Ordinance 18985
Attachment A
Available from the Clerk's Office

City of Issaquah

2018 Water System Plan Update

December 2018

Prepared by HDR, Inc. 2018

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Certification

This 2018 Water System Plan for the City of Issaquah was prepared by HDR Engineering, Inc., and City of Issaquah staff, under the direction of the following Registered Professional Engineers:

Jeff Hansen, PE
HDR Engineering, Inc.

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Approval

Reviewed by Washington State Department of Health in accordance with the provisions of WAC 246-290-100 and approved on ____________________.

Approved by the City of Issaquah by Resolution _____ dated ________.

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Acronyms and Abbreviations

µg/L	Micrograms per Liter
AC, ACP	Asbestos Cement, Asbestos Cement Pipe
ac-ft	Acre-feet
ADD	Average Day Demand
BIP	Bellevue-Issaquah Pipeline
BPS	Booster Pump Station
ccf	Hundred Cubic Feet
CCR	Consumer Confidence Report
CEU	Continuing Education Unit
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
CPA	Conservation Potential Assessment
CWA	Cascade Water Alliance
CWSP	Coordinated Water System Plan
CWSSA	Critical Water Supply Service Area
DBP	Disinfection By-Product
DBPR	Disinfection By-Products Rule
DNS	Determination of Non Signifiicance
DOH	Washington State Department of Health
DSL	Distribution System Leakage
Ecology	Washington State Department of Ecology
EKC	East King County
EPA	Environmental Protection Agency
ERU	Equivalent Residential Unit
ft	Feet
ft/s, fps	Feet per Second
FTE	Full Time Employee
GAC	Granular Activated Carbon
gal	Gallon
GFC	General Facility Charge
GMA	Growth Management Act
gpcpd	Gallons per Capita per Day
gpm	Gallons per Minute
GWA	Ground Water Rule
HAA	Haloacetic Acids
HGL	Hydraulic Grade Line
hp	Horsepower
HVF	High-volume, Unidirectional Flushing
ICP	Issaquah Comprehensive Plan
IDSE	Initial Distribution System Evaluation
ILA	Interlocal Agreement
IMC	Issaquah Municipal Code
IOC	Inorganic Contaminants
KCC	King County Code
KCCP	King County Comprehensive Plan
LF	Linear Feet
LIVA	Lower Issaquah Valley Aquifer
LRAA	Locational Running Annual Averages
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDD	Maximum Day Demand
MFR	Multi-family Residential
MG	Million Gallons
mg/L	Milligrams per Liter
MGD	Million Gallons per Day
MRDL	Maximum Residual Disinfectant Level
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PAA	Potential Annexation Area
pCi/L	Picocurie per Liter
PFC	Perfluorinated Compounds
PFOS	Perfluorooctanesulfonic acid
PHAL	Provisional Health Advisory Level
PHD	Peak Hour Demand
PHG	Public Health Goal
Plan	Water System Plan
PLC	Programmable Logic Controller
PNR	Public Notification Rule
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
Qa	Annual Quantity (Water Rights)
Qi	Instantaneous Quantity (Water Rights)
RAA	Running Annual Average
RCW	Revised Code of Washington
rpm	Revolutions per Minute
RTCR	Revised Total Coliform Rule
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SEPA	State Environmental Policy Act
SFR	Single-family Residential
SMCL	Secondary Maximum Contaminant Level
SMP	Standard Monitoring Program
SOC	Synthetic Organic Contaminants
SPU	Seattle Public Utilities
sq ft	Square Feet
SSS	System-Specific Study
TCR	Total Coliform Rule
TSP	Transmission Supply Plan
TTHM	Total Trihalomethane
UCMR	Unregulated Contaminant Monitoring Regulations
ULID	Utility Local Improvement District
UTRC	King County Utilities Technical Review Committee
VFD	Variable Frequency Drive
VOC	Volatile Inorganic Contaminants
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation
WSP	Water System Plan
WUCC	Water Utility Coordinating Committee
WUE	Water Use Efficiency

Executive Summary

The City of Issaquah (City) 2018 Water System Plan (Plan) has been prepared according to Washington State Department of Health (DOH) requirements as described in Washington Administrative Code (WAC) 246-290. These regulations require the City to update and submit to DOH a water system plan for approval every 10 years. This plan updates and supersedes the 2012 Water System Plan Update.

This Plan summarizes Issaquah's existing water system, establishes the water utility policies and criteria in accordance with the City of Issaquah Comprehensive Plan framework, projects future water demands, analyzes the existing water system and recommends improvements to correct deficiencies and meet future water service needs. The Plan provides the City with a guide to continued effective and efficient management of its water utility, particularly in the light of challenges associated with continued growth throughout its service area and redevelopment in the Central Issaquah area.

The Plan was developed collaboratively by City staff and HDR Engineering, Inc. in 2017 and 2018. The planning period includes a short-term horizon (10 years, through 2027) and long-term horizon (20 years, through 2037).

ES.1 Introduction

The City owns and operates a Group A public water system with water system identification number 363505.

The City's earliest known water supply was from a series of surface water springs flowing from the East Issaquah Watershed, purchased from the Gilman Water Company in 1923. The City's primary water supply was groundwater wells until 1998.

In 1999, the City joined the Cascade Water Alliance (CWA). The City currently provides portions of its service area with CWA water, with other areas receiving groundwater from its own wells. The City also has the ability to blend its groundwater with Cascade water in some portions of the system.

ES.2 Existing System

The City has defined a Retail Service Area in this Plan, approximately 8.4 square miles in size, representing the area of existing and near-term future service. The City has also identified a Future Service Area, comprised of areas to which the City intends to ultimately provide water service. This area is consistent with that depicted in the East King County Coordinated Water System Plan with exceptions to some areas that have been assumed by the City's system since the coordinated water system plan was last updated. The Retail and Future Service Area boundaries are presented in Figure ES-1.

Other water purveyors that are adjacent to the City's system are: City of Bellevue, Sammamish Plateau Water, Water District 90, Edgehill Water Association. The City has four interties with the City of Bellevue, two emergency interties with Sammamish Plateau Water, and two interties with Cascade's regional transmission main.

The topography of Issaquah has a direct impact on the location and configuration of distribution, storage and pumping facilities. The Retail and Future Service Areas consist of 14 existing operating areas and three proposed operating areas. Concentrated commercial development resides in the valley and residential development on the plateaus and hillsides.

ES.3 Water Utility Policies and Criteria

The City manages its water utility in accordance with established federal and state regulations for public water systems. City policies and standards provide a consistent framework for the planning, design, construction, maintenance, operation, and service of the City's water system and water supply sources. The City's policies are grouped in major categories including:

- Service Area and Extensions
- Customer Service
- System Reliability
- Fire Protection
- Emergency Management Plan
- Coordination/Cooperation with Other Utilities
- Water System Design
- Environmental Stewardship
- Water Conservation
- Financial Policies

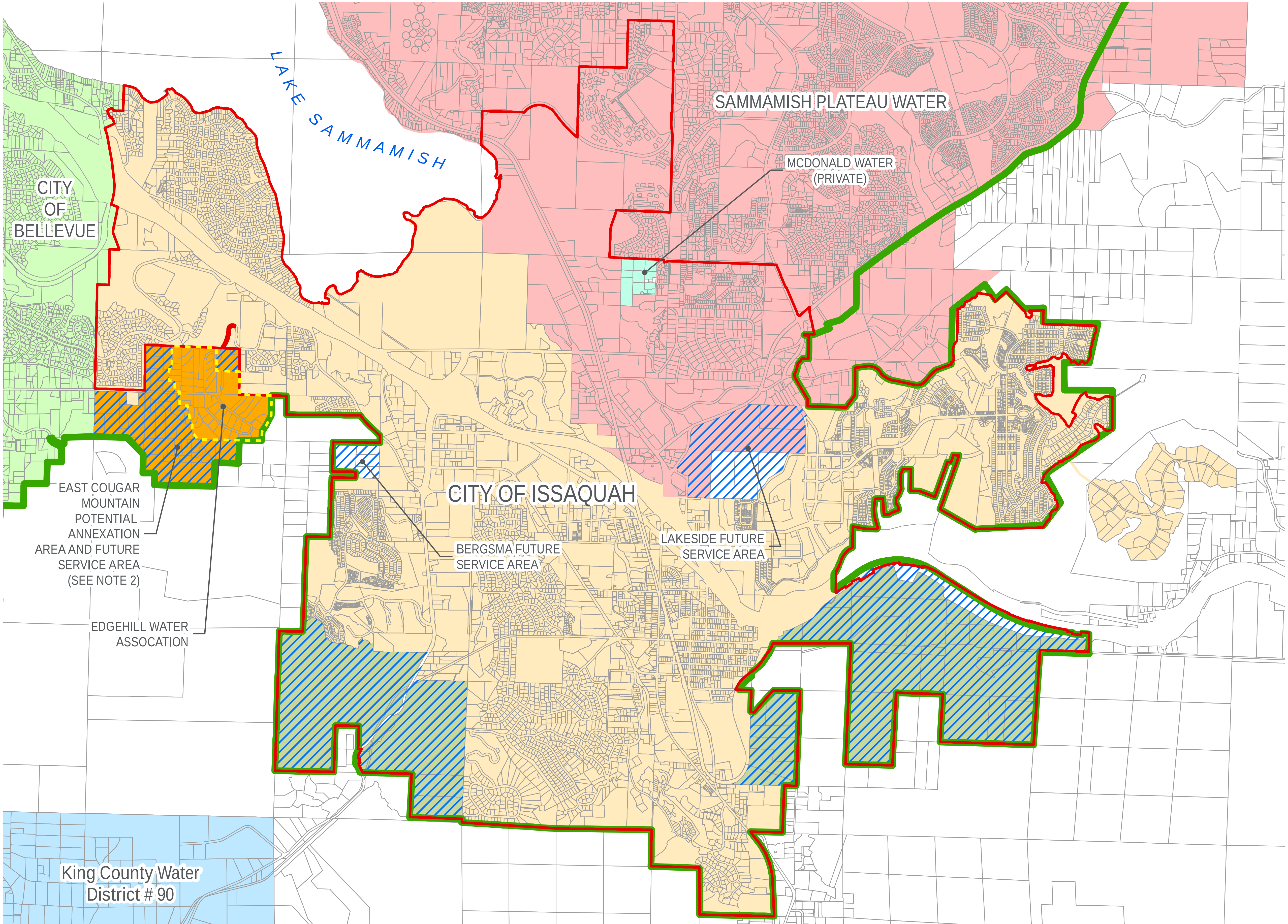
ES.4 Planning Considerations

This Plan has been developed consistent with the policies, land use, and zoning established in the City's 2017 Comprehensive Plan. The population within the City is estimated to grow from 37,000 in 2017 to approximately 50,000 by 2027, with much of that growth and associated commercial redevelopment occurring in the Central Issaquah area in the valley, particularly within the Regional Growth Center.

ES.5 Water Requirements

Quantifying realistic water demand is necessary for planning infrastructure projects and securing adequate water supply to meet future needs. This Plan includes a water demand forecast by first analyzing recent historical water production and customer usage data to understand the water consumption characteristics specific to the City. Based on a review of the data from 2014 to 2016, the recent typical average daily demand (ADD) water use for a single-family residence (SFR) in Issaquah has been 145 gallons per day (gpd). However, for planning purposes, a value of 150 gpd is used to project demand associated with future SFR development. This value of 150 gpd is referred to as an equivalent residential unit (ERU) of demand.

On average from 2014 through 2016, SFR customers have comprised 35 percent of total system water production, while MFR and commercial customers have represented 19 and 21 percent, respectively. Approximately 15 percent of production is comprised of irrigation and public account



LEGEND

City Limits

King Co. Urban Growth Boundary

Parcels

Issaquah Service Area

Retail Service Area

Future Service Area

Areas within Future Service Area Zoned as Open Space

Potential Annexation Area (PAA)

Adjacent Purveyor Service Areas

City of Bellevue

King County Water District 90

Sammamish Plateau Water

McDonald Water (Private)

Edgehill Water Association

Notes:

1. Water Service Areas per King County GIS (accessed January 2018) except as follows: changes to Bellevue/Issaquah boundaries for South Cove and area west of Lakemont, changes to Sammamish Plateau Water/ Issaquah boundaries for Lakeside, assumption of Grand Ridge into Issaquah. Urban Growth Boundary per 2017 King County Comprehensive Plan.

2. The City of Issaquah has requested to King County that this area be removed from the City's PAA. In the 2016 King County Comprehensive Plan update, King County committed to a due diligence review (Action 14, page 12-21) on every parcel within the East Cougar Mountain PAA. King County is committed to continue working with Issaquah and Bellevue on issues of water availability, response times and fire flows within the PAA. Some of this work will start in early 2018, and is intended to influence the Scope of Work for the 2020 King County Comprehensive Plan update.

0 Miles 0.5

HDR

CITY OF ISSAQUAH WASHINGTON

ISSAQUAH SERVICE AREA

FIGURE ES-1

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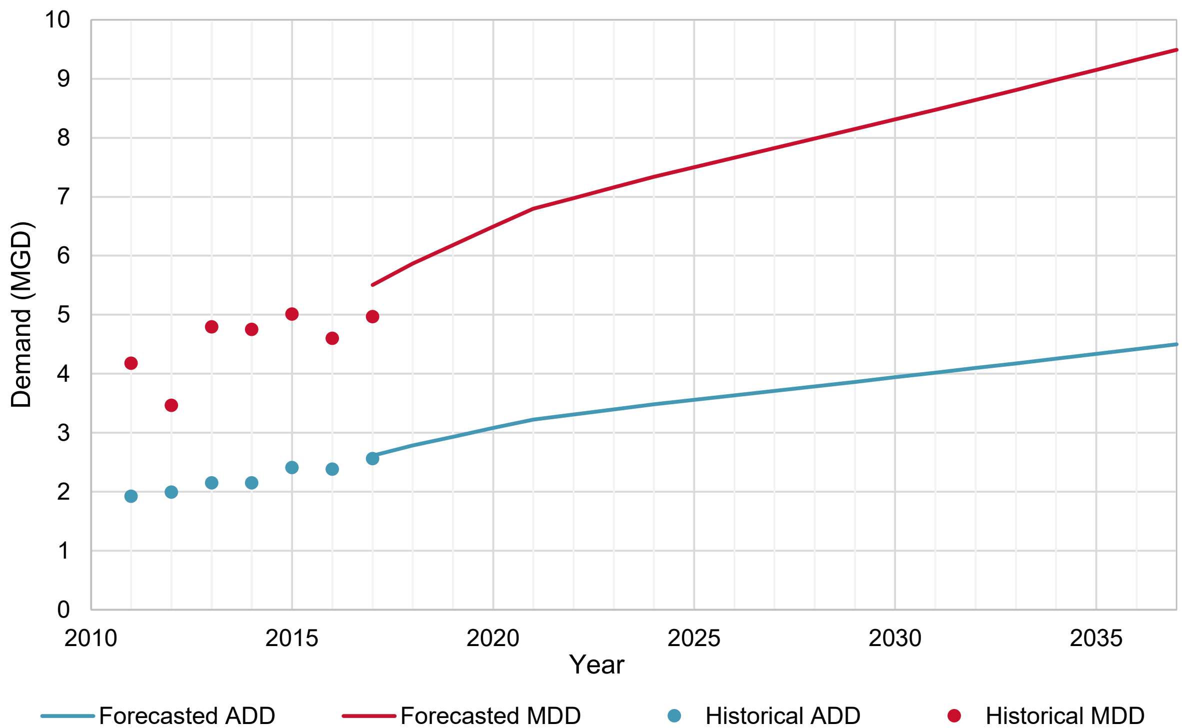
usage. The remaining 10 percent of total water production is comprised of non-revenue water, with distribution system leakage accounting for 6.4 percent.

