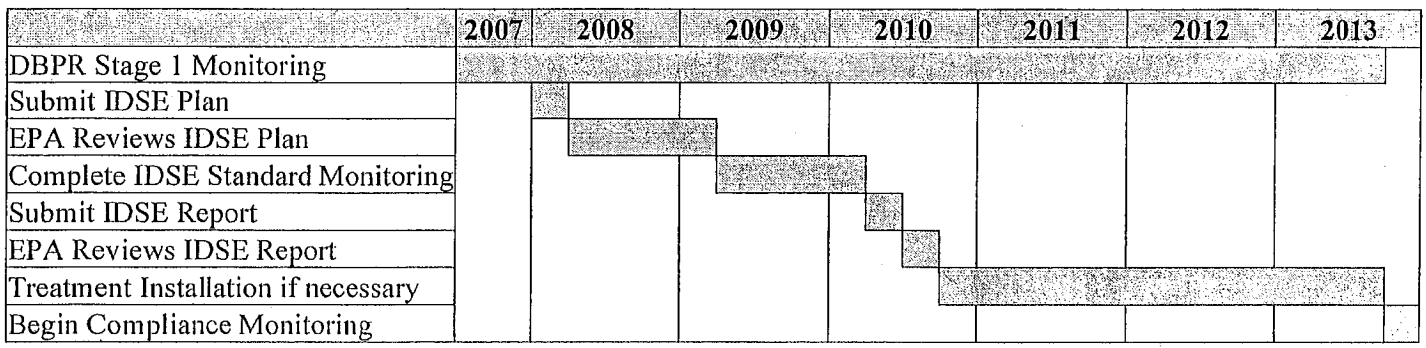
(1) If EPA does not approve the IDSE Plan within 12 months or provide notification that it has not yet completed its review within 12 months, the Plan is considered approved. Implement monitoring as outlined in the Plan.

(2) If EPA does not approve the IDSE Report within 3 months or provide notification that it has not yet completed its review within 3 months, the Report is considered approved. Implement monitoring as required.

The following table illustrates the schedule the Town will follow over the next 6 years.

TABLE 2

Town of Eatonville Compliance Timeline



The number of IDSE standard monitoring locations and frequency of sampling is determined based on the system population. The Town serves treated surface and ground water under the influence of surface water to an estimated 2007 population of 2,380. The system is required to sample every 90 days, or four monitoring periods per year. The SMP monitoring is in addition to existing Stage 1 DBPR sites. The types of monitoring sites are listed in the following table.

TABLE 3

SMP Monitoring Sites

Location	TTHM Samples	HAA5 Samples
Near Entry Point	0	0
Average Residence Time	0	0
High TTHM	1	1
High HAA5	1	1
TOTAL	**2**	**2**

The Town must complete IDSE standard monitoring by March 31, 2010. Site selection is intended to determine new compliance monitoring sites that more accurately represent high TTHM and HAA5 levels. Two samples must be collected during each sampling event at each location in order to test for TTHM and HAA5. Standard monitoring will take place between April 1, 2009 and March 31, 2010. The total number of sites required for IDSE Plan monitoring is two samples per monitoring period. Standard monitoring results should not be used to comply with the Stage 1 D/DBP Rule.

The Town will submit an IDSE Report to EPA by July 1, 2010. The purpose of this report is to use the IDSE standard monitoring and Stage 1 results to select the best Stage 2 D/DBP Rule locations. Once the IDSE Report is complete and approved by EPA, the Town will be required to begin routine sampling and reporting. Compliance with the Stage 2 D/DBP Rule is required by October 1, 2013.

STANDARD MONITORING SITE SELECTION

Various data and resources were utilized in the selection of monitoring site locations. Information used includes:

- Water System Base Map
- Disinfection Residual Data
- Stage 1 DBP Data
- Hydraulic Model

NEAR ENTRY POINT AND AVERAGE RESIDENCE TIME

Based on the Town's population and distribution system, sampling at high TTHM and HAA5 locations are the only required sampling locations. Sampling near entry points and average residence time locations is not required.

HIGH TTHM

Information used to select a high TTHM monitoring location includes chlorine residual data, 2005 through 2007 TTHM results, distribution and facilities maps, and the hydraulic model. Sites with high TTHM concentrations are generally located in areas with higher residence times, downstream of storage reservoirs and booster stations, in dead end water lines prior to the last customer.

The following table presents TTHM results and testing locations from 2005 through 2007.

TABLE 4

Stage 1 TTHM Results – 300 Block Antonie Avenue

Year	January (µg/L)	April (µg/L)	July (µg/L)	October (µg/L)	Locational Annual Average (µg/L)
2005	74.7	59.0	43.8	34.6	53.0
2006	55.9	30.6	NA (1)	89.7	58.7
2007	29.5 (2)	19.0 (2)	81.9	NA (1)	43.5
Average	53.4	36.2	62.9	62.2	51.7

(1) Data not available on DOH database.
(2) Samples taken in February and May.

The TTHM sample results show that the average was 51.7 µg/L in the 300 block of Antonie Avenue between the years 2005 to 2007.

Low chlorine residual values relative to the average indicate longer residence times, and may be connected with high TTHM concentrations. The City's chlorine residual data for 2006 and 2007 are shown in Table 5.

TABLE 5

2006-2007 Chlorine Residual Data

Location	Average Residual (mg/L)	
	2006	2007
102-106 Antonie Avenue North	0.81	0.53
102 Orchard Avenue North	NA	0.72
103 Pennsylvania Avenue North	NA	0.55
104 Madison Avenue South	1.16	0.42
202 Eatonville Highway	1.01	0.62
210 Washington Avenue North	0.88	NA
236 Center Street East	1.06	0.82
249-349 Mashell Avenue North	1.24	0.73
301-303 Antonie Avenue North	1.14	0.64
401 Weyerhaeuser Road	1.20	NA
402 Mashell Avenue South	1.03	0.54
600 Williams Court	1.09	NA
Center Street Pump house	1.24	NA
300,000-Gallon Reservoir	0.63	0.50
Average	**1.04**	**0.61**

Several locations throughout the Town have low residuals for the years of 2006 and 2007. Of the frequently sampled sites, the 300,000-gallon concrete reservoir in the 996 Zone has the lowest residual values for both years. Overall, the lowest residuals were found in the southern and middle parts of the Town.

The hydraulic model is used to check for locations of relatively high residence times. Figure 2 illustrates relative residence times within the water system. Since the hydraulic model is not intended to provide sole justification for monitoring locations, additional chlorine residual samples were taken in areas thought to have higher residence times. Results from these tests are shown in Table 6.