Total system-wide ADD is projected to increase from 2.61 MGD in 2017, to 4.50 MGD in 2037. Maximum day demand (MDD) is projected to increase during this same time period from 5.51 MGD to 9.49 MGD. The demand forecast is summarized in Figure ES-2.

Figure ES-2. System-Wide Demand Forecast



ES.6 Water Use Efficiency

Conservation is termed a demand-side management program. As a supply alternative, it serves to decrease consumption, allowing a utility to delay procurement of additional water supplies, reduce withdrawals and associated impacts from existing water resources, manage peak demand and reduce wastewater flows. This Plan summarizes the City's conservation program that is mandatory through the State Water Use Efficiency (WUE) Rule.

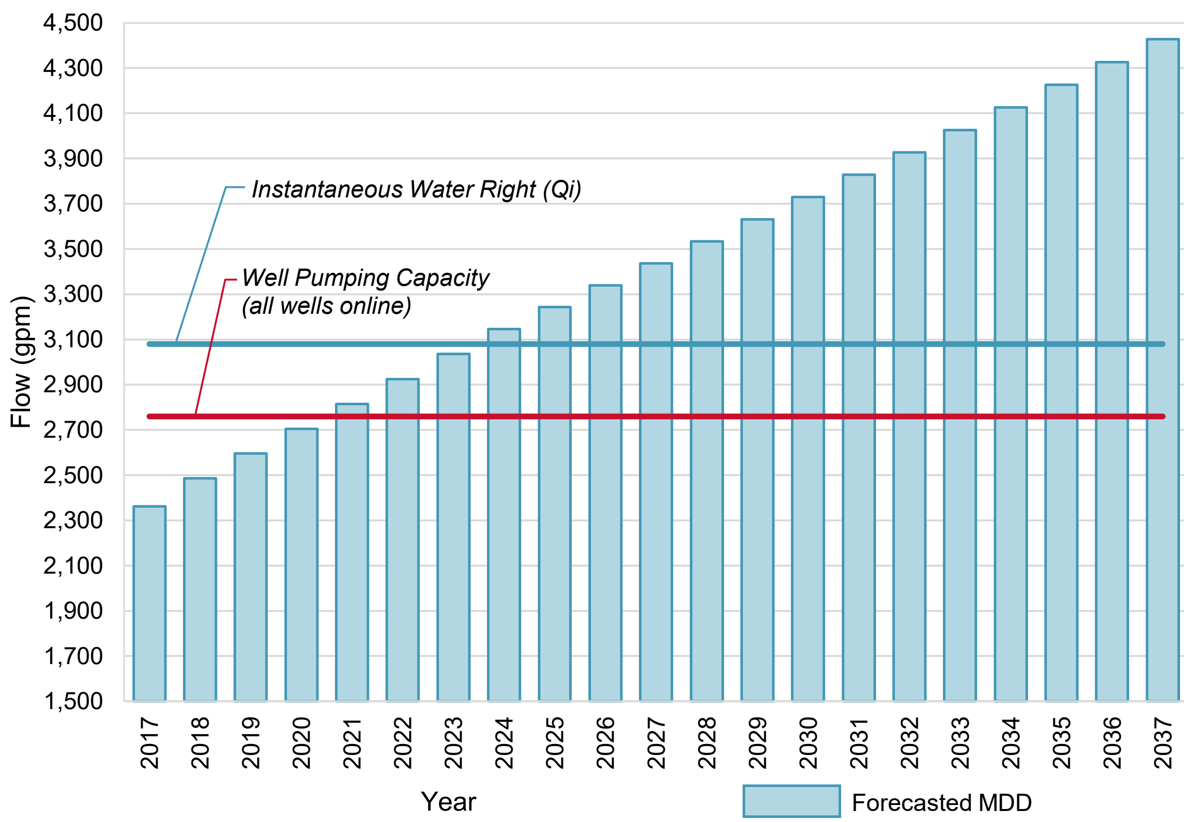
Since 2004, the City has worked with CWA to plan, design, and implement coordinated conservation programs across all CWA member areas. As a member of CWA, the City participates in the regional efforts that are tied to the adopted regional water use efficiency goals CWA has established for its member water utilities in consultation with the DOH. As such, CWA's WUE goal is adopted by the City as its formal WUE goal, and is stated as: "Cascade will dedicate resources necessary to achieve a cumulative drinking water savings of 0.6 million gallons per day on an annual basis and 1.0 million gallons per day on a peak season (June – September) basis by 2020." – Adopted by CWA's Board of Directors, October 23, 2013 for the period 2014 to 2019. The City continues to implement multiple conservation measures in support of meeting CWA's regional goal.

ES.7 Supply Evaluation

Historically the City's primary sources of supply have been wells in the Issaquah Valley Aquifer. In addition, the City purchases regional surface water supply from CWA. According to the CWA Interlocal Contract, CWA is obligated to provide a Full Supply Commitment to each founding member, one of whom is Issaquah, to meet current and future supply needs within the member's Retail Service Area. As a result of this agreement, Issaquah will be able to meet projected water demands within the 20-year planning period of this Plan.

A large portion of the City's existing service area has historically been served solely by its groundwater wells. Due to projected growth in these areas, the City's existing groundwater rights and pumping capacities will not be sufficient to fully serve these areas into the future. Based on the demand projections developed for this Plan, current well pumping capacity is capable of meeting MDD in the well-supplied areas until 2021. At that point, regional CWA water will be needed to supplement groundwater supplies in order to meet peak season demands. This is indicated in the comparison of groundwater well capacities and projected well-supplied area demands presented in Figure ES-3.

Figure ES-3. Maximum Day Demand of Well Supplied Areas



sufficient capacity to meet current and future MDD for the operating areas served by each. All BPSs have adequate capacity through the next 20 years per DOH requirements.

ES.8 Water Quality

The City of Issaquah must comply with the drinking water standards of the federal Safe Drinking Water Act (SDWA) and its amendments. The DOH adopted the federal standards under WAC 246-290. This Plan summarizes anticipated future regulations that will affect the City, summarizes the City water treatment practices, and presents the City's more recent water quality sampling data. The City is in compliance with all DOH water quality and reporting requirements.

ES.9 Facility Evaluation and Recommendations

A hydraulic analysis of the City's water system was conducted to identify many projects for incorporation into the Capital Improvement Program (CIP). A hydraulic model was used to evaluate compliance with the DOH's minimum requirements and the City's policies and criteria under existing and future conditions. This includes evaluating minimum pressure requirements, reservoir storage, and fire flows.

The volumes and elevations of existing storage facilities were evaluated against DOH requirements and City policies. Existing storage volumes are sufficient to meet all current and future needs in the City, with the exception of the Valley area, where additional storage volume is required to meet future needs. This is accommodated through the planned Spar Reservoir included in the CIP.

The hydraulic analysis identified high velocities throughout portions of the distribution system. Many of the areas requiring high fire flows (3,500 gpm) are located in the Valley area and are supplied by piping 8 inches in diameter and smaller. Projects to correct these deficiencies have been included in the CIP.

ES.10 Operations and Maintenance

The Public Works Engineering (PWE), Public Works Operations (PWO), and Finance Departments all work in coordination to manage water utility functions. The PWE Department provides design, construction, and inspection of projects related to the water system. The PWO Department performs daily activities including infrastructure maintenance, inspections, utility locating, water quality monitoring, and cross-connection control program management. The Finance Department provides financial functions for the water utility including utility billing services and customer water sales records.

ES.11 Capital Improvement Program

Improvements necessary for meeting the City's current and future needs are managed through the CIP. The CIP is a strategic plan for investing in the City's water infrastructure through 2037, with emphasis on the improvements needed between 2018 and 2027. The improvements listed in the CIP are based upon the evaluation of the existing system facilities, reports from the operations staff, and the analyses performed while preparing this Plan.

Table ES-1 provides a summary of the CIP costs, organized by project type. In total, the CIP amounts to approximately $53 million of investment in the 2018-2027 time period, with an additional $8.3 million in investment in the following 10 year period. Nearly 50% of the near-term CIP cost is associated with the planning, design, and construction of a new water treatment plant to upgrade the treatment associated with the City's wells to support the blending of groundwater and regional CWA water to serve areas that are presently only served by City groundwater.

Table ES-1. Summary of Capital Improvement Plan Costs

Project Category	2018-2027	2028-2037	Total 2018-2037
Distribution Projects	$11,370,000	$8,320,000	$19,690,000
Pump Station Projects	$6,175,000	$0	$6,175,000
Storage Projects	$7,036,000	$0	$7,036,000
Water Supply and Treatment Projects	$28,330,000	$0	$28,330,000
Total Budget	**$52,911,000**	**$8,320,000**	**$61,231,000**

ES.12 Financial Program

The City's water utility is operated as a separate enterprise fund, and is required to be financially self-sufficient from other City departments. In addition to the operating fund, separate funds have been established for capital improvements and bond redemption for the utility. Water system operation, maintenance, and capital improvements are paid for through water rates paid by customers connected to the water system and the one-time general facility charges that are paid by future customers at the time the permit for development is issued.

The analysis conducted as part of this Plan indicated that City rates may need to be modified to support the revenue requirements needed to fund planned water system improvements. However, the details of such changes will be identified in subsequent water utility cost of service and rate studies, which will propose a detailed financial plan for funding the CIP and associated future annual expenditures.

Chapter 1. Introduction, System History, and Related Plans

1.1 Purpose and Scope

This Water System Plan Update (Plan) has been prepared according to Washington State Department of Health (DOH) regulations under Washington Administrative Code (WAC) 246-290-100. These regulations require the City of Issaquah (City) to update and submit a water system plan for approval to DOH every ten years.

This plan updates and supersedes the 2012 Water System Plan Update (completed in November 2013). This Plan summarizes the City's existing water system, documents the water utility policies and criteria in accordance with the City of Issaquah 2017 Comprehensive Plan (Comprehensive Plan) framework, projects future water demands, analyzes the existing water system, and recommends improvements to correct deficiencies and meet future needs. The Plan provides the City with information to evaluate the impacts of future proposed development, land use, and growth on the water system; as well as evaluating potential operational changes related to the use of in-city groundwater supply versus regional water supplies, expansion of operating areas, and changes to water regulations .The Plan is organized as follows:

- **Chapter 2:** Provides an overview of the existing water system including adjacent purveyors, the boundary of the service area, operating areas, and supply, storage and distribution system facilities.
- **Chapter 3:** Reviews and updates the water utility policies and criteria for operation, design and planning to ensure future improvements and expansions are consistent with the City's Comprehensive Plan.
- **Chapter 4:** Estimates the effect of future land uses on demographic trends within the service area.
- **Chapter 5:** Analyzes historical production and water sales to develop future demand projections.
- **Chapter 6:** Updates the City's water use efficiency goals and identifies the role that water conservation will have in reducing future water requirements and how the City's water conservation program will be implemented.
- **Chapter 7:** Documents existing water resources available to the City and analyzes the ability to meet future water resource needs. This includes an evaluation of options for providing long-term treatment needs for the City's supplies.
- **Chapter 8:** Reviews existing water quality data for the system and discusses existing and forthcoming regulatory requirements applicable to the City water system.
- **Chapter 9:** Assesses the capability of the existing water system to meet existing and future demands using a hydraulic model, and documents system deficiencies.
- **Chapter 10:** Documents operations and maintenance (O&M) programs.
- **Chapter 11:** Presents a Capital Improvement Program (CIP), indicating priorities for construction, to address potential future water system deficiencies.

- **Chapter 12:** Documents the City's financial program for the water utility and identifies steps to be taken in order to ensure adequate funding of the water system in the future.

1.2 General Water System Information

The City owns and operates a public water system that currently serves customers within the retail service area. The following is a summary of information on the City's water system for the year 2017. This information is consistent with data on file with DOH.

Water System Name	Issaquah Water System
Water System ID No.	363505
Water System Classification	Group A
Type of Ownership	Local Government (Community)
Owner No.	2776
Address	1775 12th Avenue NW PO Box 1307 Issaquah, WA 98027-1307
System Contact Person	Bret Heath – Public Works Operations & Emergency Management Director
Limit on Number of Service Connections	This system does not have a limit on the number of approved service connections

1.3 Approval Process

This Plan is required to meet state, county, and local requirements. The Plan complies with the requirements of DOH and the Washington State Department of Ecology (Ecology) as set forth in WAC 246-290 for Group A Public Water Supplies as well as the Revised Code of Washington (RCW) 35.58.220 (Powers Relative To Water Supply), RCW 70.116 (Public Water System Coordination Act Of 1977), and RCW 70.119A.180 (Water Use Efficiency Requirements - Rules). This Plan is also consistent with King County Code (KCC) 13.24 (Water and Sewer Comprehensive Plans) with respect to water system planning.

The City will submit this document to adjacent utilities and local governments having jurisdiction to assess consistency with ongoing and adopted planning efforts. Additionally, King County and DOH must review and approve the Plan. In King County, the approval is accomplished through the Utilities Technical Review Committee (UTRC) that reviews all proposed Water System Plans prior to submittal to the County Council with a recommendation. The City Council will approve the final Plan following all other approval processes. The Adopting Resolution will be included in Appendix A, upon Plan approval by the City Council. See Appendix B for the agency/adjacent purveyor comments.

1.4 Environmental Assessment

The City has determined this Plan does not have a probable significant adverse impact on the environment and has issued a Determination of Non Significance (DNS) under the State Environmental Policy Act (SEPA). This decision was made after review of the completed environmental checklist and other information on file with the lead agency. It should be noted, however, that each CIP project presented in the Plan would undergo subsequent project-specific environmental review (or determination if project is categorically exempt from environmental review) as part of the preliminary and final design process. The SEPA Checklist and environmental DNS issued by the City for the Plan is provided in Appendix C.

1.5 Water System History

Table 1-1 lists the key events in the history and development of the water system from previous Water System Plans.

The City's earliest known water supply was from a series of surface water springs flowing from the East Issaquah Watershed (Lake Tradition Plateau) purchased from the Gilman Water Company in 1923. In 1967, Risdon Well No. 1 was drilled and became the primary source of potable water until Risdon Well No. 2 came on-line in 1969.

The East Issaquah Watershed springs remained in service until 1970 when construction of Interstate 90 disrupted the flow. As a result of this disruption of flow, in 1976 the Washington State Department of Transportation (WSDOT) drilled two new wells, the Gun Club Wells No. 3 and 3A, to replace the supply that was lost. As a condition for the new wells, the City relinquished its water rights to the springs. Although the City relinquished the water rights, it retains property ownership of the East Issaquah Watershed.

From 1970 to 1987, the City relied solely on groundwater produced by the Risdon and Gun Club Wells for its potable water supply. Two additional wells, Gilman No. 4 and No. 5, were added to the system in 1987. The Gun Club Well are now offline after being decommissioned in 1987 and 1988.

In 1989 and 1990 the City entered into an agreement with the City of Bellevue to provide service up to a maximum of 600 multi-family units and 700 equivalent residential units (ERUs) for the Lakemont Triangle and Montreux developments, respectively. The primary reasons for connection to the Bellevue water system for these areas were related to cost and efficiency. Existing Bellevue water mains were closer to the developments and allowed for gravity supply, whereas water from the City would have required pumping and installation of longer water mains.

In February 1997, to meet increasing system future demand, the City entered into another wholesale water agreement with Bellevue. The agreement provided a substantial amount of the City's water supply; up to 4.2 mgd on a maximum day demand (MDD) basis. The Bellevue–Issaquah Pipeline (BIP) was constructed in 2002, and connected to Bellevue's existing 24-inch line along Newport Way, east of Bellevue's Eastgate inlet from Seattle.

In 1999, the City joined the Cascade Water Alliance (CWA) in anticipation of future population growth in the region. CWA is committed to meeting all current and future water supply needs of its members. The BIP was acquired by CWA in 2004. CWA water is wheeled through Bellevue mains to supply some areas of the City's water system.

In 2012, the City installed a blending system allowing a combination of CWA and well water to be used in the Issaquah Highlands.

In 2015 and 2016 the City upgraded two pump stations in the distribution system that were nearing the end of their service life and were vulnerable to seismic events. Reservoir rehabilitation projects were completed in 2016 and 2017 in the Forest Rim, Mt. Hood, Wildwood, South Cove, and Grand Ridge Operating Areas.

In 2016, a granular activated carbon (GAC) system was installed at Well 4 (one of the Gilman Wells) to reduce levels of perfluorooctane sulfonate (PFOS). The currently installed GAC system is designed to be temporary.

In 2017, the City of Issaquah assumed service of the South Cove area from the City of Bellevue.

Table 1-1. Water System History

Year	Event
1923	East Issaquah Watershed purchased from Gilman Water Company.
Late 1940s	200,000-gallon concrete holding tank constructed in the East Issaquah Watershed.
1960	Wildwood ground-level reservoir (60,000 gallons) and Wildwood pump station constructed.
1962	East Hill reservoir revisions: new chlorination building. Comprehensive plan completed by Richard E. Wolf, Consulting Engineer.
1963	Downtown 10 and 12-inch supply grid constructed. Twin Cemetery 500,000-gallon reservoirs constructed.
1967	Risdon Well No. 1 drilled, becoming City's primary source of water.
1968	Wildwood pump house constructed. Twin Highwood 250,000-gallon tanks constructed. Sycamore booster pump station constructed by private contractor.
1969	Risdon Well No. 2 drilled. Wildwood pump station revisions and pump house constructed.
1970	Automatic control and telemetry system installed. Construction of I-90 disrupts flow from East Issaquah Watershed springs.
1973	Constructed 12-inch transmission main to northwest industrial area.
1976	Wildwood reservoir capacity increased. Mountain Park booster pump station and Mount Hood reservoir constructed. East Issaquah Watershed springs abandoned. Gun Club Wells No. 3 and No. 3a drilled to replace supply lost from East Issaquah Watershed springs.
1978	Mt. Hood booster pump station constructed. Forest Rim booster pump station constructed.
1979	Forest Rim standpipe constructed.
1986	Westside 2 MG reservoir constructed.
1987	Gilman Wells Nos. 4 and 5 drilled.
1988	Terra II booster pump station constructed.
1989-90	City approves wholesale water agreements with the City of Bellevue to serve the Montreux and the Lakemont Triangle operating areas.
1993	Terra II booster pump station reconfigured and Cougar Ridge standpipes constructed.
1994	City and Sammamish Plateau Water District approve an agreement for a two-way intertie for standby and emergency water supply and lease of standby storage from the 297 Tank.
1997	City entered into wholesale water agreement with the City of Bellevue to supply Issaquah with up to 4.2 mgd peak day demand from city of Seattle.
1998	Issaquah Highlands (formerly Grand Ridge) 3 million-gallon reservoir, pump station and transmission/distribution piping constructed.

Table 1-1. Water System History

Year	Event
1999	City entered a contract to form Cascade Water Alliance to provide the long-term water supply needs of its members.
1999	City approves agreement with Port Blakely to construct transmission main (BIP) from Bellevue to service the Issaquah Highlands and Talus Projects.
2001	Holly 1 pump station modified and Holly 2 pump station constructed.
2002	Forest Rim reservoirs constructed to replace reservoir damaged in February 2001 earthquake.
2002	12th Avenue pump station constructed to serve and move water to the 480 zone.
2002	Talus Shangri-La 616 Reservoir, pump stations and transmission/distribution piping constructed.
2002	The 24” regional main (BIP) from Bellevue to Issaquah was constructed.
2003	Issaquah Highlands Summit 1234 Reservoir and booster pump station constructed.
2003	City constructed and began operations of a chlorination treatment facility at Gilman Wells #4 and #5 and at Risdon Wells #1 and #2.
2004	Cascade acquired the 24” regional main from Port Blakely Communities and Issaquah.
2005	Bellevue and Issaquah signed revised agreement to wheel Cascade water to Issaquah through Bellevue’s system.
2005	Cougar Ridge reservoirs condemned due to structural inadequacy.
2006	The Bellevue Issaquah Pipe line (BIP) began operating to supply water to Issaquah Highlands and Talus areas.
2008	Construction of new Wildwood pump station to replace existing, aging pump station.
2008	Construction of new Cougar Ridge reservoirs to replace existing reservoir due to latent defects and damage in Nisqually quake.
2008	Sequestration Treatment facility was added to Well #4 and #5 at the Gilman pump house to remedy the presence of manganese.
2008	Fluoridation Treatment facility was added to Talus Booster pump station to allow blending of ground water and surface water.
2011	Fluoridation Treatment facility was added to Holly Booster pump stations to allow future blending of groundwater and surface water.
2012	Installed blending facility to allow regional and groundwater to be used in Issaquah Highlands
2015	Completed Mountain Park Booster Pump Station Upgrade
2015	Assumed Ownership of Water System for the Grand Ridge Community
2016	Installed GAC System on Well 4 to remove PFOS
2016	Completed Mt. Hood Booster Pump Station Upgrade
2017	Assumed Water Service of South Cove/Greenwood Point (from Bellevue)
2017	Completed Wildwood Reservoir Rehabilitation
2017	Completed Mt. Hood Reservoir Rehabilitation

1.6 Related Plans

1.6.1 City of Issaquah Comprehensive Plan

The City Comprehensive Plan (effective March 2017) has a number of required elements, for which the City has adopted goals, objectives, and policies. The objectives for each of the elements address the vision residents and local businesses have identified and Council has adopted for the next 20 years. The policies and criteria in Chapter 3 of this plan are consistent with those of the City's Comprehensive Plan.

Additionally, Washington State's Growth Management Act (GMA) requires municipalities to establish the boundaries within which "urban services" will be provided and to evaluate the capacity of their utility systems to accommodate the projected demands for these services. This is also established in the City's Comprehensive Plan. The City intends growth to be accommodated within the existing city limits first and then within the potential annexation area (PAAs). Future land use and growth projections are presented. Household and commercial growth projections for the City that are presented in Chapter 4 of this Plan were developed based on information provided in the City's Comprehensive Plan.

1.6.2 Central Issaquah Plan

The Central Issaquah Plan (first adopted in 2012 and last amendment effective March 2017) supplements the City's Comprehensive Plan by providing detailed goals, and policies for the Central Issaquah area. The Central Issaquah Plan provides details on projected growth for both the Central Issaquah area and the Regional Growth Center within it (also known as the Central Issaquah Urban Core). These are used by this Water System Plan in projecting future water demands. The Central Issaquah Plan also incorporates elements of the Rowley Development Agreement.

1.6.3 Cascade Water Alliance Transmission and Supply Plan (2012)

CWA adopted in 2012 a Transmission and Supply Plan (TSP) which supplements information on regional supply presented in each CWA member's individual water system plans. The plan includes information on CWA's mission, utility membership, and structure; water supply and operations; conservation; long-term water demands and sources of supply; infrastructure needs; and financial requirements.

Water for CWA is sourced from Seattle Public Utilities (SPU) which provides for a "declining block" of supply that will be reduced in five-year increments beginning in 2024. Major CWA infrastructure related to Issaquah includes the Bellevue-Issaquah Pipeline (BIP) which directly delivers CWA water to the Issaquah distribution system (a portion of CWA water is wheeled through Bellevue through intertie connections).

The TCP outlines regional-scale water conservation practices and goals for its members.

The TCP also evaluates CWA's supply portfolio through 2060, and outlines future water supply sources for CWA which include:

- Growth of production from CWA member's own supplies
- Supply from former CWA member Covington Water District providing surplus water from their Regional Water Supply Partnership with Tacoma Water, and delivering that water to CWA

members using a future transmission pipe (Tacoma-Cascade Pipeline). The TCP envisioned this beginning around 2024.

- Supply from the Lake Tapps Reservoir project which the TCP plans for this beginning around 2030.

Cascade continually monitors the balance between demand and supply. At this time it appears the projects identified for new development and transmission may be pushed out considerably compared with the 2012 TSP.

1.6.4 Coordinated Water System Plan (2005)

In February 2005, a Memorandum of Understanding on Water Resource and Supply Planning between Cascade and King County was signed regarding Coordinated Water System Plans for King County.

This stated that carrying out its authority under the Coordination Act, King County had previously declared four areas within King County, specifically South King County, Skyway, Vashon, and East King County (EKC), which includes Issaquah, to be critical water supply service areas (CWSSAs). King County has ratified a Coordinated Water System Plan (CWSP) for each of these areas. DOH subsequently approved each CWSP. King County believes that all four of these plans should be reviewed and updated as authorized and necessary under the Coordination Act to achieve the following goals:

- Consistency and compliance with current provisions of state law.
- Incorporation of updated water supply planning documents, including Cascade's Transmission and Supply Plan.
- Ensure the planned and coordinated delivery of safe and reliable water throughout King County in order to meet the population and economic growth needs identified under GMA through credible, objective, transparent, and accessible methodologies for projecting future demands.
- Provide for the assessment of the feasibility of proposals for shared source, transmission, storage facilities, and interties.
- Provide support for the development of long-term water supply capacity by water systems within King County to deliver safe and reliable water.
- Clarification of processes and responsibilities for addressing failing water systems.

On October 31, 2005, the Planning Framework Summary was developed to prepare the framework of technical information and planning efforts to address major water resource management and regional water supply planning issues in and around the King County region. The framework includes a regional demand forecast, supply alternatives analysis for King County, climate change analysis, reclaimed water opportunities, source exchange strategies, small water systems strategy, implementing the Municipal Water Law, and prioritization of tributaries that are to be addressed through source substitution for fish flow enhancement.

On May 3, 2006, a Clarifying Statement approved by the Coordinating Committee’s Regional Water Supply Planning Process was issued which stated:

> *Multiple agencies and organizations are voluntarily participating in a regional water supply planning process for the purpose of identifying, compiling information on, and discussing*

many of the key issues that relate to or may affect water resources of the region. The goal is to develop the best available data, information, and pragmatic tools that the participants may use, at their discretion, to assist in the management of their respective water systems and resources, and in their water supply planning activities. Information developed by each technical committee is advisory only and development of that information in no way expands or limits the authority of any entity. All information generated will be shared among all those interested in receiving it. The planning process is not required by statute, but is expected to provide useful data that may support other processes that any participant may use to address water resource and water supply issues. Each of the participants is free to accept or reject the results of this process.

A synthesis of the Regional Water Supply Planning Process was published in April 2009, by King County Department of Natural Resources and Parks, which summarizes the contents, recommendations, and conclusions from each technical committee report, and offers possible next steps for each topic. Included is a matrix of tools and methodologies developed or reviewed either by the technical committees that may be useful to water utilities in their own planning and management activities or in other regional processes. The report closes with broad conclusions and possible next steps for King County, noting that King County anticipates using information, data, and tools developed through this process where appropriate in its own various planning and management activities and in partnerships with others.

East King County Coordinated Water System Plan

King County Council formally declared EKC a CWSSA (Ordinance 7893, December 22, 1986) (pursuant to the Public Water System Coordination Act of 1977 (Chapter 70.116 RCW)). As a result of this action, a Water Utility Coordinating Committee (WUCC) was formed for the purpose of preparing a Critical Water Supply Plan in EKC. The WUCC consisted of representatives of water system agencies having 50 or more service connections.

On September 8, 1987, the King County Council formally adopted the external boundaries of the CWSSA through Ordinance 8214.

In October 1989, the three-year regional water system planning effort culminated in the adoption of the EKC CWSP. The plan is significant in that it establishes the framework for water system planning in EKC.

East King County Coordinated Water System Plan (Updates through November 1996)

Update looked at specific issues:

1. Water demand forecasts.
2. Boundaries among the utilities.
3. Regional water supply options.
4. Conservation programs.
5. Minimum design standards for water systems.
6. Requirements of E2SSB 5448 which amended RCW 70.116, 70.119, and 70.119A; and connections among the 1990 Growth Management Act, the 1994 King County Comprehensive Plan, and the CWSP water demand forecasts.

The EKC CWSP shows the Critical Water Supply Service Area Boundary for Issaquah. This boundary extends beyond the Urban Growth Boundary limits and corporate city limits, most notably extending to the south to the Four Lakes/Mirrormont service areas. It is the City's intent that the Water Service Boundary coincide with the city corporate limits, PAAs and the urban growth boundary. The City's service area has changed over the years through annexations and extensions. The King County Water Service Planning Area map, dated June 2006, will be updated with these revisions. The EKC CWSP Update's main component was the assessment of the water supply needs in eastern King County. The plan was developed under the guidance of the WUCC. The goal of the plan was to assist area utilities in establishing an effective process for planning and developing public water systems.

1.6.5 King County Comprehensive Plan

The King County Comprehensive Plan (KCCP) (with updates most recently adopted in December 2016) is a long-range guiding policy document for all land use and development regulations in unincorporated King County, and for regional services throughout the County including transit, sewers, parks, trails and open space. The KCCP provides projected growth within unincorporated King County by designating where growth will occur through policies, goals, plans, and regulations. The KCCP includes a land-use map of unincorporated King County. The KCCP includes a zoning map of unincorporated King County that identifies land-use types and densities that will accommodate the projected growth. An urban growth boundary is also defined in the KCCP to direct most of the projected growth into more urban areas. Cities, like Issaquah, have annexed urban unincorporated areas and assumed service delivery, zoning, and all other responsibilities for these areas. The County, in turn, revises its land use and zoning maps to reflect the revised jurisdictional authority.

1.6.6 Issaquah Creek Valley Groundwater Management Plan (March 1999)

This plan encompasses an area of 93 square miles located east and southeast of Lake Sammamish. The City's wells are all located within the boundaries of the Management Plan area. The plan recommends 18 specific goals to protect groundwater quality and quantity with 66 management strategies overall, recognizing the vulnerability of the lower Issaquah Valley aquifer system and its importance in supplying all the potable water in the area. The plan notes that currently stable groundwater levels may be affected by new development in the area. The plan recommends forming the Issaquah Creek Valley Management Committee with representatives from King County, City of Issaquah, Sammamish Plateau Water and Sewer District, Muckleshoot Indian Tribe, and representatives from the Issaquah Creek Valley Groundwater Management Committee. The Plan recommends that the King County Council and the City authorize a ballot measure to create an Aquifer Protection Area to provide funding for the implementation of the Plan.

1.6.7 East King County Groundwater Management Plan (December 1998)

The area encompassed by this plan includes the north central portion of King County. The Issaquah Creek Valley Groundwater Management Area is adjacent to the EKC Groundwater Management Area to the west; the City's service area is near to, but does not overlap with the EKC Groundwater Management Area. The goal of developing the plan was to protect the existing excellent groundwater quality. This goal is to be achieved through a combination of conservation, education and long-term monitoring and data collection. The plan recommends the formation of a management committee to oversee all groundwater protection activities in the area. The committee has been inactive since 2004.

A project is planned for 2018 to update the Critical Aquifer Recharge Area boundary within the plan.

1.6.8 Lower Issaquah Valley Wellhead Protection Plan (1993)

This is the current Wellhead Protection Plan for the Lower Issaquah Valley aquifer (LIVA) and assesses the hydrogeologic conditions of the LIVA. The City's wells draw from this aquifer, which is the same aquifer described in the Issaquah Creek Valley Groundwater Management Plan. Approximately 40 square miles was delineated as the wellhead protection area based on a conceptual model of the aquifer and hydrogeologic mapping. A contaminant source inventory was most recently completed in 2017 and is included in Appendix P. A risk screening has also been completed. A number of wellhead protection strategies were proposed to manage land-use and prevent groundwater contamination including: aquifer management zones, land-use zoning and control, special permitting, hazardous materials handling regulations, public education, engineering, spill response planning, water supply contingency planning, and monitoring and further technical studies.