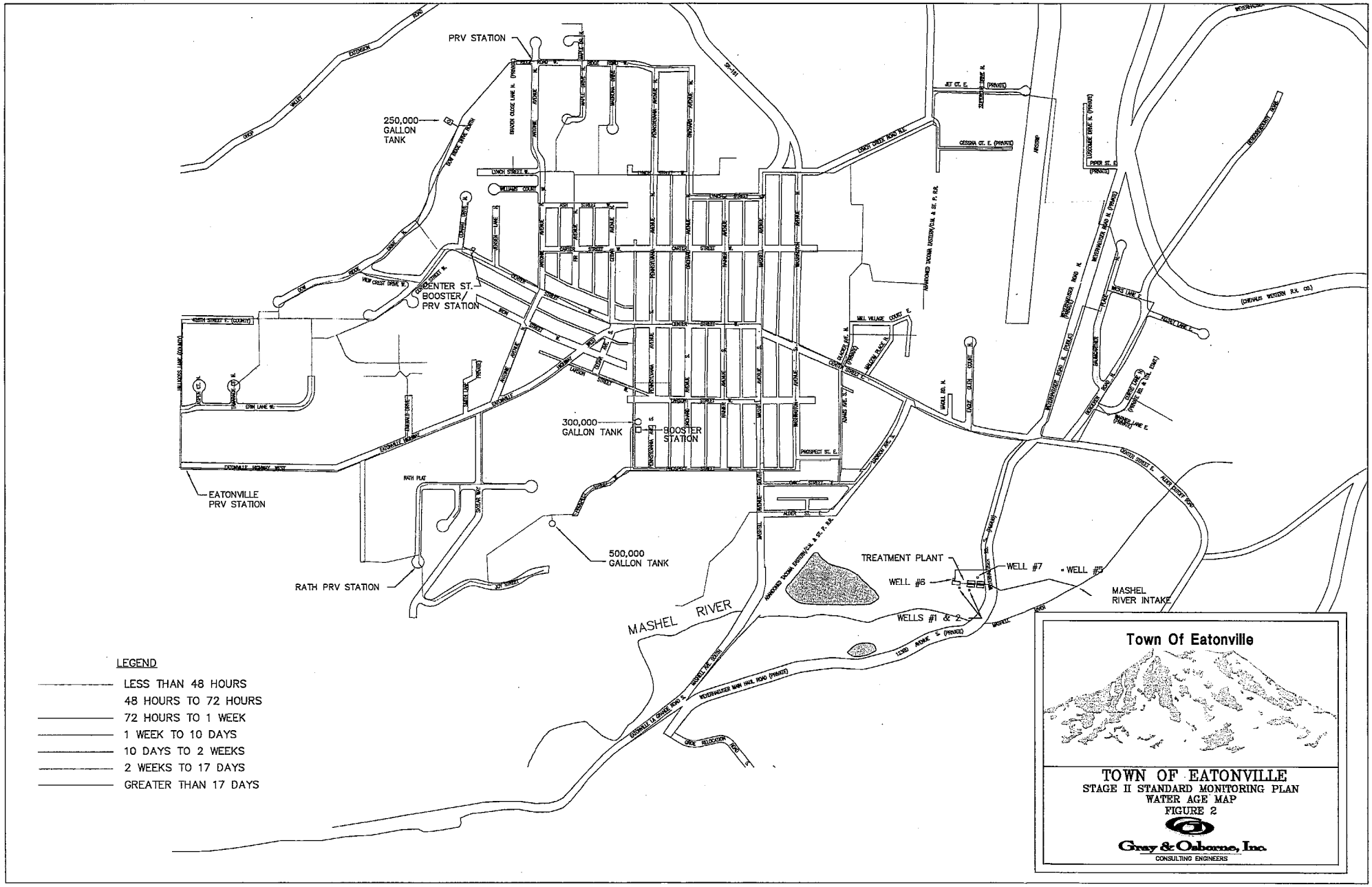

PRV STATION
250,000 GALLON TANK
CENTER ST. BOOSTER/ PRV STATION
300,000 GALLON TANK
BOOSTER STATION
EATONVILLE PRV STATION
RATH PRV STATION
500,000 GALLON TANK
MASHEL RIVER
TREATMENT PLANT
WELL #7
WELL #6
WELL #5
WELLS #1 & 2
MASHEL RIVER INTAKE
LEGEND
LESS THAN 48 HOURS
48 HOURS TO 72 HOURS
72 HOURS TO 1 WEEK
1 WEEK TO 10 DAYS
10 DAYS TO 2 WEEKS
2 WEEKS TO 17 DAYS
GREATER THAN 17 DAYS
Town Of Eatonville
TOWN OF EATONVILLE
STAGE II STANDARD MONITORING PLAN
WATER AGE MAP
FIGURE 2
Gray & Osborne, Inc.
CONSULTING ENGINEERS

TABLE 6

Additional Chlorine Residual Data

Location	Chlorine Residual (mg/L)		
	11/16/07	11/19/07	Average
645 Joy Street	0.05	0.15	0.10
210 Pennsylvania Avenue North	0.39	0.74	0.57
191 Dow Ridge North	0.48	0.59	0.54
10614 Eatonville Highway	0.25	0.57	0.41
725 Kelsey Lane	1.05	0.90	0.98
153 Weyerhaeuser Road	1.04	1.02	1.03

Several of the additional sampling sites yield residual values far below the average, indicating a likelihood of high TTHM values.

HIGH HAA5

Information used to select two high HAA5 monitoring locations includes historical HAA5 monitoring data, residual data, distribution and facilities map, and the hydraulic model. As seen with high TTHM concentrations, high temperatures and longer residence times often lead to high HAA5 concentrations. However, when residence time is high and residual levels are low microorganisms can consume HAA5, causing levels to decrease. HAA5 samples should be taken in areas of moderate residence time to reduce the possibility that biodegradation has occurred.

The following table presents HAA5 testing results and locations from 2005 through 2007.

TABLE 7

Stage 1 HAA5 Results – 300 Block Antonie Avenue

Year	January (µg/L)	April (µg/L)	July (µg/L)	October (µg/L)	Locational Annual Average (µg/L)
2005	87.8	96.2	106.3	52.9	85.8
2006	92.6	78.3	NA (1)	56.4	75.8
2007(2)	32.1	17.6	21.2	NA (1)	23.6
Average	70.8	64.0	63.8	54.7	61.7

(1) Data not available on DOH database.
(2) Samples taken in February, May, and August.

The HAA5 sample results show that the average was 61.7 μg/L in the 300 block of Antonie Avenue between the years 2005 to 2007.

The residual data previously discussed are also utilized to determine areas with low chlorine residual values. High residence generally indicates areas with high HAA5 levels. As discussed above, several additional sampling sites were chosen based on residence times found with the hydraulic model. Two of the additional locations and one current sampling location yield residual values that are at least 0.19 mg/L below the 2007 average value of 0.61 mg/L. Chlorine residual data is shown in Tables 5 and 6.

STANDARD MONITORING LOCATIONS

The standard monitoring locations chosen are based on the breakdown in Table 3 and on previous justifications in the previous sections. Figure 3 depicts the IDSE Stage 2 monitoring locations, Stage 1 D/DBP Rule monitoring locations, and major system components.

Table 8 summarizes the monitoring site locations.

TABLE 8

Monitoring Site Locations

Site No.	Sample Type	Address
1	High TTHM	650 Joy Street
2	High HAA5	10920 Eatonville Highway

The high TTHM site chosen is in the Hilltop Zone at 650 Joy Street. This site demonstrates high water age according to the hydraulic model, and is illustrated as location one in Figure 3. Based on routine and additional sampling, it is within the area that has the lowest chlorine residual of all areas tested.

A high HAA5 monitoring site chosen is in the 1050 Zone at 10920 Eatonville Highway, illustrated as sample site two in Figure 5. The HAA5 monitoring site is chosen based on recent average chlorine residual data of 0.41 mg/L at a nearby sample site and moderate residence time. Since HAA5 can degrade with time, it is important to choose a site with a moderate residence time.

PROPOSED STANDARD MONITORING SCHEDULE

The standard monitoring schedule for the Town is based around the peak historical month. It is mandatory that a sampling period falls within the peak historical month to ensure the collection of data when peak TTHM and HAA5 concentrations are expected. Table 9 summarizes historic water temperature.