1.7 Development Agreements

In 1996, the City adopted the urban village zone. Each area with this zoning has a development agreement that dictates the rules and entitlements associated with that urban village during its specified build-out period. These agreements include the allowable build-out for the development as measured in ERUs.

Chapter 2. Existing System

This chapter describes the existing components of the City's water system. Included are descriptions of the service area, adjacent water purveyors and interties, physical features, supply sources, operating areas, distribution piping, pressure reducing valve stations and booster pump stations.

2.1 Service Area

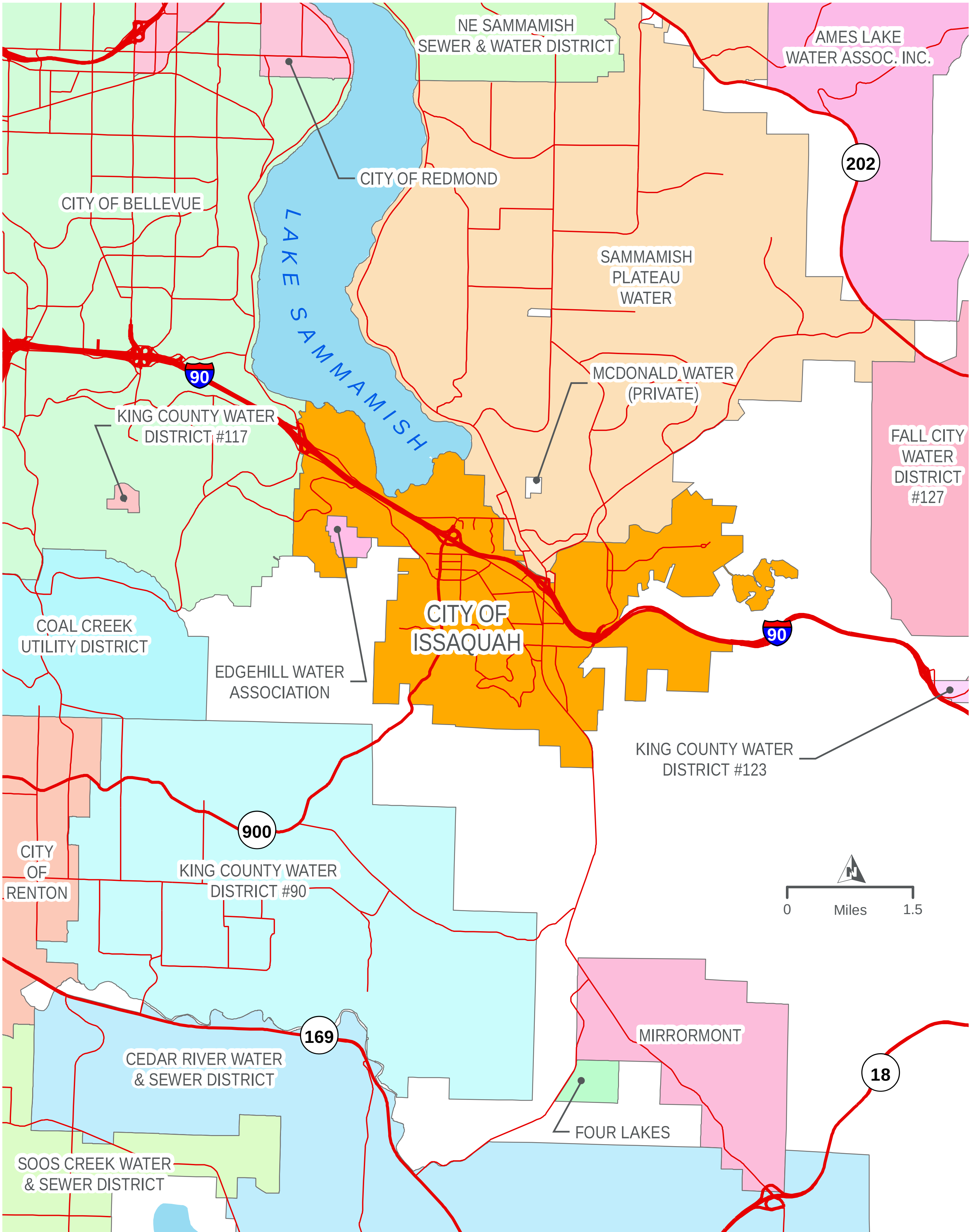
Issaquah's service area and the service areas of adjacent water purveyors are shown in Figure 2-1.The adjacent water purveyors include Bellevue, Edgehill Water Association, Water District 90, and Sammamish Plateau Water (SPW).

The service area includes both the retail service area as well as the future service area. The retail service area is the area that current has distribution system piping available that can supply water. The future service area is the area that the water system will have the exclusive opportunity to provide water to in the future if desired by the water system. The future service area include future operating areas anticipated to be added to the City's water system within the 20-year planning horizon of this Plan (to 2037). Both the retail service area and future service area are shown in Figure 2-2 which also shows the City's current limits and the King County Urban Growth Boundary. The combination of the retail service area and future service area comprise the service area of the water system.

2.2 Adjacent Purveyors, Regional Suppliers, and Interties

Bellevue, SPW, Water District 90, and Edgehill Water Association are the adjacent water purveyors. The City's water system has interties with Bellevue and SPW. The City also has two interties with the regional water supplier Cascade Water Alliance's (CWA's) Bellevue-Issaquah Pipeline (BIP). It is important that the City coordinate operation with these adjacent purveyors and regional water supplier. Highlights of the adjacent purveyors and their relationship to the City's system are explained below.

Summary information on each of these systems can be found in each purveyor's water system plan. Table 2-1 summarizes pertinent information about each of the City's connections to adjacent purveyors. The location of each intertie is shown in Figure 2-3.



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SERVICE AREAS OF ADJACENT WATER PURVEYORS

FIGURE 2-1

Table 2-1. Existing Intertie Connections

Name	Location	Pressure Zone Supply	Operating Area Served	Purveyor	Meter Size (inch)	Primary Purpose
Montreux Intertie	SE 60th and 180th (1800 SE 60th Street	1150	Montreux	Cascade Water Alliance/City of Bellevue	6-inch	Supply for 700 ERU
Lakemont Triangle Intertie	SE Newport Way and Lakemont Boulevard (17200 SE Newport Way)	520	Lakemont Triangle	Cascade Water Alliance/City of Bellevue	12-inch[a]	Supply for 600 MF units
Talus Regional Intertie	Newport Way and 17th Ave	520	None (Talus Foothills, Talus Shangri-La in the future)	Cascade Water Alliance	10-inch	Future supply for several operating areas
Highlands Regional Intertie	Holly Street BPS	520	IH Summit, IH Central Park	Cascade Water Alliance	8-inch	Supply for several operating areas
1st Avenue NE Emergency Intertie	1st Avenue NE and Juniper Street (940 1st Avenue NE)	297	Valley 297	Sammamish Plateau Water and Sewer District	6-inch	Emergency
SE 56th Street Emergency Intertie	SE 56th Street and 221st Avenue SE	297	Valley 297	Sammamish Plateau Water and Sewer District	8-inch	Emergency
South Cove Intertie	4300 block W Lake Sammamish Parkway SE	271	South Cove	Cascade Water Alliance/City of Bellevue	12-inch	Supply for 1,600 ERU
South Cove Emergency Intertie	4200 block 181st Avenue SE	271	South Cove	Cascade Water Alliance/City of Bellevue	8-inch	Emergency

[a] A master meter is not located at the Lakemont Triangle Intertie. The 12-inch size refers to the pipe size for the intertie. Demands through the intertie connection are estimated using the sum of individual customer meter volumes in the operating area.

2.2.1 Cascade Regional Transmission Main

The City is a founding member of the Cascade Water Alliance (CWA), which was formed in 1999 as an organization that replaced the City of Seattle in the responsibility of providing wholesale water to CWA members. Membership in CWA includes the cities of Issaquah, Bellevue, Kirkland, Redmond, and Tukwila; as well as SPW, and Skyway Water and Sewer District. CWA has a long-term supply agreement to purchase water from the cities of Seattle and Tacoma. The City began receiving water from CWA in 2006 and all water received through the Bellevue interties is supplied by CWA. The City constructed the regional transmission main and facilities for the BIP. After CWA was formed, the City's regional facilities were transferred to CWA ownership. The March 2012 CWA Interlocal Agreement details CWA's commitment to supplying Issaquah's water needs (Appendix D).

The regional transmission main connects to Bellevue's system on 161st Avenue SE and travels east along Newport Way and Dogwood Street into the City. The regional transmission main supplies the City with regional water through two interties: the Talus intertie and the Highlands intertie. Both of these interties connect to the Valley 297 Operating Area. The regional transmission main also supplies SPW.

CWA Intertie

The CWA intertie to the regional transmission main is located at Newport Way and 17th Avenue (State Route 900) for service to the Talus Foothills and Talus Shangri-La Operating Areas. Talus is currently typically served solely by City groundwater supplies. However, the City is capable of serving Talus with CWA water at any time based on groundwater operational considerations. The City fluoridates the groundwater for Talus when it enters the Talus system, so there is consistency in fluoride being deliver to Talus whether City groundwater or CWA water is being used.

Highlands Intertie

The Issaquah Highlands Summit and Central Park Operating Areas are capable of receiving a blend of City well and regional CWA water. A blending station allows the selection of a blend of well and CWA water before going to the Holly Street BPSs. However, currently the blend station is only supplying CWA water to the Issaquah Highlands Summit and Central Park Operating Areas. CWA water is supplied from the regional transmission main through the Highlands intertie located near the Holly Street I and II BPSs at a rate of up to 0.75 mgd.

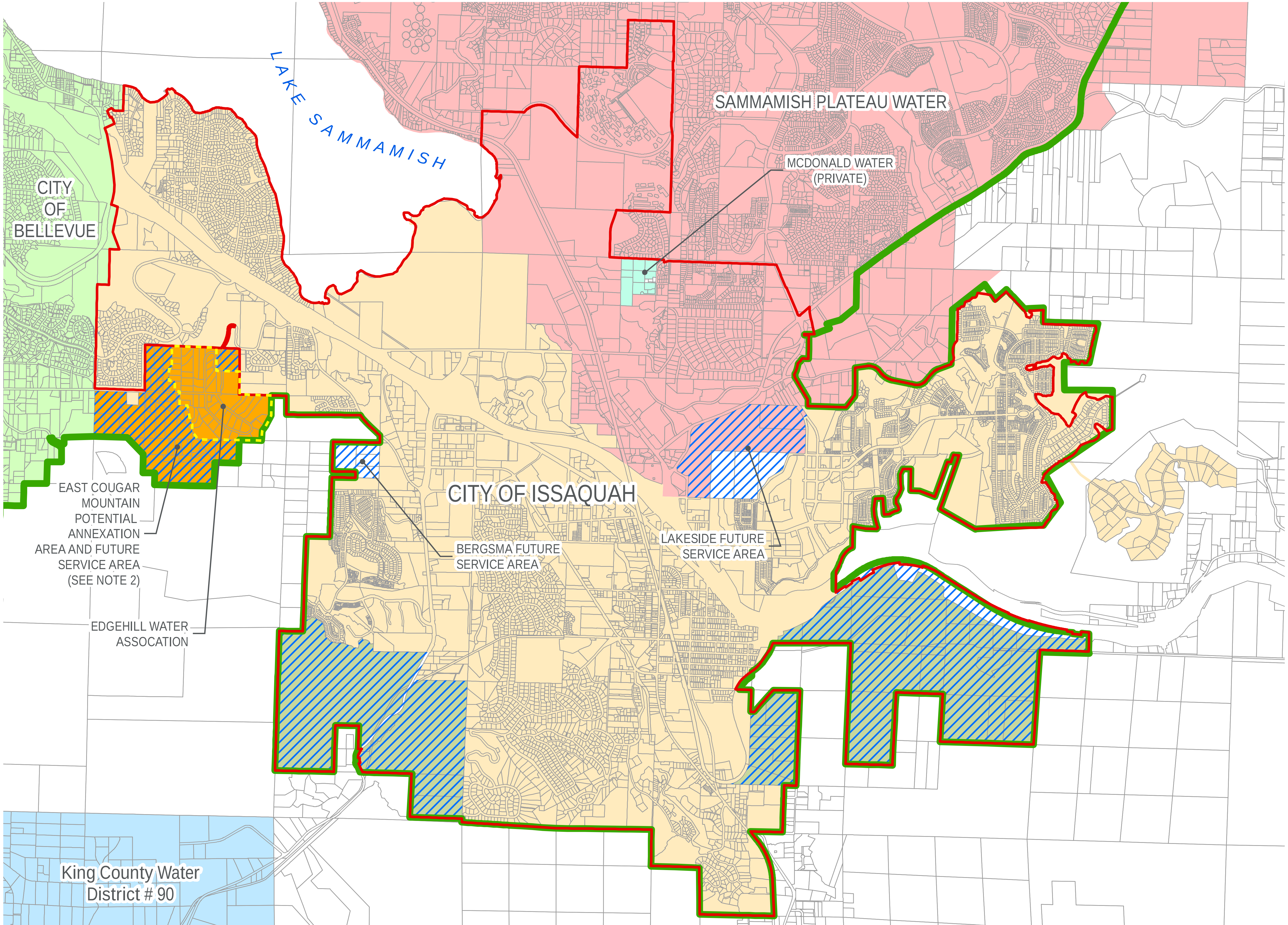
2.2.2 City of Bellevue

Bellevue is the adjacent water purveyor to the west. In 1989, Bellevue and the City signed an interlocal agreement to serve the Montreux and Lakemont Triangle areas. This was revised in 2005 to address the change of the regional water supplier from Seattle Public Utilities (SPU) to CWA (Appendix D). This was then amended to include Issaquah assuming service to the Greenwood/South Cove Area. According to the amended agreement, Bellevue currently wheels CWA water through its system to the City through three existing interties (Montreux, Lakemont, and South Cove) and will wheel water through one future intertie to supply a redundant feed to the South Cove Reservoir.

Montreux Intertie

The first wholesale service agreement, Resolution 5159, in 1989, with Bellevue provided supply for up to 700 ERU in the City's Montreux area (historically referred to as Glacier Ridge). This intertie is located at SE 60th Street and 180th Avenue SE. Bellevue supplies water from its 1150 operating zone through a 6-inch meter with a maximum fire flow rate of 2,500 gpm.

The 1989 agreement was revised in 2001 to supply no more than 150 ERU of the total 700 ERU supply from Bellevue's 1465 operating zone to serve the future Cougar Mountain Operating Area. The area to be served was clearly defined in the revised agreement with boundary revisions that follow property lines and therefore eliminate bisected properties. The revised agreement also describes additional facilities needed to supply water from Bellevue's 1465 operating zone. The additional facilities are to be provided in response to development activity in the Cougar Mountain Operating Area and have not yet been constructed. The agreement was modified most recently in



Notes:

1. Water Service Areas per King County GIS (accessed January 2018) except as follows: changes to Bellevue/Issaquah boundaries for South Cove and area west of Lakemont, changes to Sammamish Plateau Water/ Issaquah boundaries for Lakeside, assumption of Grand Ridge into Issaquah. Urban Growth Boundary per 2017 King County Comprehensive Plan.

2. The City of Issaquah has requested to King County that this area be removed from the City's PAA. In the 2016 King County Comprehensive Plan update, King County committed to a due diligence review (Action 14, page 12-21) on every parcel within the East Cougar Mountain PAA. King County is committed to continue working with Issaquah and Bellevue on issues of water availability, response times and fire flows within the PAA. Some of this work will start in early 2018, and is intended to influence the Scope of Work for the 2020 King County Comprehensive Plan update.