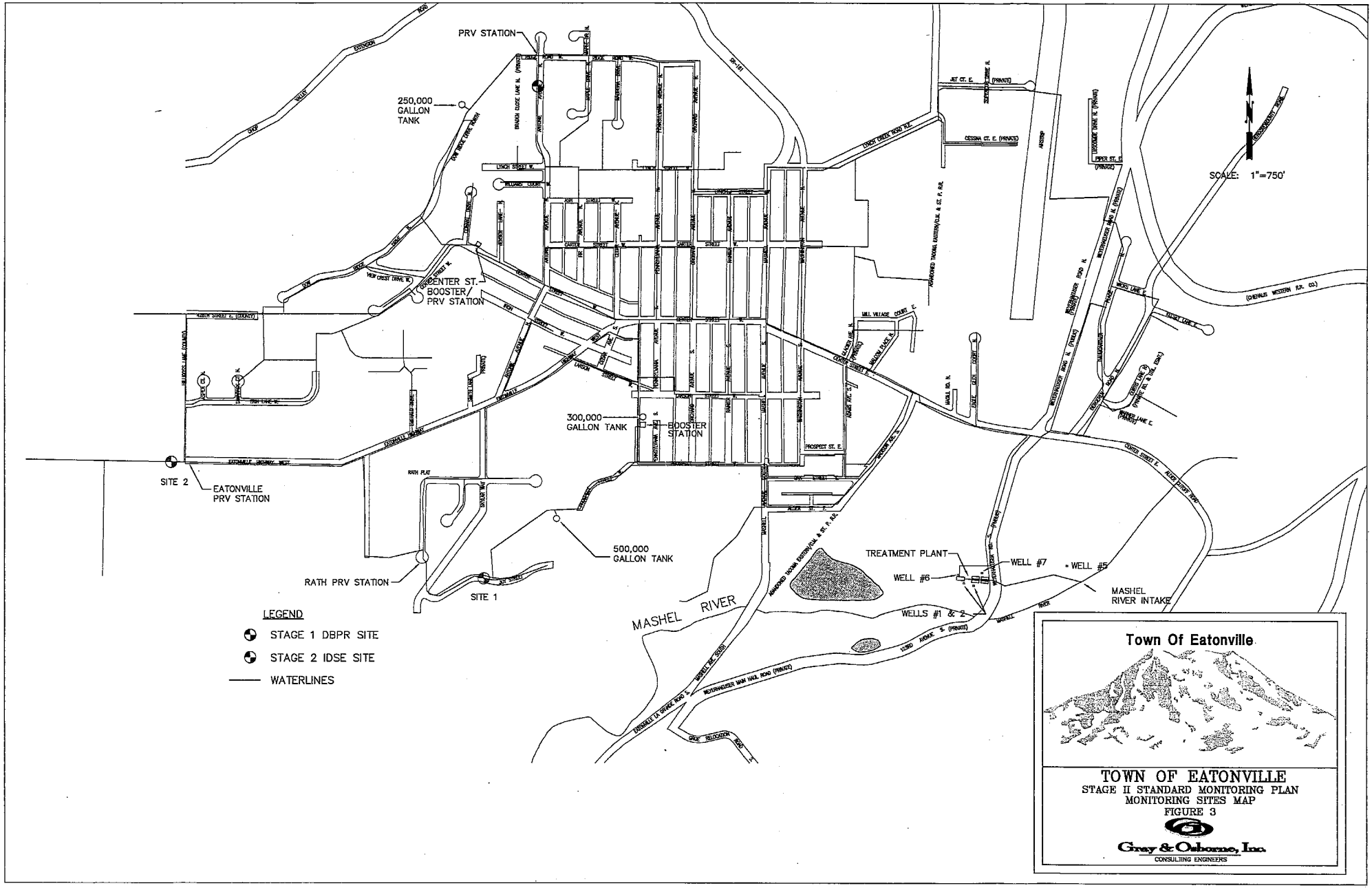

PRV STATION
250,000 GALLON TANK
CENTER ST. BOOSTER/ PRV STATION
300,000 GALLON TANK
BOOSTER STATION
500,000 GALLON TANK
SITE 2
EATONVILLE PRV STATION
RATH PRV STATION
SITE 1
MASHEL RIVER
TREATMENT PLANT
WELL #7
WELL #6
WELL #5
WELLS #1 & 2
MASHEL RIVER INTAKE
SCALE: 1"=750'
LEGEND
STAGE 1 DBPR SITE
STAGE 2 IDSE SITE
WATERLINES
Town Of Eatonville
TOWN OF EATONVILLE
STAGE II STANDARD MONITORING PLAN
MONITORING SITES MAP
FIGURE 3
Gray & Osborne, Inc.
CONSULTING ENGINEERS

TABLE 9

Historic Source Water Temperatures

Year	Average Source Temperature (C)		
	July	August	September
2003	14.7	15.8	NA
2004	14	15	NA
2005	13	15	12
2006	14	13	13.4
2007	19	19	17
Average	**15**	**16**	**14**

The highest temperatures have historically occurred in August. High temperatures generally yield high HAA5 concentrations as seen in Table 7.

Monitoring must be complete by March 31, 2010. The following table outlines the proposed standard monitoring schedule.

TABLE 10

Standard Monitoring Schedule

Monitoring Period	Projected Sampling Date
Period 1	Week of 5/10/2009
Period 2	Week of 8/16/2009
Period 3	Week of 11/15/2009
Period 4	Week of 2/14/2010

Both standard monitoring sites shall be tested for TTHM and HAA5 concentrations during each monitoring period according to the schedule above.

APPENDIX P

Water Rights Self Assessment

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

Table 1

WATER SYSTEM PLAN
WATER RIGHTS SELF ASSESSMENT – EXISTING STATUS

PERMIT CERTIFICATE OR CLAIM #	NAME ON DOCUMENT	PRIORITY DATE (List oldest first)	SOURCE NAME/ NUMBER	ANY PORTION SUPPLEMENTAL? (If yes, explain in footnote)	EXISTING WATER RIGHTS		EXISTING CONSUMPTION		CURRENT WATER RIGHT STATUS (Excess/Deficiency)	
					Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
Permits/ Certificates 1. GWC 5676-A	Town of Eatonville	11/29/1966	Wells 1, 2, 6, and 7 S06	Yes – Portion of the Annual Volume	360 gpm	394 afy [1]	360 gpm	186 afy	0	208 afy
2. G2-01087C	Town of Eatonville	8/18/1967	Wells 1, 2, 6, and 7 S06	Yes – Annual Volume	250 gpm	400 afy [2]	250 gpm	140 afy	0	260 afy
3. SWC 10307	Town of Eatonville	8/18/1967	Mashel River S05	Yes – Portion of the Annual Volume	2.3 cfs (1,032 gpm)	525 afy [3]	400 gpm	54 afy	632 gpm	471 afy
4.										
Claims 1. S2-004455CL [4]	Town of Eatonville	6/1908 [4]	Mashel River S05	No	4 cfs claimed 2.3 cfs used	1,000 afy claimed 588 afy used	Numbers included in SWC 10307 above			
2.										
3.										
4.										
TOTAL	**********	*********	*********	**********	1,642 gpm	525 afy [5]	1,010 gpm	380 afy	632 gpm	145 afy

INTERTIE NAME/ IDENTIFIER	NAME OF PURVEYOR PROVIDING WATER	EXISTING LIMITS ON INTERTIE USE		EXISTING CONSUMPTION THROUGH INTERTIE		CURRENT INTERTIE SUPPLY STATUS (Excess/Deficiency)	
		Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
1. None							
2.							
3.							
4.							
TOTAL	**********						

PENDING WATER RIGHT APPLICATION (New/Change)	NAME ON APPLICATION	DATE SUBMITTED	ANY PORTION SUPPLEMENTAL? (If yes, explain in footnote)	PENDING WATER RIGHTS	
				Maximum Instantaneous Flow Rate (Qi) Requested	Maximum Annual Volume (Qa) Requested
1. None					
2.					
3.					
4.					

[1] The Superseding Certificate contains the following limitation: "Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307." The original certificate, permit, and amended report of examination contained the following limitation: "Issued as a supplemental supply to the claim of vested rights, the total annual withdrawal shall not exceed 394 acre-feet, less any amount diverted under existing rights."

[2] The Superseding Certificate contains the following limitation: "Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307." The original certificate contained the following limitation: "This certificate is issued as a supplemental supply to the existing rights, the total annual withdrawal shall not exceed 400 acre-feet, less any amount diverted or withdrawn under existing rights." The permit and report of examination contained similar language, although the annual volume not to exceed was 525 acre-feet per year since the instantaneous rate originally allocated could support pumping to that volume.

[3] The Report of Examination and Permit contain the following limitation: "Issued as a primary right for 131 acre-feet per year, and as a supplemental right for 394 acre-feet per year, the total annual diversion shall not exceed 525 acre-feet, less any amount diverted or withdrawn under existing rights." Even though the Certificate does not have this language, it is still interpreted to be limiting on the water right.

[4] Since surface water certificate 10307 identifies nearly the same instantaneous rate and annual volume as was identified as being in use at the time of claim submittal, it has been assumed that the claim is not additive to the surface water certificate and more accurately identifies when surface water use of the Mashel River began.

[5] If the water right claim is recognized as being valid for either the claimed or used volume, the total annual volume of the Town's rights would be larger.

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Department of Health
20435 72nd Ave. S, Ste 200
Kent, WA 98032-2358
Fax: (253) 395-6750

☐ SWRO Drinking Water
Department of Health
PO Box 47823
Olympia, WA 98504-7823
Fax: (360) 664-8058

☐ ERO Drinking Water
Department of Health
1500 W. Fourth Ave, Suite 305
Spokane, WA 99201
Fax: (509) 456-3115

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

Table 2

WATER SYSTEM PLAN
WATER RIGHTS SELF ASSESSMENT – 6 YEAR FORECAST

PERMIT CERTIFICATE OR CLAIM #	NAME ON DOCUMENT	PRIORITY DATE (List oldest first)	SOURCE NAME/ NUMBER	ANY PORTION SUPPLEMENTAL? (If yes, explain in footnote)	EXISTING WATER RIGHTS		FORECASTED WATER USE FROM SOURCES (6-year Demand)		FORECASTED WATER RIGHT STATUS (Excess/Deficiency)	
					Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
Permits/ Certificates 1. GWC 5676-A	Town of Eatonville	11/29/1966	Wells 1, 2, 6, and 7 S06	Yes – Portion of the Annual Volume	360 gpm	394 afy [1]	360 gpm	225 afy	0	169 afy
2. G2-01087C	Town of Eatonville	8/18/1967	Wells 1, 2, 6, and 7 S06	Yes – Annual Volume	250 gpm	400 afy [2]	250 gpm	169 afy	0	231 afy
3. SWC 10307	Town of Eatonville	8/18/1967	Mashel River S05	Yes – Portion of the Annual Volume	2.3 cfs (1,032 gpm)	525 afy [3]	400 gpm	79 afy	632 gpm	446 afy
4.										
Claims 1. S2-004455CL [4]	Town of Eatonville	6/1908 [4]	Mashel River S05	No	4 cfs claimed 2.3 cfs used	1,000 afy claimed 588 afy used	Numbers included in SWC 10307 above			
2.										
3.										
4.										
TOTAL	**********	********	********	**********	1,642 gpm	525 afy [5]	1,010 gpm	473 afy	632 gpm	52 afy

INTERTIE NAME/ IDENTIFIER	NAME OF PURVEYOR PROVIDING WATER	EXISTING LIMITS ON INTERTIE USE		FORECASTED CONSUMPTION THROUGH INTERTIE		FORECASTED INTERTIE SUPPLY STATUS (Excess/Deficiency)	
		Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
1. None							
2.							
3.							
4.							
TOTAL	**********						

PENDING WATER RIGHT APPLICATION (New/Change)	NAME ON APPLICATION	DATE SUBMITTED	ANY PORTION SUPPLEMENTAL? (If yes, explain in footnote)	PENDING WATER RIGHTS	
				Maximum Instantaneous Flow Rate (Qi) Requested	Maximum Annual Volume (Qa) Requested
1. None					
2.					
3.					

[1] The Superseding Certificate contains the following limitation: "Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307." The original certificate, permit, and amended report of examination contained the following limitation: "Issued as a supplemental supply to the claim of vested rights, the total annual withdrawal shall not exceed 394 acre-feet, less any amount diverted under existing rights."

[2] The Superseding Certificate contains the following limitation: "Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307." The original certificate contained the following limitation: "This certificate is issued as a supplemental supply to the existing rights, the total annual withdrawal shall not exceed 400 acre-feet, less any amount diverted or withdrawn under existing rights." The permit and report of examination contained similar language, although the annual volume not to exceed was 525 acre-feet per year since the instantaneous rate originally allocated could support pumping to that volume.

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Olympia, WA 98504-7823
Fax: (360) 664-8058

☐ ERO Drinking Water
Department of Health
1500 W. Fourth Ave, Suite 305
Spokane, WA 99201
Fax: (509) 456-3115

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

Table 3

WATER SYSTEM PLAN
WATER RIGHTS SELF ASSESSMENT – 20 YEAR FORECAST

PERMIT CERTIFICATE OR CLAIM #	NAME ON DOCUMENT	PRIORITY DATE (List oldest first)	SOURCE NAME/ NUMBER	ANY PORTION SUPPLEMENTAL? (If yes, explain in footnote)	EXISTING WATER RIGHTS		FORECASTED WATER USE FROM SOURCES (20-year Demand)		FORECASTED WATER RIGHT STATUS (Excess/Deficiency)	
					Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
Permits/ Certificates 1. GWC 5676-A	Town of Eatonville	11/29/1966	Wells 1, 2, 6, and 7 S06	Yes – Portion of the Annual Volume	360 gpm	394 afy [1]	360 gpm	225 afy	0	169 afy
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4.										
Claims 1. S2-004455CL [4]	Town of Eatonville	6/1908 [4]	Mashel River S05	No	4 cfs claimed 2.3 cfs used	1,000 afy claimed 588 afy used	Numbers included in SWC 10307 above			
2.										
3.										
4.										
TOTAL	**********	********	********	**********	1,642 gpm	525 afy [5]	1,296 gpm	836 afy	346 gpm	- 311 afy

INTERTIE NAME/ IDENTIFIER	NAME OF PURVEYOR PROVIDING WATER	EXISTING LIMITS ON INTERTIE USE		FORECASTED CONSUMPTION THROUGH INTERTIE		FORECASTED INTERTIE SUPPLY STATUS (Excess/Deficiency)	
		Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
1. None							
2.							
3.							
4.							
TOTAL	**********						

PENDING WATER RIGHT APPLICATION (New/Change)	NAME ON APPLICATION	DATE SUBMITTED	ANY PORTION SUPPLEMENTAL? (If yes, explain in footnote)	PENDING WATER RIGHTS	
				Maximum Instantaneous Flow Rate (Qi) Requested	Maximum Annual Volume (Qa) Requested
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2.					
3.					

[1] The Superseding Certificate contains the following limitation: "Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307." The original certificate, permit, and amended report of examination contained the following limitation: "Issued as a supplemental supply to the claim of vested rights, the total annual withdrawal shall not exceed 394 acre-feet, less any amount diverted under existing rights."

[2] The Superseding Certificate contains the following limitation: "Wells 1, 2, 6 and 7 are authorized a combined withdrawal rate of 610 gpm, and 525 acre-feet per year under Water Right Certificates G2-01087 and Certificate 5676 – less any amount diverted directly from the Mashel River under surface water certificate 10307." The original certificate contained the following limitation: "This certificate is issued as a supplemental supply to the existing rights, the total annual withdrawal shall not exceed 400 acre-feet, less any amount diverted or withdrawn under existing rights." The permit and report of examination contained similar language, although the annual volume not to exceed was 525 acre-feet per year since the instantaneous rate originally allocated could support pumping to that volume.

[3] The Report of Examination and Permit contain the following limitation: "Issued as a primary right for 131 acre-feet per year, and as a supplemental right for 394 acre-feet per year, the total annual diversion shall not exceed 525 acre-feet, less any amount diverted or withdrawn under existing rights." Even though the Certificate does not have this language, it is still interpreted to be limiting on the water right.

[4] Since surface water certificate 10307 identifies nearly the same instantaneous rate and annual volume as was identified as being in use at the time of claim submittal, it has been assumed that the claim is not additive to the surface water certificate and more accurately identifies when surface water use of the Mashel River began.

[5] If the water right claim is recognized as being valid for either the claimed or used volume, the total annual volume of the Town's rights would be larger.

The Department of Health is an equal opportunity agency. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388). For additional copies of this form, call 1-800-521-0323. This and other forms are available at http://www.doh.wa.gov/ehp/dw

To return form, please see reverse side.

Please return completed form to the Office of Drinking Water regional office checked below.