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ISSAQUAH SERVICE AREA

FIGURE 2-2

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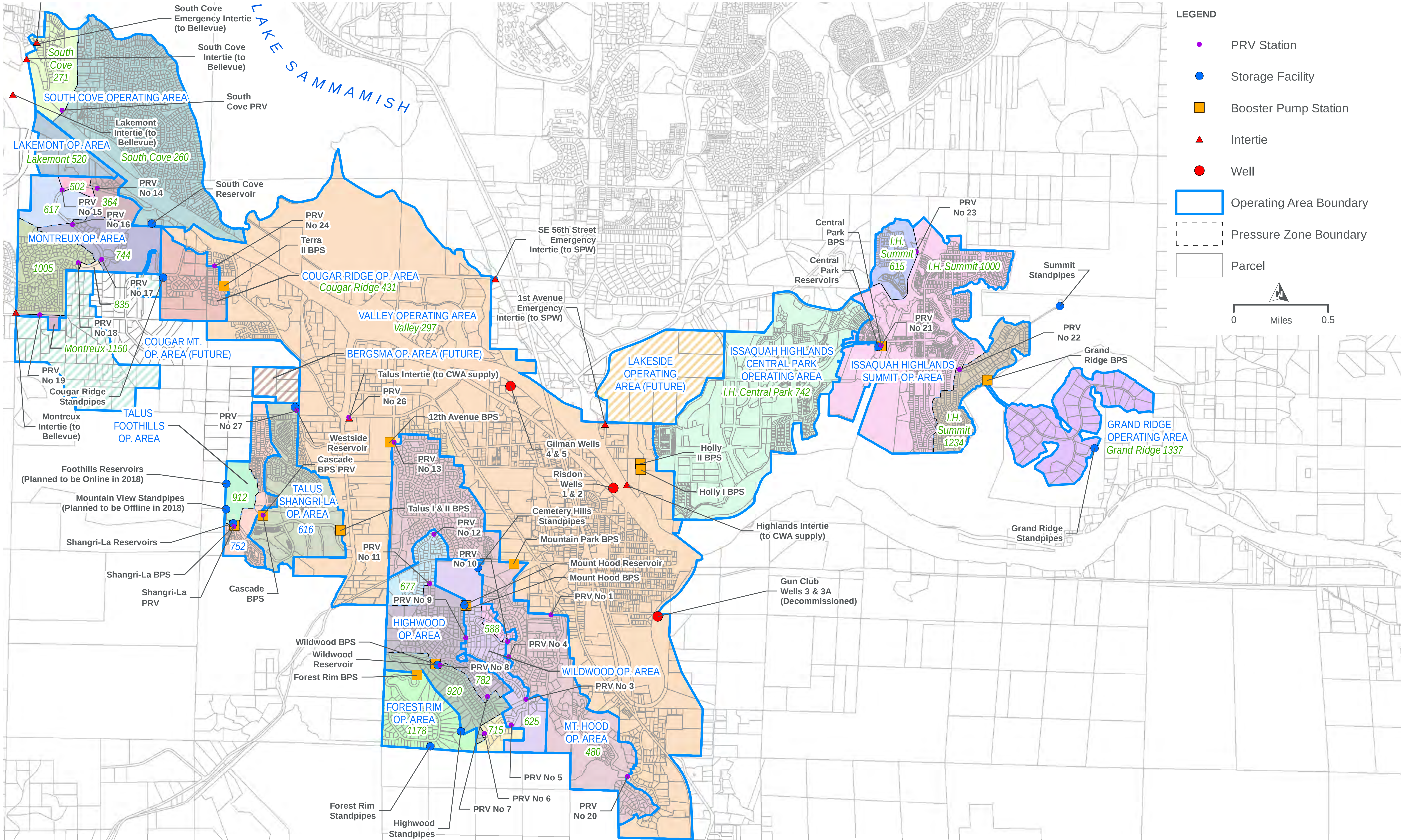

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OPERATING AREAS, PRESSURE ZONES, AND MAJOR FACILITIES

FIGURE 2-3

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2005 to become a facilities agreement in which Bellevue allows the City to use its system to wheel CWA water to the Montreux intertie to serve up to 700 ERU (Appendix D).

Lakemont Triangle Intertie

In 1990, a second wholesale service agreement, Resolution 5232, with Bellevue was completed that provides water to the Lakemont Triangle Area for 600 multi-family units. Bellevue provides water from a 12-inch diameter main in the 520 Zone to the 17300 block of Newport Way SE with a maximum fire flow rate of 2,000 gpm. The City constructed approximately 6,350 linear feet (LF) of water main within the Bellevue service area to extend the main to the Lakemont Triangle area. The 6,350 LF of the main was owned, operated, and maintained by the City until ownership was transferred to CWA. The agreement was modified most recently in 2005 to become a facilities agreement in which Bellevue allows the City to use Bellevue's system to wheel CWA water to the Lakemont intertie to serve up to 400 ERU (600 multi-family units) (Appendix D).

No intertie meter is in place at this connection. The City plans to construct a master meter for this intertie (see Chapter 11 – Capital Improvement Program).

South Cove Intertie

The latest version of the water facilities agreement includes assumption of the South Cove area by Issaquah from Bellevue. Bellevue provides water to the South Cove area through two interties: a 12-inch main at the 4300 block of W Lake Sammamish Parkway SE that serves as the primary intertie, and an 8-inch main at the 4200 block of 181st Avenue SE for emergencies. The primary intertie has a maximum capacity for fire flows of about 1,000 gpm. The primary intertie has a master meter.

The agreement allows the City to use the Bellevue system to wheel CWA water to the South Cove intertie to serve up to 1,600 ERU.

2.2.3 Sammamish Plateau Water

SPW is the adjacent water purveyor to the northeast. At the present time, the SPW water system has two operating interties with the City. The governing agreement, including emergency intertie information, is included in Appendix D.

1st Avenue NE Emergency Intertie

The agreement for interties was approved in 1994. The first intertie described in the agreement is the 1st Avenue NE intertie. This connection is two-way and metered at 940 1st Avenue NE, enabling the City and SPW to exchange water between their respective 297 pressure zones. The intertie was constructed and is currently owned by SPW. SPW personnel manually operate the intertie valve. At the present time, this connection is operated for emergencies only.

SE 56th Street Emergency Intertie

The SE 56th Street Intertie connects the City and SPW systems at SE 56th Street near East Lake Sammamish Parkway SE and 221st Avenue SE. The intertie provides emergency supply for both the City and SPW.

Future SPW Interties

In 1996, the City and SPW amended the original 1994 Agreement for Interties to include a third emergency intertie on Black Nugget Road. At this time, the intertie has not been constructed.

2.2.4 King County Water District 90

King County Water District 90 is the water purveyor to the south of the City. Currently the water systems for the City and Water District 90 are not connected. An intertie between these systems is not anticipated at this time.

2.2.5 Edgehill Water Association

Edgehill Water Association is a water purveyor west of the City's limits, but within the service area. Edgehill currently has 39 connections of the maximum 51 service connections in the Cougar Mountain area. Cougar Mountain is a potential annexation area (PAA) of the City. There is no physical connection between the City's and the Edgehill's water systems.

2.3 Vicinity Characteristics

2.3.1 Topography

The topography of the City's service area has a direct impact on the location and configuration of distribution, storage, and pumping facilities. Three distinct topographic features exist: 1) the lowland valley; 2) the Tradition Lake and Grand Ridge plateaus; and 3) the moderate to steep hillsides adjacent to the valleys. Issaquah has concentrated commercial development in the valley and residential development on the plateaus and hillsides. As development has reached farther up the mountain slopes, more pressure zones, pumping facilities and reservoirs have been required, thereby adding complexity to the system. The mid-century development of neighborhoods on Squak Mountain created multiple additional pressure zones.

The service area is situated primarily in the southern-most part of the Sammamish River Valley, south and east of Lake Sammamish. This portion of the valley is approximately 4.5 miles long with a maximum width of approximately 1.5 miles at the north end, narrowing to a width of 0.5 miles at the south end. The valley slopes range from one to six percent, with high elevations of approximately 160 feet at the southern end and a low elevation of 26 feet along the shore of Lake Sammamish.

There are two large plateaus located east of the valley: Tradition Lake and Grand Ridge. These plateaus are separated from the valley by 20 to 40 percent slopes and from each other by the valley of the East Fork of Issaquah Creek that contains I-90. The typical slope on the plateaus is six percent, and the average elevation is approximately 500 feet. Hillsides, which represent a majority of the service area, have slopes ranging from 20 to 40 percent.

The highest elevation in the service area, at approximately 2,020 feet, is the top of Squak Mountain in the southern portion of the service area.

The City lies within the lower reaches of the Issaquah Creek Drainage Basin, which is a tributary to Lake Sammamish. The service area is drained by a series of small creeks:

- Tibbetts Creek, draining Cougar and Squak Mountains.
- Main stem of Issaquah Creek drains Squak and Tiger Mountains.

- East and North Forks of Issaquah Creek drains the south slopes of Grand Ridge and the north valley floor.

2.3.2 Climate

The service area has a west coast, marine-type climate influenced by moist air masses coming from the Pacific Ocean. In late fall and winter, these air masses rise along the mountain foothills, causing the air to cool and moisture to fall out as precipitation throughout the area. Average annual rainfall is about 40 inches, generally occurring between October and March. Average annual snowfall is 8.6 inches. The temperatures are in the mid-70s Fahrenheit (F) in the summer, in the 40s F during the winter, with an overall average of 50 degrees F.

As is common in the Puget Sound area, climate has a significant impact on water consumption since customers use more or less water depending on the weather. During hot, dry weather, water consumption increases as a result of lawn watering and other outdoor water uses; during cool and wet weather, consumption decreases. See Chapter 5 for a comparison of the water demands for the City between winter and summer months.

2.3.3 Geology

A detailed description of the Issaquah area's geology is provided in the Lower Issaquah Valley Wellhead Protection Plan, Volume I Report[1]. Broadly defined, the Lower Issaquah Valley is a deep pre-glacial bedrock bowl filled with relatively coarse glacial advance and recessional outwash sediments. These sediments allow relatively easy lateral movement of large quantities of water.

General geologic conditions in the Sammamish Valley, on the adjacent hillsides and on the northeasterly slopes of Squak Mountain include:

- The valley floor is generally composed of layers of unconsolidated sedimentary deposits, sand, gravel, silt, and clay to an approximate depth of 100 feet, lying over clays. Deep under the clay layer, between approximately 200 and 400 feet deep, there is another water-bearing layer. This material is deepest at the north end of the valley near Lake Sammamish and shallowest at the south end.
- On the hillsides, there are deposits of stratified glacial drift that may be up to 100 feet thick.
- Squak Mountain's northeasterly slopes contain ancient lake sediments that are typically associated with landslide hazards.

An analysis of soils and topography is essential to determine the physical constraints on development within the service area. Five soil factors will affect development on both the valley floor and the hillsides:

- Erosion potential.
- Landslide hazard.
- Water table.
- Suitability for individual drain fields.
- Flooding Potential

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[1] Lower Issaquah Valley Wellhead Protection Plan, Volume I Report, Golder Associates, November 1993.

Erosion and landslide hazard will influence hillside development the most, including placement of water system facilities, whereas the other factors will be more instrumental in limiting development on the valley floor and on the plateaus.

2.4 Supply Sources

2.4.1 Groundwater Supply Sources

The City currently operates four production wells to provide groundwater to its customers. These wells are called the Risdon Wells and Gilman Wells and appear Figure 2-3. A summary of the amount of water withdrawn from the production wells is summarized in Chapter 7.

Risdon Wells

Risdon Wells No. 1 and 2 were constructed in 1967 and 1969, respectively, and are located just south of I-90, east of SE 72nd Street. Well No. 1 has an authorized instantaneous quantity (Qi) of 630 gpm (0.91 mgd) and an annually quantity (Qa) of 1,000 acre-feet (ft/year) (0.89 mgd). Well No. 2 has an authorized Qi of 1,200 gpm (1.73 mgd) and a Qa of 1,600 ac-ft/year (1.43 mgd).

Gilman Wells

The Gilman Wells No. 4 and 5 were constructed in 1987 and are located southeast of where I-90 crosses Issaquah Creek. Gilman Well No. 4 has an authorized Qi of 250 gpm (0.36 mgd) and a Qa of 200 ac-ft/year (0.18 mgd). Well No. 5 is supplemental to the primary water rights for the Risdon Wells with an authorized Qi of 1,000 gpm (0.144 mgd) and a Qa of 1,600 ac-ft/year (1.43 mgd).

2.4.2 Purchased Water Supply

In addition to groundwater supplies, the City also purchases water from CWA. The water is delivered through interties discussed in Section 2.2. Regional water is used to serve the Issaquah Highlands. The City has facilities in place to potentially deliver CWA water to Talus and to provide a blend of CWA and groundwater to the Issaquah Highlands. The City anticipates that the entire service area may be served blended regional/well water in the future.

The Montreux intertie to Bellevue has the capacity to serve a maximum of 700 ERU in the Montreux Operating Area and a portion of the future Cougar Mountain Operating Area according to the terms of the Bellevue facilities agreement. The connection to Bellevue's water system that serves Lakemont may serve up to 600 multi-family units according to the facilities agreement with Bellevue, and the connection to Bellevue's water system that serves South Cove may serve up to 1,600 ERU (Appendix D).

2.5 Operating Areas

The City's water system is currently comprised of 14 hydraulic operating areas, further divided into a total of 27 individual pressure zones. There are two proposed operating areas to serve future growth within the service area: Cougar Mountain and Bergsma.

The major hydraulic operating areas each comprise a separate portion of the overall water distribution system, containing separate storage facilities. The operating areas, and associated pressure zones, are shown in Figure 2-3 and summarized in Table 2-2. Connections between operating areas are via booster pump stations (BPSs) from lower to higher elevation operating areas or through pressure reducing valve (PRV) connections.

In a few locations, where pipes cross hydraulic boundaries, closed valves separate the operating areas. In some hydraulic operating areas, the variation in elevation within the area is too great to be served by a single pressure zone. Under these circumstances, multiple PRVs are installed, forming separate pressure zones, to avoid system pressures outside of the accepted range. Pressure zones depend on the same supply and storage facilities as the rest of the operating area.

Currently, supply for the majority of the City's service area is from the Gilman and Risdon wells, described in the previous section. The Lakemont, South Cove, and Montreux Operating Areas are not currently served by these wells; they are supplied through separate interties with Bellevue. The Issaquah Highlands development is currently supplied only with CWA water but the system has the capability of delivering a blend of water from City wells and from CWA. This production strategy enables the City to maximize total production from its own wells, and to meet higher demand in the summer season. Water purchased from CWA supplement Issaquah's well production to meet the summer peaking demand. See Chapter 7 for a summary of the amount of water purchased from CWA.

A hydraulic profile of the existing water system is shown in Figure 2-4.