☒ NWRO Drinking Water
Department of Health
20435 72nd Ave. S, Ste 200
Kent, WA 98032-2358
Fax: (253) 395-6750

☐ SWRO Drinking Water
Department of Health
PO Box 47823
Olympia, WA 98504-7823
Fax: (360) 664-8058

☐ ERO Drinking Water
Department of Health
1500 W. Fourth Ave, Suite 305
Spokane, WA 99201
Fax: (509) 456-3115

APPENDIX Q

Susceptibility Assessment Survey Form

Ground Water Contamination Susceptibility Assessment Survey Form
Version 2.1

Wellfield Representative well

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager : Town of Eatonville / Frank Ruisch

Water system name : Town of Eatonville

County: Pierce

Water system number: 22300K Source number: ~~02~~ 06 wellfield w/ (501 & 502) = 506

Well depth: 44 (ft.) (*From WFI form*)

Source name: Well #2

WA well identification tag number:___ ___ ___-___ ___ ___

_____ well not tagged

Number of connections: 679 Population served: 1380

Township: 16N Range: 4E

Section: 23 1/4 1/4 Section: NE 1/4 NE 1/4

Latitude/longitude (if available): N/A /

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
____other: _____

Q5e

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 6 / __ / 69 month/day/year

last reconstruction: __ / __ / __ month/day/year

_____ information unavailable

44'
not Confined
not Sealed
Open 20-50
WQ OK

2) Well driller: Robinson, Roberts & Associates

___ well driller unknown

3) Type of well:

___Drilled: ___ rotary ___ bored ✓ cable (percussion) ___ Dug

___ Other: ___ spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other: _____

Additional comments: method unknown

4) Well report available? ___ YES (attach copy to form) ___ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 250 GPM (gallons/min)

Source of information: 1974 Comprehensive Water Plan

If not documented, how was pumping rate determined? _____

___ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

✓ disinfection ___ filtration ___ carbon filter ___ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

7) If source is chlorinated, is a chlorine residual maintained: ✓ YES ___ NO

Residual level: 1.0 mg/L *(At the point closest to the source.)*

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

___ < 20 ft ✓ 20–50 ft ___ 50–100 ft ___ 100–200 ft ___ > 200 ft

___ information unavailable ('< ' *means less than;* '> ' *means greater than*)

2) Depth to ground water (static water level):

___ < 20 ft ✓ 20–50 ft ___ 50–100 ft ___ > 100 ft

___ flowing well/spring (artesian)

How was water level determined?

___ well log ___ other: Log & Comp Plan

___ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: ___ YES ___ NO

5) Wellhead elevation (height above mean sea level): 785 (ft)

How was elevation determined? ✓ topographic map ___ Drilling/Well Log ___ altimeter

✓ other: notes from Compdan Topo map

___ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

✓ evidence of a confining layer in well log

___ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth ~~to~~ ground water more than 20 feet above the ~~top~~ bottom of the ~~open interval~~ lowest confining layer? ___ YES ✓ NO

___ information unavailable

7) Sanitary setback:

___ < 100 ft* ___ 100–120 ft ___ 120–200 ft ___ > 200 ft
* if less than 100 ft describe the site conditions:

_____

_____

_____

_____

8) Wellhead construction:

___ wellhead enclosed in a wellhouse

___ controlled access (describe): _____

_____

___ other uses for wellhouse (describe): _____

_____

___ no wellhead control

9) Surface seal:

___ 18 ft

___ < 18 ft (no Department of Ecology approval) (*'<' means less than*)

___ < 18 ft (Approved by Ecology, include documentation) (*'<' means less than*)

___ > 18 ft (*'>' means greater than*)

✓ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year):

___ < 10 in/yr ___ 10–25 in/yr X > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 45, Million (gallons)

How was this determined?

___ meter

X estimated: ___ pumping rate (gpm Two wells)

___ pump capacity ( )

___ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 700 (ft)

1 year ground water travel time : 980 (ft)

5 year ground water travel time: 2200 (ft)

10 year ground water travel time: 3100 (ft)

Information available on length of screened/open interval?

___ YES ___ NO

Length of screened/open interval: 6 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? ___ YES ___ NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___ YES ___ NO (mark and identify on map).

Comments: _____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application				✓
stormwater injection wells				
other injection wells	✓	✓		
abandoned ground water well				
landfills, dumps, disposal areas				
known hazardous materials clean-up site				
water system(s) with known quality problems				
population density > 1 house/acre			✓	
residences commonly have septic tanks				
Wastewater treatment lagoons				
sites used for land application of waste				

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? *(Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.)*

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

_____

_____

_____

_____

_____

_____

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)

	YES	NO	
Results greater than MCL			
< 2 mg/liter nitrate		✓	
2–5 mg/liter nitrate	✓		.02
> 5 mg/liter nitrate			9-21-93
___ Nitrate sampling records unavailable			

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)

	YES	NO	
Results greater than MCL or SAL			6-13-90
VOCs detected at least once			1-7-94
VOCs never detected			9-24-93
___ VOC sampling records unavailable			11-5-90 Distrib

C. EDB/DBCP:

(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)

	YES	NO
EDB/DBCP detected below MCL at least once		
EDB/DBCP detected above MCL at least once		
EDB/DBCP never detected		

___ EDB/DBCP tests required but not yet completed

✓ EDB/DBCP tests not required

D. Other SOCs (Pesticides):

	YES	NO
Other SOCs detected (pesticides and other synthetic organic chemicals)		

___ Other SOC tests performed but none detected (list test methods in comments

✓ Other SOC tests not performed

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

E. Bacterial contamination: YES NO

Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records). ___ ___

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source. ___ ___

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

_✓_ YES _____ NO

Describe with references to map produced in Part IV:

_____

_____

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

___ YES _✓_ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

_✓_ YES ___ NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

___ YES ✓ NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	___	✗	___
6 month–1 year travel time	___	___	___
1–5 year travel time	___	___	___
5–10 year travel time	___	___	___

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	___	___	___
1–5 year travel time	___	___	___
5–10 year travel time	___	___	___

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES ___ NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? ___ YES ___ NO

- -

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

____

____

____

____

____

____

____

____

____

Appl.8915
Per. 8355

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

WELL LOG

Record by Driller

Source Driller's record

Location: State of WASHINGTON

County Pierce

Area

Map

S½ NE ¼ NE¼ sec 23 T. 16 N., R. 4 E. W.

Diagram of Section

23

Drilling Co. L. R. Gandio

Address Tacoma, Washington

Method of Drilling ? Date 7-1 1969

Owner Town of Eatonville

Address Eatonville, Washington

Land surface, datum ft. above below

SWL: 23 Date June, 19 69 Dims.

Correlation	Material	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Municipal supply		
	artifical fill	0	2
	gravel to boulder size	2	9
	sand & gravel W/ clayey binder	9	32
	sand, gravel clay-tight	32	38
	gravel small amount sand, dark		
	losse	38	44
	sand, gravel clay	44	45½
	Casing: 10" from +2' to 38.5'		
	Screen: UOP Johnson, stainless 10" 150 from		
	38' to 44'		
	Pupm test: 240 gpm with 12.5' dd after 4 hrs.		

Turn up

Sheet of sheets

RECEIVED
JUL 28 1994
Department of Health
Division of Drinking Water

Ground Water Contamination Susceptibility Assessment Survey Form

Version 2.1

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager : Town of Eatonville / Frank Ruisch

Water system name : Town of Eatonville

County: Pierce

Water system number: 22300K Source number: 501 ~~502~~

Well depth: 52 (ft.) (*From WFI form*)

Source name: ~~aquifer 36' to 42' and 38-44'~~ Well #1

WA well identification tag number: ___ ___ ___-___ ___ ___

✓ well not tagged

Number of connections: 673 Population served: 1380

Township: 16 N Range: 4 E

Section: 23 1/4 1/4 Section: N.E 1/4 of th N.E. 1/4

Latitude/longitude (if available): not available

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
____other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

Q5c

PART II: Well Construction and Source Information

1) Date well originally constructed: 501 10/25/66 month/day/year ~~502 June, 1969 100' N.E.~~

last reconstruction: 4/ __ /94 month/day/year 501 redeveloped.

_____ information unavailable

52'
Not Confined
Seal ?
NO3 OK
20-30

2) Well driller: S01 — L. R. Gandio

~~S02 — Robinson, Roberts & Assoc.~~, Inc.