Table 2-2. Existing Hydraulic Operating Areas and Pressure Zones

Operating Area / Pressure Zone	Highest Service Elevation	Supply Facilities	Storage Facilities
Valley 297	229	Risdon Well & Gilman Wells	Cemetery Hills Reservoir & Westside Reservoir
Mt. Hood 480	397	Mt. Park & 12th Ave BPSs	Mt. Hood Reservoir
Wildwood 625 Sub-Zone 588 Sub-Zone	 517 421	Mt. Hood BPS	Wildwood Reservoir
Highwood 920 Sub-Zone 782 Sub-Zone 715 Sub-Zone 677 Sub-Zone	 770 640 619 530	Wildwood BPS	Highwood Reservoir
Forest Rim 1178	1080	Forest Rim BPS	Forest Rim Reservoir
Cougar Ridge 430	319	Terra II BPS	Cougar Ridge Reservoir
Lakemont 520	312	City of Bellevue 520 Zone	Multiple 520 Zone Reservoirs (Bellevue)
Montreux 1005 Sub-Zone 835 Sub-Zone 744 Sub-Zone 617 Sub-Zone 502 Sub-Zone 364 Sub-Zone	 862 717 592 475 375 260	City of Bellevue 1150 Zone	Cougar Mountain 1150 Reservoir (Bellevue) [a]
Issaquah Highlands Central Park 742	666	Holly Street BPSs	Central Park 742 Reservoir

Table 2-2. Existing Hydraulic Operating Areas and Pressure Zones

Operating Area / Pressure Zone	Highest Service Elevation	Supply Facilities	Storage Facilities
Issaquah Highlands Summit 1234 Sub-Zone 1000 Sub-Zone 615 Sub-Zone	 1079 882 652	Central Park BPS	Summit 1234 Reservoir
Talus Shangri-La 616	530	Talus BPSs	Shangri-La 616 Reservoir
Talus Foothills Talus Foothills 912 [b] Talus Foothills 752	 800 565	Shangri-La BPS Cascade BPS	Foothills 912 Reservoir [b]
Grand Ridge 1337	1200	Grand Ridge BPS	Grand Ridge 1337 Reservoir
South Cove South Cove 271 South Cove 260	 207	 City of Bellevue 270 Zone	 Multiple 520 Zone Reservoirs (Bellevue) South Cove Reservoir

[a] Additional storage is provided from higher zones via PRVs

[b] Foothills 912 Reservoir will be brought online in 2018 creating the Talus Foothills 912 Zone. Currently, the Talus Mountain View 752 Zone is served by the Mountain View 752 Reservoir which will be decommissioned when the 912 level reservoir is brought online.

2.5.1 Valley Operating Area

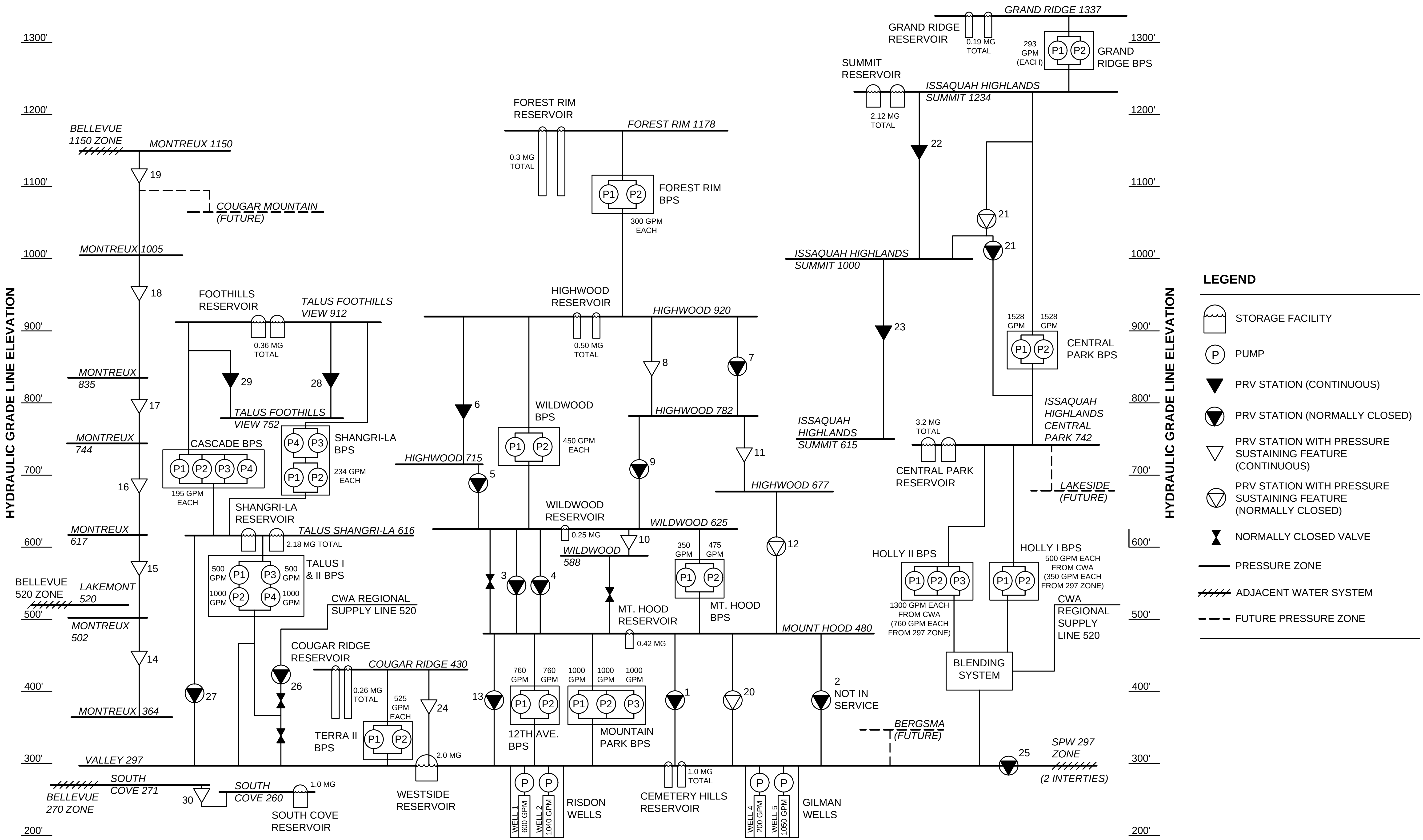
The Valley Operating Area is the City's oldest and largest. It dates back to 1923 when a series of springs, in what is now known as the Lake Tradition Plateau, was purchased from the Gilman Water Company. The operating area encompasses the valley floor, between Squak Mountain and Tiger Mountain in the southern portion of the City, and is bounded by Cougar Mountain and Lake Sammamish to the north. The I-90 corridor runs through the northern portion of the operating area. Most of the City's commercial and industrial development is located in this operating area, primarily along the I-90 Corridor.

The City's well supply system is located in the Valley Operating Area. The wells pump to the Westside Reservoir and Cemetery Hills Reservoir, which nominally operate on the 297-foot hydraulic gradient. The Valley Operating Area is not subdivided into additional pressure zones.

2.5.2 Mt. Hood Operating Area

The Mt. Hood area operates at a typical hydraulic elevation of 480 feet and is located on the northern and eastern portions of Squak Mountain. The majority of the Mt. Hood Operating Area is single-family residential, with some multi-family developments. There are no commercial or industrial zoned areas within the Mt. Hood Operating Area. The operating area is bounded to the north and east by the Valley Operating Area and to the south by the Wildwood and Highwood Operating Areas. The Mt. Hood Operating Area extends from the southeast to the northwest, roughly adjacent to, and southwest of, NW Newport Way and Front Street South.

The Mt. Hood Operating Area is not subdivided into additional pressure zones. Water is pumped from the Valley Operating Area to Mt. Hood Operating Area via the Mountain Park and 12th Avenue



EXISTING HYDRAULIC PROFILE

FIGURE 2-4

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NW BPSs. Storage is provided by the Mt. Hood reservoir. Emergency connections exist between Mt. Hood and the Valley Operating Areas, through PRVs 1, 13 and 20. PRV 2 is bypassed, but could be manually put into service in an emergency.

2.5.3 Wildwood Operating Area

The Wildwood Operating Area occupies a higher elevation of Squak Mountain, adjacent to, and to the southwest of, the Mt. Hood Operating Area. The area currently consists of single-family developments. The majority of the Wildwood Operating Area functions at a 625-foot hydraulic gradient. Wildwood Operating Area is served by the Mt. Hood BPS. The Wildwood reservoir provides storage for the Operating Area, operating on the 625-foot gradient. The Wildwood 588 sub-zone is supplied from the Wildwood 625 Zone, via PRV 10. Emergency connections exist between Wildwood and Mt. Hood Operating Areas, through PRV 3 and 4.

2.5.4 Highwood Operating Area

The Highwood Operating Area rests at still a higher elevation on Squak Mountain, adjacent and to the southwest of Mt. Hood and Wildwood. The Highwood Operating Area contains four pressure zones. The Wildwood BPS serves Highwood Operating Area, pumping water to the 920-foot hydraulic gradient from the Wildwood 625 Zone.

Storage for the Highwood Operating Area is twin standpipes, which “float” on the 920-foot gradient. The Highwood 782 Zone is served by the 920 Zone, via PRV 7 and 8. The Highwood 715 Zone is also served from the 920 Zone, through PRV 6. The Highwood 677 Zone is served from the 782 Zone through PRV 11. Emergency connections exist between Highwood and Mt. Hood through PRV 12, and through PRVs 5 and 9 to Wildwood.

2.5.5 Forest Rim Operating Area

The Forest Rim Operating Area contains the highest hydraulic gradient on Squak Mountain at 1,178 feet. The Forest Rim Operating Area is located adjacent and to the southwest of the Highwood Operating Area. The Forest Rim Operating Area is served by the Forest Rim BPS, pumping water from the Highwood 920 Zone. Storage for this operating area is provided by twin standpipes. The Forest Rim Operating Area is zoned for single-family residential development. The operating area is not subdivided into additional pressure zones. No emergency connections exist between the Forest Rim and Highwood Operating Areas.

2.5.6 Cougar Ridge Operating Area

The Cougar Ridge Operating Area is located in the northwest portion of the city, just south of the I-90 corridor. Cougar Ridge is zoned single-family. The area is served by the Terra II BPS, pumping water from the Valley Operating Area to the Cougar Ridge 431-foot hydraulic gradient. Storage for Cougar Ridge is provided by twin standpipes, which operate on the 431- foot gradient.

2.5.7 Lakemont Operating Area

The Lakemont Operating Area, also known as the Lakemont Triangle, is located at the northwest corner of the service area, and is located between the Montreux Operating Area and the I-90 corridor. Lakemont is served by an intertie with Bellevue’s water system, the Lake Hills 520 Zone. The 12-inch water main that serves the Lakemont Operating Area is not metered; Bellevue bills wheeling charges from the domestic meter readings the City provides. Lakemont does not have its own BPS or reservoir, but relies on Bellevue’s 520 Zone reservoir to provide service and storage at the proper operating pressures. The Lakemont Operating Area is not subdivided into additional pressure zones.

2.5.8 Montreux Operating Area

The Montreux Operating Area is also located in the northwest corner of the City. The operating area is bounded by the Cougar Ridge Operating Area to the east, the Lakemont Operating Area to the west and the Valley Operating Area to the north and the future Cougar Mountain Operating Area to the south. The southern boundary of Montreux sits adjacent to Bellevue’s water service boundary, the 1150 Zone.

Montreux is served from a 12-inch water main from Bellevue’s 1150 Zone through a 6-inch master meter. Montreux does not require a dedicated BPS, relying instead on the 1,150-foot hydraulic gradient supply from Bellevue, and storage from Bellevue’s Cougar Mountain 1150 reservoir. The Montreux Operating Area consists of seven individual pressure zones, more than any other operating area. PRV 19 reduces Bellevue’s 1,150-foot gradient to the 1,005-foot level of Montreux’s second highest pressure zone. PRVs 18, 17, 16, 15, and 14 systematically reduce the 1,005-foot gradient to levels required for the five additional pressure zones, 835-foot, 744-foot, 617-foot, 502-foot, and 364-foot gradients, respectively.

2.5.9 Talus Shrangri-La Operating Area

The Talus Shangri-La Operating Area (aka Talus 616) is located in the Talus development, in Issaquah’s southern city limits. The operating area is bounded by the Valley Operating Area to the south and east, by the Talus Foothills Operating Area to the west, and to the south by Issaquah city limits. The Talus Shangri-La Operating Area operates at the 616- foot hydraulic gradient. It is not subdivided into additional pressure zones.

The Talus Shangri-La Operating Area is supplied by the Talus I & II BPSs. The stations have been constructed as two identical, attached stations; each station functioning as a separate, and therefore redundant, pump station. Each station is capable of boosting water from either the City’s groundwater source (297 Zone) or the Regional Water main (520 Zone), to the Shangri-La Reservoir at the 616 gradient line. The Shangri-La Reservoir is supplied by the Talus II BPSs and rests at a hydraulic gradient of 616 feet.

2.5.10 Talus Foothills Operating Area

The Talus Mountain View Operating Area currently rests at the 752-foot gradient. However, changes to the Shangri-La BPS and Mountain View Reservoir planned for 2018 will change the hydraulic grade of the operating area to the 912-foot gradient and create two pressure zones (Talus Foothills 912 and Foothills Talus 752) also located in the Talus development. At this time, the operating area would be referred to at the Talus Foothills Operating Area instead of Talus Mountain View. The operating area is bound by the Talus Shangri-La Operating Area to the east, the Valley Operating Area and the future Cougar Mountain Operating Area to the north, and the retail service area boundary to the west. The Talus Foothills Operating Area is supplied by the Shangri-La BPS and Cascade BPS, drawing water from the Shangri-La Operating Area and pumping to the Foothills 912 Reservoir. Once planned modifications to the operating are completed, PRVs will allow flow from the Talus 912 Zone to supply the Talus 752 Zone.

2.5.11 Issaquah Highlands Central Park Operating Area

The Issaquah Highlands Central Park Operating Area is located in the eastern portion of the City's service area, at the southern end of the Sammamish plateau. The operating area is bounded by the Valley Operating Area to the west, I-90 corridor to the south, the Issaquah Highlands Summit Operating Area to the east and SPW boundary to the north and northeast. The hydraulic gradient of the Issaquah Highlands Central Park Operating Area is 742 feet. The Issaquah Highlands Central Park Reservoir is supplied by the Holly Street BPSs No. 1 and No. 2. The Holly Street BPSs are designed to work in parallel with the Holly Street No. 1 BPS as lead (flowing first) providing a flow range up to 800 gpm while the Holly Street No. 2 BPS will provide flows up to 2,200 gpm if additional flows are needed beyond the Holly Street No. 1 BPS's capacity. Both pumping stations are able to convey water from the Valley 297 Zone or from the 520 Zone (24-inch Regional Water main) to the Central Park reservoir.

2.5.12 Issaquah Highlands Summit Operating Area

The Issaquah Highlands Summit Operating Area rests at the 1,234-foot gradient, northeast of the Issaquah Highlands Central Park Operating Area. The Summit Zone is bound to the south by I-90, to the east by King County Rural Boundary and the Grand Ridge Operating Area, and to the north by SPW boundary. The 1234 Zone is the highest hydraulic gradient in the City's retail service area and is fed by twin, steel reservoirs. In addition, there is PRV 22 which serves a 1000 Zone from the 1234 Zone and a 615 Zone is fed by the 1000 Zone through PRV 23. PRV 21 is normally closed, but if opened, is able to feed the main 742 Zone from the 1234 Zone.

The Issaquah Highlands Summit Operating Area is supplied by water from the Central Park BPS located adjacent to the Central Park Reservoir. The water is pumped to the Summit Reservoir through a dedicated water supply line located on the hillside east of the Central Park BPS and the urban growth boundary.

2.5.13 Grand Ridge Operating Area

Added to the system since the 2012 water system plan update, the Grand Ridge Operating Area rests at the 1,337-foot gradient, east of the Issaquah Highlands Summit Operating Area. The area is supplied by the Grand Ridge BPS which takes water from the Issaquah Highlands Summit 1337 Pressure Zone. Storage for the area is provided by the Grand Ridge Reservoir.

2.5.14 South Cove Operating Area

Added to the system in January 2017, the South Cove Operating Area rests at the 271-foot gradient. The area is bounded by the Lakemont and Montreux Operating Areas to the south, Lake Sammamish to the north and east, and the Bellevue water service area to the west. The operating area is supplied by an intertie with Bellevue's 270 Zone.