___ well driller unknown

3) Type of well:

___Drilled: ___ rotary ___ bored ✓ cable (percussion) (S01) ___ Dug

___ Other: ___ spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other: _____

Additional comments: S02 method unknown

4) Well report available? ✓ YES (attach copy to form) ___ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: S01 300 gpm, S02 250 gpm (gallons/min)

Source of information: 1974 Comprehensive Water Plan

If not documented, how was pumping rate determined? _____

___ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

✓ disinfection ___ filtration ___ carbon filter ___ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

Chlorination provides distribution system disinfection protection from disease causing organisms

7) If source is chlorinated, is a chlorine residual maintained: ✓ YES ___ NO

Residual level: 1.0 mg/l *(At the point closest to the source.)*

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

___ < 20 ft ✓ both 20–50 ft ___ 50–100 ft ___ 100–200 ft ___ >200 ft

___ information unavailable ('< ' *means less than;* '> ' *means greater than*)

2) Depth to ground water (static water level):

___ < 20 ft ✓ both 20–50 ft ___ 50–100 ft ___ >100 ft

___ flowing well/spring (artesian)

How was water level determined?

___ well log ___ other: log in comprehensive plan

___ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: ___ YES ___ NO

5) Wellhead elevation (height above mean sea level): 785 (ft)

How was elevation determined? ___ topographic map ___ Drilling/Well Log ___ altimeter

✓ other: notes from comp plan probably topo map info

___ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

✓ ✓ evidence of a confining layer in well log 2' silt layer 34–36'

___ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the top of the open interval? ___ YES ✓ NO

___ information unavailable

7) Sanitary setback:

___ < 100 ft* ___ 100–120 ft ___ 120–200 ft ___ > 200 ft
* if less than 100 ft describe the site conditions:

The closest septic system is 1800' upstream along the river there is a total 5 septic systems upstream of this well.

8) Wellhead construction:

✓ wellhead enclosed in a wellhouse

✓ controlled access (describe): both well houses are in a locked fenced compound area

✓ other uses for wellhouse (describe): none

___ no wellhead control

9) Surface seal:

___ 18 ft

___ < 18 ft (no Department of Ecology approval) ('<' *means less than*)

___ < 18 ft (Approved by Ecology, include documentation) ('<' *means less than*)

___ > 18 ft ('>' *means greater than*)

✓ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year):

___ < 10 in/yr ___ 10–25 in/yr X > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 37 – 45 million gal/yr from the two wells (gallons)

How was this determined?

___ meter

✓ estimated: ___ pumping rate (well 1 200 gpm well 2 150 gpm)

___ pump capacity (well 1 300 gpm well 2 = 200 gpm)

___ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time: 700 (ft)

1 year ground water travel time : 980 (ft)

5 year ground water travel time: 2200 (ft)

10 year ground water travel time: 3110 (ft)

Information available on length of screened/open interval?

✓ YES ___ NO

Length of screened/open interval: 6 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? ✓ YES ___ NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___ YES ___ NO (mark and identify on map).

Comments: _____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application				✓
stormwater injection wells				
other injection wells	✓	✓		
abandoned ground water well				
landfills, dumps, disposal areas				
known hazardous materials clean-up site				
water system(s) with known quality problems				
population density > 1 house/acre			✓	
residences commonly have septic tanks				
Wastewater treatment lagoons				
sites used for land application of waste				

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

a) pesticides would come from incidental home owner use

b) the only abandoned wells that I know of are the Town wells shown on the map along the river.

c) the only high density residential area is outside the 1 yr boundary and is assumed to be downstream of our well hydraulica

d) There are no septic systems w/in the 1yr boundary

e There are (estimate) 16 septic systems w/in the 5 yr boundary

There are 3 septic systems

e) There is a sewage treatment plant that outfalls to the Mashell River downstream of the wells between the 5-10yr

f) The Mashell River watershed is owned primarily by Weyehaeuser, Champion and state land and is an operating

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following co
(Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l) 3-7-88 0.5

	YES	NO
Results greater than MCL	___	___
< 2 mg/liter nitrate since 1990	✓	___
2–5 mg/liter nitrate cannot find records	___	___
> 5 mg/liter nitrate prior to that ✓	___	___
___ Nitrate sampling records unavailable		

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.) 11-5-90 1&2 (THM ARTIFACT) Distrib. 6-12-90

	YES	NO
Results greater than MCL or SAL	___	___
VOCs detected at least once	___	___
VOCs never detected	✓	___
___ VOC sampling records unavailable		

C. EDB/DBCP:

(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)

	YES	NO
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	___	___

___ EDB/DBCP tests required but not yet completed ✓

✓ EDB/DBCP tests not required

D. Other SOCs (Pesticides):

	YES	NO
Other SOCs detected (pesticides and other synthetic organic chemicals)	___	___

___ Other SOC tests performed but none detected (list test methods in comments ✓

✓ Other SOC tests not performed

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC
performed, but no SOCs detected, list test methods here: _____

E. Bacterial contamination: YES NO

Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records). ___ ___

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source. ___ ✓

✓ Source sampling records for bacteria unavailable We have not tested our wells for Bacteria ~~recently~~ for many years

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

✓ YES ___ NO

Describe with references to map produced in Part IV:

_____

_____

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

___ YES ✓ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

✓ YES ___ NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

___ YES ✓ NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time		✓	
6 month–1 year travel time		✓	
1–5 year travel time		✓	
5–10 year travel time		✓	

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time		✓	
1–5 year travel time		✓	
5–10 year travel time		✓	

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

The main direction of ground water flow is estimated to be from the east to the west, from the mountains to the lowlands.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES ✓ NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? ___ YES ✓ NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

Keith Boettcher 7-28-94

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

5676A
Appl. #8408
Permit #7798

WELL LOG

Record by: Driller
Source: Driller's record

Location: State of WASHINGTON
County: Pierce
Area:
Map:
NE ¼ NE ¼ sec 23 T 16 N., R 4 E. W.

Diagram of Section

Drilling Co. Robinson, Roberts & Assoc., Inc.
Address: 1315 South 59th - Tacoma, Washington
Method of Drilling: Cable Date: 19
Owner: Town of Eatonville
Address: Eatonville, Washington
Land surface, datum: ft. above/below
SWL: 19' Date: October 25, 1966 Dims: 12" x 52'

Correlation	Material	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Domestic		
	Sand & gravel, muddy	0	18
	Pebbles, sand, coarse, dirty	18	34
	Sand & silt, blue	34	36
	Cobbles, pebbles, some sand, coarse	36	42
	Sand, gravel, clay, tight	42	49
	Hardpan (Sand on top)	49	52
	Casing: 12" from 1:3-38½'		
	10" from 34½-38½'		
	Screened from 38½-43½'		
	Yield: 260 gpm with 5.4' DD after 4 hrs.		
	352 gpm with 10.7' DD after 3 hrs.		
	Test made November 2, 1966		
	Temperature 50°		
	Pump: 7½ h.p. turbine Jacuzzi		

19 swl
open @ 38'
Not confined

Turn up Sheet ____ of ____ sheets

APPENDIX R

Buildable Lands and Pending Development

Future Buildout Analysis

Water Service Area										
PARCELS IN UGA, OUT OF TOWN LIMITS										
Row Labels	Count of ZONEb_RH2	Average of DENSITY	Sum of LAND_ACRES	Sum of EX_CONN	Sum of CALC_CONN	Sum of CONNECTNS	Sum of FUT_CONN	Future ADUs	Total Max_ERUs	Max connections
C-2	6	8.71	15.83	5	110.3	110	105		105	110
INDUSTRIAL	16	0	353.26	11	0.0	0	0		0	0
SF-1	137	4.54	483.39	89	1755.7	1758	1679	137	1816	1895
SF-2	16	5.19	132.45	3	549.9	552	550	16	566	568
TOTALS			**984.93**	**108**	**2415.9**	**2420**	**2334**	**153**	**2487**	2573

Land Use/Zoning codes provided by city for parcels within UGA and County for those out of UGA.

Total parcel count per category.

Density as dictated by County Sum of acres. Planning Report.

Proxy of existing connections, whereas each developed parcel has a single connection.

Calculated maximum number of connections as a function of acreage x density. Parcels within UGA were reduced by a multiplier of 0.8.