The operating area is divided into two pressure zones. The South Cove 271 Zone is directly supplied by the Bellevue 270 Zone through an intertie whose storage is provided by the Bellevue 520 Zone and consists of the higher elevation parcels within the South Cove area. The South Cove 271 Zone makes up less than 10% of the operating area's water demand. A PRV station is located along Lake Sammamish Parkway which serves the South Cove 260 Zone (at a 260-foot gradient) from the South Cove 271 Zone. Storage for the South Cove 260 Zone is provided by the South Cove Reservoir. The PRV station was installed in 2017 to create the South Cove 271 Zone which historically operated at a 260-foot gradient and had low pressure issues, and to allow the South Cove Reservoir to be fully controlled by the City instead of having to rely on Bellevue. This allows the City to operate the PRV station, which has SCADA and solenoid controlled PRVs, to be actuated in a manner to promote increased turnover of the South Cove Reservoir to maintain water quality.

2.6 Distribution Piping

The existing distribution system contains approximately 135 miles of pipeline ranging in size from 4- to 16-inches in diameter, with the largest categories being 8- and 12-inch. Table 2-3 summarizes approximate pipe lengths for each type of material. Over 87 percent of the pipe is ductile iron. About eight percent of the system's pipe is cast iron. Cast iron pipe that has been examined recently was found to be mortar lined. PVC/HDPE and asbestos cement pipe comprise the rest of the system piping.

Table 2-3. Distribution Pipe Materials and Length

Diameter (inches)	PVC / HDPE	Asbestos Cement	Cast Iron	Ductile Iron	Total (ft)	Total (miles)	% of Total
4	2,300	260	20	29,100	31,680	6.0	4.4%
6	0	9,590	9,910	42,250	61,750	11.7	8.6%
8	1,030	19,430	12,770	290,360	323,590	61.3	45.3%
10	230	0	6,130	23,920	30,280	5.7	4.2%
12	630	3,320	24,480	225,380	253,810	48.1	35.5%
16	0	0	0	13,370	13,370	2.5	1.9%
Total (ft)	4,190	32,600	53,310	624,380	714,480	135.3	100.0%
Total (miles)	0.8	6.2	10.1	118.3	135.3		
Percent	0.6%	4.6%	7.5%	87.4%	100.0%		

Source: City GIS

Note: Table includes pipes with diameters of 4-inch and larger. Smaller diameter lines are typically associated with cleanouts and PRV stations. Table does not include the CWA regional transmission main.

2.7 Pressure Reducing Valve Stations

The City has 30 PRV stations within its distribution system. PRV 2 was bypassed in October, 2000 when the Mt. Hood Operating Area was re-zoned. The station is still installed and could be put back into service in an emergency situation. PRV 26, the Talus intertie with the regional main, is currently not used. The Montreux Operating Area has the largest number of PRV stations with six PRVs. PRV stations are located at the zone boundaries, supplying water from upper to lower gradient pressure zones at the appropriate (reduced) pressures. Each PRV station contains large and small-demand pressure reducing valves, in parallel. The smaller valve is typically set to maintain a higher downstream pressure gradient than the larger valve, and therefore opens first, supplying lower flows to the lower zone. The larger valve is set to maintain a lower downstream gradient and opens only during periods of high demand and lower pressure in the lower gradient zone.

PRV stations are set to provide either continuous supply to the lower gradient zone, or to open only during emergency situations when the pressure drops significantly. Of the 30 PRV stations, 16 operate continuously, 13 are normally closed and used for emergency operation, and PRV 2 has been bypassed. Normally-closed PRVs are typically set 5-10 psi below the normal operating pressure of the downstream operating areas.

Eleven PRV stations are configured with a pressure sustaining feature. The PRV stations equipped with this feature supply water to lower gradient zones in the same manner as regular PRV stations, but also monitor pressure on the higher gradient side of the station, closing if this pressure drops to a predetermined level. Pressure sustaining-equipped stations will close if a failure in the lower pressure zone occurs, such as a water main break, preventing excessive water from discharging from the upper to lower pressure zone. Table 2-4 summarizes existing PRV station data for the City's distribution system.

Table 2-4. Pressure Reducing Valve Stations

PRV Station No.	Location	Size (inches)			Upstream Pressure Zone	Downstream Pressure Zone	Normally Closed	Continuous	Pressure Sustaining
		Main	Large Valve	Small Valve					
1	345 Mine Hill Rd. SW	12	10	3	Mt. Hood 480	Valley 297	•		
2	735 Wildwood Blvd. SW	12	10	3	Mt. Hood 480	Valley 297	*Not in Service*		
3	925 Wildwood Blvd. SW	6	6	2	Wildwood 625	Mt. Hood 480	•		
4	415 SW Forest Drive	6	6	2	Wildwood 625	Mt. Hood 480	•		
5	1065 SW Ridgewood Circle	8	6	2	Highwood 715	Wildwood 625	•		
6	1130 SW Ridgewood Place	8	6	1.5	Highwood 920	Highwood 715		•	
7	1045 Greenwood Blvd. SW	6	4	1.25	Highwood 920	Highwood 782	•		
8	740 Highwood Drive SW	8	8	2	Highwood 920	Highwood 782		•	•
9	770 Mt. Park Blvd. SW	8	6	2	Highwood 782	Wildwood 625	•		
10	530 Mt. Park Blvd. SW	8	6	2	Wildwood 625	Wildwood 588		•	•
11	170 Mt. Olympus Dr. SW	8	6	2	Highwood 782	Highwood 677		•	•
12	170 Mt. Olympus Dr. NW	8	6	2	Highwood 677	Mt. Hood 480	•		•
13	720 12th Ave. NW	10	8	3	Mt. Hood 480	Valley 297	•		
14	Village Park Dr. NW #1	8	8	3	Montreux 502	Montreux 364		•	•
15	Village Park Dr. NW #2	8	8	3	Montreux 617	Montreux 502		•	•
16	Village Park Dr. NW #3	8	8	3	Montreux 744	Montreux 617		•	•
17	Village Park Dr. NW #4	8	8	3	Montreux 835	Montreux 744		•	•
18	Village Park Dr. NW #5	8	8	3	Montreux 1005	Montreux 835		•	•
19	SE 60th St at 182nd Ave	12	8	3	Bellevue 1150	Montreux 1005		•	•
20	1495 Sycamore Dr. SE	12	6	2	Mt. Hood 480	Valley 297	•		
21	1901 Park Dr NE	12	8	3	Summit 1234	Central Park 742	•		

Table 2-4. Pressure Reducing Valve Stations

PRV Station No.	Location	Size (inches)			Upstream Pressure Zone	Downstream Pressure Zone	Normally Closed	Continuous	Pressure Sustaining
		Main	Large Valve	Small Valve					
22	1693 30th Ave NE	8	8	4	Summit 1234	Summit 1000		●	
23	NE Natalie Way	8	8	4	Summit 1000	Summit 742		●	
24	1700 Pine View Dr	8	6	2	Cougar Ridge 431	Valley 297		●	●
25	NW Sammamish Pkwy at 221st	12	8	3	SPW 297	Valley 297	●		
26	NW Newport Way at SR900	12	6	6	Cascade 520	Valley 297	●		
27	Westside Reservoir	-	-	-	Talus Shangri-La 616	Valley 297	●		
28	Shangri-La BPS	12	8	1.5	Talus 912	Talus 752	●		
29	Talus Dr and Shangri-La Way	12	6	-	Talus 912 (Cascade BPS Discharge)	Talus 752	●		
30	Sammamish Pkwy at 188th Ave SE	12	8	3	South Cove 271	South Cove 260		●	●

2.8 Booster Pump Stations

The City operates 14 BPSs (when Talus I and II are counted separately, though housed in the same building) that transfer water from the Valley Operating Area to higher elevation pressure zones. These BPSs operate collectively by moving water from one operating area to the next-higher operating area. Each BPS is configured for connection to a portable, auxiliary power supply in the event of a power outage. BPS data is summarized in Table 2-5. The table identifies pump station location, typical flow rates, operating pressures, supply and discharge operating areas, and other pertinent information. The BPSs are also shown schematically in Figure 2-4.

The City's BPSs contain two or more pumps that operate on an alternating basis. Pumps are turned on and off automatically based on water levels in the reservoirs that the pumps feed. Reservoirs are identified in the Telemetry Control Parameter column of Table 2-5. As the water level drops in a reservoir to a determined level, the first (lead) pump for the associated BPS will start. If the water level continues to drop, reaching a second determined level, the second (lag) pump will start. As water level in the reservoir subsequently rises to a determined water level, the lead pump will shut off. As the water level continues to rise to the determined height for maximum water level height, the lag pump will then turn off. Lead and lag pumps alternate for every pumping cycle.

Table 2-5. Booster Pump Stations

Name / Year of Installation or Last Upgrade	Location	Total Capacity (gpm)	Upstream Pressure Zone	Downstream Pressure Zone	Controlled By
Mountain Park 2015	W. Sunset Way	3,000	Valley 297	Mt. Hood 480	Mt. Hood Reservoir level
12th Avenue NW 2002	12th Ave. NW	1,450	Valley 297	Mt. Hood 480	Mt. Hood Reservoir level
Mt. Hood 2016	Mt. Hood Dr SW	825	Mt. Hood 480	Wildwood 625	Wildwood Reservoir level
Wildwood 2008	Highwood Dr SW	900	Wildwood 625	Highwood 920	Highwood Reservoir level
Forest Rim 2018 (planned replacement)	Mt. Side Dr SW	400 [c]	Highwood 920	Forest Rim 1178	Forest Rim Reservoir level
Terra II 1993	NW Pine Cone Dr	1,000	Valley 297	Cougar Ridge 431	Cougar Ridge Reservoir level
Holly Street I [a] 2001	1st Ave NE	1,025	Valley 297 or Regional	Central Park 742	Central Park Reservoir level
Holly Street II [a] 2001	1st Ave NE	4,200	Valley 297 or Regional	Central Park 742	Central Park Reservoir level
Talus I/II [a] 2002	NW Talus Dr	1,890	Valley 297 or Regional	Talus Shangri-La 616	Shangri-La Reservoir level
Shangri-La 2018 (planned upgrade)	Shangri- La Way NW	500	Talus 616	Talus 912 [b]	Foothills Reservoir level
Central Park 2002	IH Central Park	3,020	Central Park 742	Summit 1234	Summit Reservoir level
Cascade 2018 (planned construction)	Shangri-La Way NW	780	Talus 616	Talus 912	Foothills Reservoir level
Grand Ridge 2015	Grand Ridge Dr	538	Grand Ridge 1337	Summit 1234	Grand Ridge Reservoir

[a] Pump stations which may be operated from the RM (Regional Main) and/or City Wells.

[b] Shangri-La BPS currently pumps to the Talus 752 Zone. However, modifications to the Talus Mountain View Operation Area (planned for 2018) will have the Shangri-La BPS pumping to the Talus 912 Zone.

[c] Planned replacement is anticipated as having two 200 gpm pumps.

2.8.1 Mountain Park Booster Pump Station

The Mountain Park BPS provides the initial step in moving water from the Valley Operating Area to the higher-elevation operating areas on Squak Mountain. The Mountain Park and 12th Avenue pump stations discharge into a transmission main to the Mt. Hood reservoir and ultimately supply all the water used by the Mt. Hood, Wildwood, Highwood and Forest Rim Operating Areas. The original Mountain Park BPS was constructed in 1970. In 2015 a new Mountain Park BPS was constructed due to the original pump station reaching the end of its useful life and its susceptibility to damage from seismic events. The new pump station also has an increased pumping capacity that resolves a deficiency in fire flow storage in the Mt. Hood Operating Area by supplementing fire suppression storage in the Mt. Hood Reservoir. The new pump station has three 1,000 gpm pumps and an on-site generator for backup power. The pump station is controlled by the water level in the Mt. Hood Reservoir.

2.8.2 12th Avenue NW Booster Pump Station

The 12th Avenue Pump Station located at 721 12th Avenue NW in the Tibbetts Valley Park upper parking lot, together with Mountain Park, provides the initial step in moving water from the Valley to the higher elevation operating areas on Squak Mountain. As stated previously, the 12th Avenue and Mountain Park pump stations discharge to a transmission main to the Mt. Hood reservoir and ultimately supply all the water used by the Mt. Hood, Wildwood, Highwood and Forest Rim Operating Areas.

The underground concrete building houses two 700-gpm pumps and was constructed in 2002 and brought on line in January 2003. There is also electrical transfer switchgear that supports an auxiliary generator power supply.

2.8.3 Mt. Hood Booster Pump Station

The Mt. Hood BPS supplies water to the Wildwood Operating Area from the Mt. Hood 480 Zone. The pump station discharges into a transmission main from the Mt. Hood Operating Area to the Wildwood Operating Area. The pump station is a concrete masonry structure built in 1977 and located adjacent to the Mt. Hood reservoir. The pump station houses two 450-gpm pumps. There is also electrical transfer switchgear that supports an auxiliary generator power supply. Pump operation is controlled by the water level in the Wildwood reservoir. The pumps and building are in good condition.

2.8.4 Wildwood Booster Pump Station

The Wildwood BPS pumps from the Wildwood to the Highwood Operating Area. The pump station, located adjacent to the Wildwood reservoir was originally constructed in 1967 and completely rebuilt in 2009. The pump station discharges to the Highwood distribution system and the Highwood 920 twin reservoirs. The new pump station is a reinforced concrete building housing two 450 gpm pumps. Pump operation is controlled by water level in the Highwood Reservoir. There is also electrical transfer switchgear that supports an auxiliary generator power supply.

2.8.5 Forest Rim Booster Pump Station

The Forest Rim BPS pumps to the Forest Rim Operating Area. The pump house, constructed in 1979, is concrete masonry with a wood frame roof. The pump station currently houses two 300 gpm pumps. There is also electrical transfer switchgear for an auxiliary generator power supply. However, the pump station is nearing the end of its design lifespan and is also susceptible to seismic damage. A new, replacement pump station is planned for construction in 2018.

2.8.6 Terra II Booster Pump Station

The Terra II BPS supplies water to the Cougar Ridge Operating Area, from the Valley Operating Area. The pump station discharges to the Cougar Ridge operating zone. The pump station is a partially buried, reinforced concrete structure built in 1985. The pump station houses two 500 gpm. This is the only BPS with an on-site emergency power generator.

Pump operation is controlled by the water level in the twin standpipes. The partially-buried wall and roof need sealing to eliminate water intrusion, but the pumps and building are in good condition.

2.8.7 Holly Street Booster Pump Stations I & II

The Holly Street BPSs supply water to the Central Park Operating Area from the Valley 297 Zone, or the Regional Water Supply at the 520-foot gradient line. The pump stations discharge into a transmission main located in Park Drive NE, to the Central Park Operating Area. Holly St BPS I provides flow in the range of approximately 0 gpm to 800 gpm while the Holly Street BPS II provides flow in the range of approximately 900 gpm to 2200 gpm. Both stations are located in the southwest portion of Issaquah Highlands, next to the Public Works Operations Maintenance Facility. Both are concrete masonry buildings.

Holly Street BPS I was constructed in 1997, has two 60-hp vertical turbine canned booster pumps and motors, and each rated for 350 gpm. Holly Street BPS I also contains return bypass piping with a pressure sustaining/pressure regulating control valve to allow flow into the 297 Zone from the 742 Zone, under emergency conditions. The pump station also has a 250-gallon bladder surge tank as well as electrical transfer switchgear which support an auxiliary generator power supply. Holly Street BPS I is the lead station for pumping to the 742 Zone.