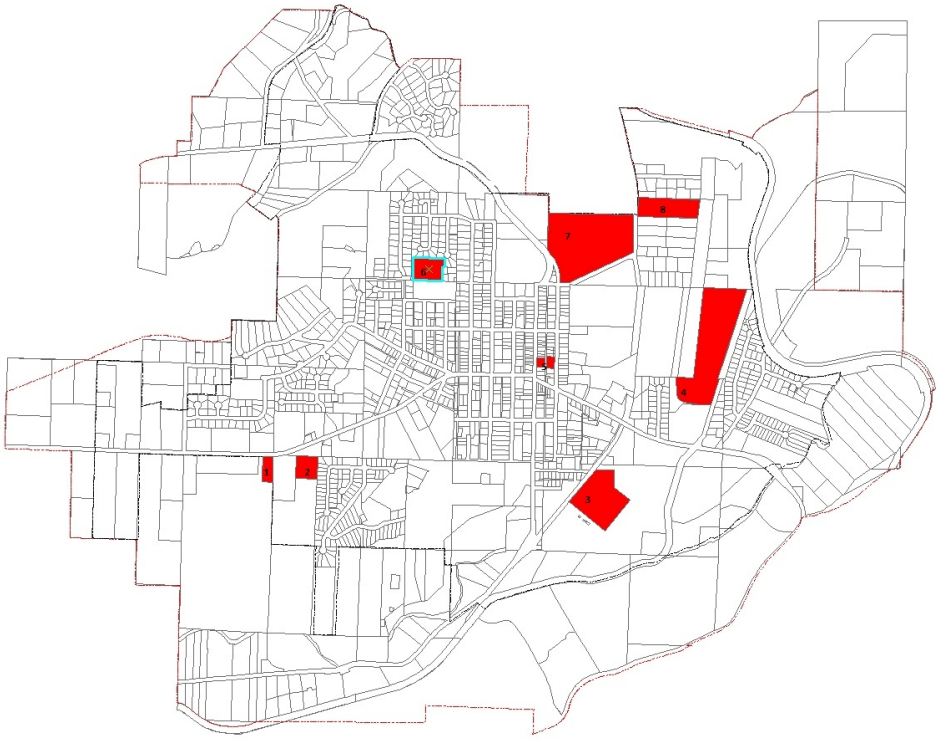
Rounded integer of Calculated Connections (areas>0 and <1.4999 = 1).

Future connections = rounded connections minus existing connections.

Additional detached units assigned to each SFR parcel.

Total Sum

Sum of Conn + Future ADUs



Appendix R
Figure R-1
Pending Developments as of August 2012

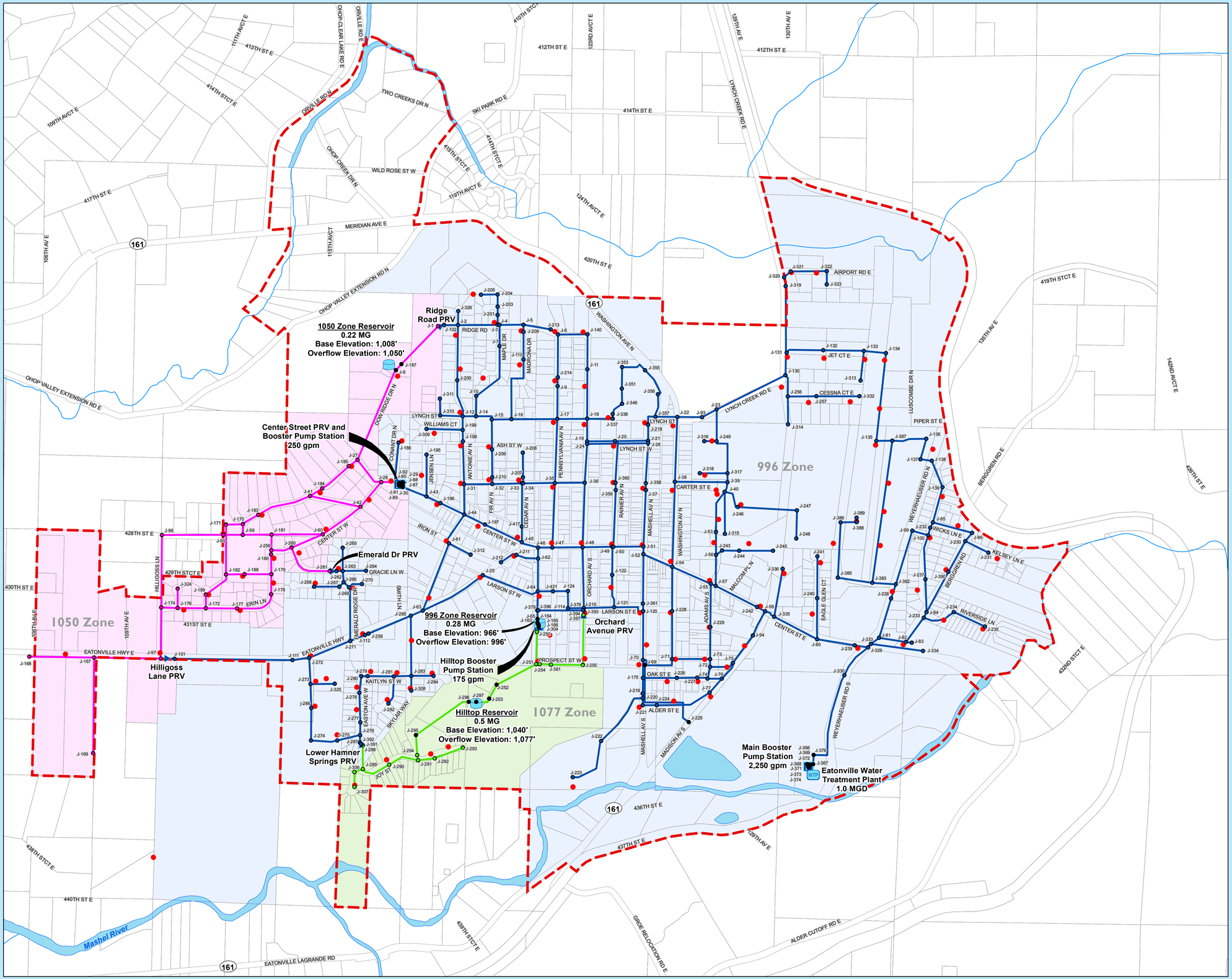
APPENDIX S

Hydraulic Model Node Diagram

Town of Eatonville

TOWN OF EATONVILLE
WATER SYSTEM PLAN

EXISTING SYSTEM HYDRAULIC MODEL NODE DIAGRAM



Legend

- Town Limits

Water Infrastructure

- Water Treatment Plant
- Reservoir
- BPS
- PRV
- Fire Hydrant

Nodes

- 996 Zone
- 1050 Zone
- 1077 Zone
- No Services

Water Main

- 996 Zone
- 1050 Zone
- 1077 Zone

Pressure Zone

- 996 Zone
- 1050 Zone
- 1077 Zone

1 INCH = 500 FEET

0 500 1,000

DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG

RH2 ENGINEERS PLANNERS SCIENTISTS

REV DATE: 10/11/2012

J:\Data\EAT\111-070\GIS\Maps\EAT-WSP-Ex-Node-Diagram.mxd By: KDS

APPENDIX T

Agency Review Correspondence

RH2 ENGINEERS PLANNERS SCIENTISTS

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RICHLAND
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Richland, WA 99352

SHERWOOD
18850 SW Parrett Mtn Rd
Sherwood, OR 97410

TACOMA
One Pacific Building
621 Pacific Ave, Ste 104
Tacoma, WA 98402

February 19, 2013

Ms. Jennifer Kropack, Regional Planner
Washington State Department of Health
Northwest Drinking Water Operations
20435 72nd Avenue S, Suite 200, K17-12
Kent, WA 98032-2358

Sent Via: *FedEx*

Subject: **Town of Eatonville Comprehensive Water System Plan**
Submittal of February 2013 WSP for DOH Review

Dear Ms. Kropack:

On behalf of the Town of Eatonville (Town), RH2 Engineering, Inc., (RH2) is submitting three copies of the Town's February 2013 Comprehensive Water System Plan (WSP) for your review. This WSP has been prepared in accordance with WAC 246-290-100. Also enclosed is the completed Washington State Department of Health (DOH) Water System Plan Submittal Form and Checklist.

A copy of the WSP will also be transmitted for review to Pierce County (County), along with a Consistency Statement Checklist for the County's signature. A copy of the WSP has also been provided to the Nisqually Tribe. The Barneys Corner, Pack Forest, and Pioneer Farm Museum water systems have been notified that the WSP is available at Eatonville Town Hall for their review and comment.

The Town is currently finalizing the State Environmental Policy Act (SEPA) Determination of Non-Significance and scheduling a date for Town Council approval of the WSP. Documentation of these items will be forwarded to you upon their completion.

If you have any questions regarding this submittal, please contact me at (425) 951-5427.

Sincerely,

RH2 ENGINEERING, INC.

Kimberly Kuzak

Kimberly A. Kuzak, P.E.
Project Manager

KS/KAK/jq/sp

Enclosures: Town of Eatonville February 2013 Comprehensive Water System Plan (3 copies)
DOH Water System Plan Submittal Form and Checklist

cc: Mr. Nick Bond, Town Planner, Town of Eatonville

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February 19, 2013

Mr. Dan Cardwell
Long Range Planning
Pierce County Planning and Land Services
2401 S 35th Street
Suite No. 2
Tacoma, WA 98409

Sent Via: *FedEx*

Subject: **Town of Eatonville Comprehensive Water System Plan Transmittal of February 2013 WSP**

Dear Mr. Cardwell:

On behalf of the Town of Eatonville (Town), enclosed with this letter is one hard copy and four CDs containing electronic copies of the Town's 2013 Comprehensive Water System Plan (WSP) for review and comment. The Pierce County WSP Review Requirement Guidelines checklist is also provided to aide in your review. A consistency review checklist is included with this transmittal for your completion as part of your review of the WSP. This WSP has been transmitted to the Washington State Department of Health (DOH) and adjacent water systems for their review, in accordance with WAC Chapter 246-290.

If you have any comments after your review of the WSP, please provide them to me in writing no later than April 1, 2013. Upon receipt of comments, the Town will promptly revise the plan as necessary and resubmit it to DOH for final approval.

If you have any questions, please contact me at (425) 951-5427.

Sincerely,

RH2 ENGINEERING, INC.

Kimberly Kuzak

Kimberly A. Kuzak, P.E.
Project Manager

KS/KAK/jq/sp

Enclosures: Town of Eatonville 2013 Comprehensive Water System Plan (1 hard copy, 4 CDs)
Consistency Review Checklist
Pierce County WSP Review Requirement Guidelines

cc: Mr. Nick Bond, Town Planner, Town of Eatonville

RH2 ENGINEERS PLANNERS SCIENTISTS

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Tacoma, WA 98402

February 19, 2013

Mr. Chris Ellings
Nisqually Indian Tribe
Nisqually Natural Resources
12501 Yelm Highway SE
Olympia, WA 98513

Sent Via: *FedEx*

Subject: **Town of Eatonville Comprehensive Water System Plan**
Transmittal of February 2013 WSP

Dear Mr. Ellings:

On behalf of the Town of Eatonville (Town), enclosed with this letter is one hard copy of the Town's 2013 Comprehensive Water System Plan (WSP) for review and comment. This WSP has been transmitted to the Washington State Department of Health (DOH) and adjacent water systems for their review, in accordance with WAC Chapter 246-290.

If you have any comments after your review of the WSP, please provide them to me in writing no later than April 1, 2013. Upon receipt of comments, the Town will promptly revise the plan as necessary and resubmit it to DOH for final approval.

If you have any questions, please contact me at (425) 951-5427.

Sincerely,

RH2 ENGINEERING, INC.

Kimberly Kuzak

Kimberly A. Kuzak, P.E.
Project Manager

KS/KAK/jq/sp

Enclosures: Town of Eatonville 2013 Comprehensive Water System Plan

cc: Mr. Nick Bond, Town Planner, Town of Eatonville

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TACOMA
One Pacific Building
621 Pacific Ave, Ste 104
Tacoma, WA 98402

February 19, 2013

Mr. Mike Williams
Barneys Corner Water System
PO Box 127
Eatonville, WA 98328

Sent Via: *US Mail*

Subject: **Town of Eatonville Comprehensive Water System Plan**
Availability of February 2013 WSP for Review

Dear Mr. Williams:

On behalf of the Town of Eatonville (Town), this letter is to inform you that the Town's 2013 Comprehensive Water System Plan (WSP) is available for review and comment. This WSP has been transmitted to the Washington State Department of Health (DOH) and other adjacent water systems for their review, in accordance with WAC Chapter 246-290. If you are interested in reviewing the WSP, a copy will be made available at Eatonville Town Hall for your review. If you have any comments after your review of the WSP, please provide them to me in writing no later than April 1, 2013. Upon receipt of comments from DOH, the Town will promptly revise the plan and resubmit it to DOH for final approval. Comments received from your organization after April 1, 2013, may not be addressed in the final version of the WSP.

If you have any questions, please contact me at (425) 951-5427.

Sincerely,

RH2 ENGINEERING, INC.

Kimberly Kuzak

Kimberly A. Kuzak, P.E.
Project Manager

KS/KAK/jq/sp

cc: Mr. Nick Bond, Town Planner, Town of Eatonville

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One Pacific Building
621 Pacific Ave, Ste 104
Tacoma, WA 98402

February 19, 2013

Mr. Dale Halverson
Pack Forest Water System
9010 453rd Street E
Eatonville, WA 98328

Sent Via: *US Mail*

Subject: **Town of Eatonville Comprehensive Water System Plan Availability of February 2013 WSP for Review**

Dear Mr. Halverson:

On behalf of the Town of Eatonville (Town), this letter is to inform you that the Town's 2013 Comprehensive Water System Plan (WSP) is available for review and comment. This WSP has been transmitted to the Washington State Department of Health (DOH) and other adjacent water systems for their review, in accordance with WAC Chapter 246-290. If you are interested in reviewing the WSP, a copy will be made available at Eatonville Town Hall for your review. If you have any comments after your review of the WSP, please provide them to me in writing no later than April 1, 2013. Upon receipt of comments from DOH, the Town will promptly revise the plan and resubmit it to DOH for final approval. Comments received from your organization after April 1, 2013, may not be addressed in the final version of the WSP.

If you have any questions, please contact me at (425) 951-5427.

Sincerely,

RH2 ENGINEERING, INC.

Kimberly Kuzak

Kimberly A. Kuzak, P.E.
Project Manager

KS/KAK/jq/sp

cc: Mr. Nick Bond, Town Planner, Town of Eatonville

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One Pacific Building
621 Pacific Ave, Ste 104
Tacoma, WA 98402

February 19, 2013

Ms. Valerie Silvertson
Pioneer Farm Museum
7716 Ohop Valley Rd
Eatonville, WA 98328

Sent Via: *US Mail*

Subject: **Town of Eatonville Comprehensive Water System Plan**
Availability of February 2013 WSP for Review

Dear Ms. Silvertson:

On behalf of the Town of Eatonville (Town), this letter is to inform you that the Town's 2013 Comprehensive Water System Plan (WSP) is available for review and comment. This WSP has been transmitted to the Washington State Department of Health (DOH) and other adjacent water systems for their review, in accordance with WAC Chapter 246-290. If you are interested in reviewing the WSP, a copy will be made available at Eatonville Town Hall for your review. If you have any comments after your review of the WSP, please provide them to me in writing no later than April 1, 2013. Upon receipt of comments from DOH, the Town will promptly revise the plan and resubmit it to DOH for final approval. Comments received from your organization after April 1, 2013, may not be addressed in the final version of the WSP.

If you have any questions, please contact me at (425) 951-5427.

Sincerely,

RH2 ENGINEERING, INC.

Kimberly Kuzak

Kimberly A. Kuzak, P.E.
Project Manager

KS/KAK/jq/sp

cc: Mr. Nick Bond, Town Planner, Town of Eatonville