Holly Street BPS II was constructed in 2002, also to boost potable water to the Central Park 742 Zone. This station was designed and installed to work in parallel with the Holly Street BPS I. Because neither Holly Street BPSs have Variable Frequency Drive (VFD) equipment, the pumps at Holly Street BPS II were sized to augment the maximum flow from Holly Street BPS I in order to minimize water surge at startup from Holly Street BPS II's 1,000-gpm pumps. Holly Street BPS II has three 200-hp vertical turbine motors and pumps, rated for 1,000 gpm at 450 feet of head. Holly Street BPS II has a 250-gallon (discharge) and a 500-gallon (suction) bladder surge tank, and electrical transfer switchgear that supports an auxiliary generator power supply.

2.8.8 Central Park Booster Pump Station

Central Park BPS is located adjacent to the Central Park 742 Zone reservoir in Issaquah Highlands. Water is pumped from the Central Park Operating Area to the Summit area through a transmission main located on the hillside east of Central Park BPS and the urban growth boundary. Central Park BPS was built in 2002. The building is a concrete masonry structure, located immediately adjacent to the reservoir. Also installed is electrical transfer switchgear that supports an auxiliary generator power supply.

Central Park BPS houses two, 250-hp vertical turbine motors, each capable of pumping 1,750 gpm. There is a 500-gallon bladder surge tank connected to the pump discharge manifold on the south side of the pump building, installed to reduce impacts on the water system related to surges in pressure caused by daily operations and unexpected pump failures. Also part of the station infrastructure is a connection from the 1234 Zone piping to the 1000 pressure zone on the north side of the station building. This connection consists of two pressure reducing/back pressure sustaining valves, each valve (one three-inch and one eight-inch) is on a separate line with isolation valves, and each can be operated independently. These valves are set to maintain pressure in the 1000 Zone

If necessary, water can be bypassed to the 742 Zone through two control valves on the northwest side of the building connected to the 1000 Zone piping. These valves are both angle-type valves; one a three-inch pressure relief/backpressure sustaining valve and the other is a six-inch valve with backpressure sustaining features. The three-inch valve is for relieving excess pressure in the 1000 Zone. The six-inch valve is intended for circulating water between zones during low demands and transferring water from the Summit 1250 Zone to the 742 Zone during emergency conditions.

2.8.9 Talus Booster Pump Stations 1 & 2

Talus BPSs I & II are redundant booster stations, equal in all aspects. The two stations reside in one building and are separated by a common wall. Constructed in 2002, the stations are located in the southeastern portion of the Talus Development on Talus Drive. Each station pump is capable of boosting water from either the 297-groundwater pressure zone or the 520 Zone Regional Water Supply main, up to the Shangri-La 616 Zone reservoir and distribution system. Each station has the capability of running separately, including the ability to operate separately while on an auxiliary power generator.

Each station is supplied with two 1,770-rpm (maximum nominal speed), 60-hp, variable speed vertical turbine pumps, each pump having a capacity of 550-gpm. Each VFD has the capability of operating between 800 and 1,770 rpm.

Each station is supplied with surge control valves on the suction side of each of the pumps and at either end of the discharge manifold. These surge anticipator valves are pilot-actuated, hydraulically operated, diaphragm-type globe valves. Their function is to limit line surges on pump start and stop, especially during instances of power failure when pumps stop abruptly. Also, a pressure reducing valve is provided on the pump suction manifold between BPS I and BPS II and acts to maintain a constant downstream pressure regardless of varying upstream pressure. The pressure reducing valve is intended to provide an emergency intertie between the 297 Zone and the 520 Zone and, except in emergency situations, will remain inactive.

2.8.10 Shangri-La Booster Pump Station

The Shangri-La BPS, constructed in 2002, is located adjacent to the Shangri-La 616 Zone reservoir. The station boosts water from the Shangri-La Operating Area to the Foothills Operating Area. The station consists of four 60-hp vertical turbine canned suction pumps, individually able to deliver 250 gpm. The Shangri-La BPS differs from The City's other BPSs in that the on-site concrete building houses only the electrical and telemetry equipment; the motor/pump assemblies are submersible and located outside in two vaults.

Modifications to the pump station are planned for completion in 2018 to support the creation of a new Talus 912 Pressure Zone. One pair of pumps boosts water from the Talus 616 Pressure Zone to the Talus 752 Zone. A second pair of pumps takes some of the flow coming off the first pair of pumps and further boosts the water from the Talus 752 Pressure Zone to the Talus 912 Pressure Zone.

2.8.11 Cascade Booster Pump Station

The Cascade BPS, constructed in 2016, is located on the boundary between the Talus 616 and 752 Pressure Zones. The station boosts water from the Shangri-La Operating Area (Talus 616) to the

Foothills Operating Area (Talus 912). The station consists of four 25-hp vertical in-line centrifugal pumps, individually able to deliver 195 gpm.

2.8.12 Grand Ridge Booster Pump Station

The Grand Ridge BPS is located on Grand Ridge Drive and boosts water from the Issaquah Highlands Summit 1234 Pressure Zone into the Grand Ridge 1337 Pressure Zone. The pump station was original constructed in 2008 but was revised in 2015. The current pump station has two 269 gpm pumps and operates off of the Grand Ridge Reservoir.

2.9 Storage Facilities

Storage facilities are provided at 13 locations throughout the City's water system. Total reservoir volume is approximately 13.8 MG. All City reservoirs are covered, ground-level reservoirs or standpipes. There are no elevated tanks within the system. The City utilizes a supervisory control and data acquisition (SCADA) system for reservoir telemetry. Table 2-6 summarizes the physical characteristics of the City's storage facilities.

Table 2-6. Storage Facilities

Reservoir Name	Location	Volume (MG)	Overflow EL (ft)	Base EL (ft)	Pressure Zones Served	Material
Valley Operating Area Storage						
Cemetery A	695 W. Sunset	0.50	298.7	267.5	Valley 297	Welded Steel
Cemetery B	695 W. Sunset	0.50	298.7	267.5	Valley 297	Welded Steel
Westside	James Bush Road	2.00	300.0	280.5	Valley 297	Welded Steel
Cougar Ridge Operating Area Storage						
Cougar Ridge A	SE 56th St.	0.13	431.0	353.3	Cougar Ridge 430	Welded steel
Cougar Ridge B	SE 56th St.	0.13	431.0	353.3	Cougar Ridge 430	Welded steel
Mt. Hood Operating Area Storage						
Mt. Hood	Mt Hood Dr. SW	0.42	483.5	464.5	Mt. Hood 480	Cast-in-place concrete
Wildwood Operating Area Storage						
Wildwood	Highwood Dr. SW	0.25	634.5	621.0	Wildwood 625, 588	Concrete
Highwood Operating Area Storage						
Highwood A	Idylwood Dr. SW	0.25	953.0	924	Highwood 920, 782, 715, 677	Welded steel
Highwood B	Idylwood Dr. SW	0.25	953.0	924	Highwood 920, 782, 715, 677	Welded steel

Table 2-6. Storage Facilities

Reservoir Name	Location	Volume (MG)	Overflow EL (ft)	Base EL (ft)	Pressure Zones Served	Material
Forest Rim Operating Area Storage						
Forest Rim A	Squak Mt. Loop SW	0.15	1,201	1,091	Forest Rim 1178	Welded steel
Forest Rim B	Squak Mt. Loop SW	0.15	1,201	1,091	Forest Rim 1178	Welded steel
Issaquah Highlands Central Park Operating Area Storage						
Central Park A	NE Park Dr.	1.60	742.1	716.8	Central Park 742	Integral cast-in-place concrete
Central Park B	NE Park Dr.	1.60	742.1	716.8	Central Park 742	Integral cast-in-place concrete
Issaquah Highlands Summit Operating Area Storage						
Summit A	Harrison Dr	1.06	1234.5	1191.7	Summit 1234, 1000	Welded steel
Summit A	Harrison Dr	1.06	1234.5	1191.7	Summit 1234, 742	Welded steel
Talus Shangri-La Operating Area Storage						
Shagri-La A (inner ring)	Shangri La Way NW	1.09	616.0	586	Talus 616	Two cell concentric ring, Concrete
Shagri-La B (outer ring)	Shangri La Way NW	1.09	616.0	586	Talus 616	Two cell concentric ring, Concrete
Talus Foothills Operating Area Storage						
Foothills A [a]	Shangri La Way NW	0.18	913	864.5	Talus 912	Welded Steel
Foothills B [a]	Shangri La Way NW	0.18	913	864.5	Talus 912	Welded Steel
Grand Ridge Operating Area Storage						
Grand Ridge A	270th Pl SE	0.10	1,237	1,294	Grand Ridge 1337	Welded Steel
Grand Ridge B	270th Pl SE	0.10	1,237	1,294	Grand Ridge 1337	Welded Steel
South Cove Operating Area Storage						
South Cove	Newport Way NW	1.03	259.5	224.5	South Cove 260	Prestressed Concrete

[a] The Mountain View Reservoir currently has an overflow elevation of 752.3 ft. A new reservoir (Foothills Reservoir) will be built in the Talus Foothills Operating Area in 2018 with an overflow of 913 ft to support a new Talus 912 Zone. At that time, the existing reservoir will be decommissioned and removed.

Chapter 3. Policies and Criteria

The City has established policies and criteria that govern various facets of water utility operations. These policies guide the development and financing of water system infrastructure and provide guidance to achieve the desired level of service in a geographically and environmentally challenging area. While the City has discretion in setting performance, design and standards criteria for its water system, the criteria must meet or exceed the minimum standards for public water systems set by DOH through WAC Chapter 246-290. Used together, the criteria provide the desired level of service to water utility customers.

The policies described in this chapter are established by the City to provide the water utility a framework for design, operation and ongoing maintenance. The policies seek to provide uniform treatment to all utility customers and to provide information to current water system customers, as well as those considering service from the City. It should be noted these policies are limited to those items related to the water system's design and operation. The City has other policies (and criteria) related to land use, development and finance that may indirectly influence the water system in addition to the requirements related specifically to the water system.

The City's design criteria, also described in this chapter, provide the details needed to implement the policies established for the water system. They focus on design parameters and other details that have been developed to establish consistency and to ensure that adequate levels of service are provided throughout the system. These criteria and standards relate to storage volume, distribution piping, pressure zones, pump stations, and system operation. The criteria also provide the planning process with a measuring tool to identify any areas of the existing system that need to be improved to achieve the desired level of customer service. Additionally, other City publications such as the Water Standards, document the design standards and procedures for extension of the water system. These Water Standards are periodically updated. The current version is included in Appendix E.

The Issaquah Comprehensive Plan (ICP) establishes the following goals for utilities and public services that apply to the water utility system:

- Goal U-A: Facilitate the development of all utilities and public services at the appropriate levels of service to accommodate Issaquah's planned growth and ensure reliability of utilities and public services.
- Goal U-B: Integrate utility plans and the Land Use Element to ensure that utility services are available to support development that is consistent with anticipated growth targets.
- Goal U-C: Provide for the City's immediate and long term water needs by: protecting the aquifer and recharge areas; providing reliable levels of water service for domestic use and fire protection; and ensuring future water supplies by implementing conservation and reuse measures and pursuing additional sources.

The Comprehensive Plan also establishes the following goals of the Capital Facilities Plan that apply to the water utility system:

- Goal CF-B: Level of service standards shall be used to evaluate adequate public facilities and services and projected needs based upon the future population estimates in Table L-3 Population and Household Projection of the Land Use Element.

In order to achieve the above goals, the City has implemented the following policies and criteria.

3.1 Service Area Extensions

3.1.1 Retail Service Area

Under the 2003 Municipal Water Law (RCW43.20.260), the City is required to plan for and provide direct retail water service to all properties within the City's retail service area as defined by the adopted Water System Plan Update, Chapter 2 (ICP Policy U-C1 Service Area).

Discussion

The City will meet its "Duty To Serve" under the 2003 Municipal Water Law (RCW43.20.260) by providing direct service to all properties within its retail service area boundaries in a timely and reasonable manner. Prior to receiving water service, provision of water service within the City's retail service area is conditioned on the developer/development providing water system infrastructure improvements that conform to the City's criteria and standards. These improvements include capital improvements as defined and/or identified in the City's Water System Plan. The City also has identified expansion of its retail service area for areas within the City's current corporate limits and its potential annexation areas.

3.1.2 Service Area Extension

The City will provide water system service extensions if:

1. The development is within the City's retail service area, and;
2. The development is consistent with all adopted codes and policies, including the provisions of Issaquah Municipal Code (IMC) 13.88 as now exists or as hereafter may be amended, and;
3. A parcel meets special circumstances as defined with this Water Comprehensive Plan and codes, and;
4. The service extension shall have no cost to the City except as it chooses to participate to benefit the overall system.

Discussion

Property owners shall be responsible for extending the water system through the full extent of their property as needed for service to the development and along their frontage as required by the City Code. The City may extend the water system to ensure orderly system development, in which case, the property owner shall be responsible for an equitable share of extension costs at the time of connection to the City's system. Water system extensions shall be constructed to current City criteria and standards and shall be sized to serve the level of development anticipated in the ICP.

3.1.3 Adequate Water System

The City will require the provision of adequate water system facilities by the applicable public or existing privately-owned community provider as a condition for approval for all development applications. (ICP Policy U-C3 Adequate Water System, consistent with ICP policy CF-C2)

Discussion

In addition to the City's groundwater sources, the City has a Water Supply Agreement with Cascade Water Alliance. Later chapters in this water system plan which discuss the forecasted demands (Chapter 5) and compares that to supply sources (Chapter 7) indicate that there is adequate capacity for future development within the City based on current groundwater sources and Water Supply Agreements.

3.1.4 Satellite Systems

The City will provide direct service to water system customers within the City service area. If no other options are deemed feasible by the City, the City may enter into a satellite system written agreement with the satellite water system owner.

Discussion

The City requires connection to its water utility or other Class A utility serving within the City limits and does not allow the use of exempt wells to meet development requirements. The decision to allow a satellite system to provide service within the City service area is solely the City's. The conditions for City operation of a satellite system are determined on a case-by-case basis.

3.1.5 Water Certification Availability

Certificates of Water Availability shall only be issued if the Public Works Director determines that there is potential for a significant shortage of available water supply therefore necessitating the need to track supply quantities available to serve customers within the service area.

Discussion

Certificates of Water Availability will be required from the water purveyor prior to Land Use approval for development projects located within City of Issaquah Corporate Limits where water utility service is provided by another water purveyor instead of the City.

3.2 Customer Service

3.2.1 Service Ownership

The City requires ownership by the City of the service line leading from the main to the meter, the meter itself, and the meter box. The property owner shall own and maintain the service line and other facilities such as pressure reducing valves, pumps, or cross-connection devices beyond the meter. Where onsite fire hydrants are required, the City shall own the mains and hydrants. Easements shall be acquired for the mains and hydrants including that portion located on public property. Fire suppression system lines on private property are the responsibility of the property owner beginning at the first valve off of the City's water main.

Discussion

Meters are used by the City to monitor and charge for water consumption. The meter provides a logical separation between City and private ownership and responsibility, with exception of Fire Suppression Lines.

3.2.2 Service Pressure and Flow

The City's goal is to provide domestic water to all utility customers in sufficient quantity to meet demand conditions at a pressure that meets or exceeds minimum applicable regulations, except during emergency conditions. For new developments, a higher-pressure requirement is imposed as detailed in the Water System Planning and Design, Section 3.7.

Discussion

The City's goal is to provide a system pressure of at least 40 psi to meet normal residential needs based on ADD flow conditions. The pressure shall be measured at the second floor elevation with the storage at the lowest Equalizing Volume elevation.

At minimum, the City will meet WAC 246-290-230(5), which states, "New public water systems or additions to existing systems shall be designed with the capacity to deliver the design peak hour demand (PHD) quantity of water at 30 psi (210 kPa) under PHD flow conditions measured at all existing and proposed service water meters or along property lines adjacent to mains if no meter exists, and under the condition where all equalizing storage has been depleted."

During a fire, system pressures must be maintained above the minimum of 20 psi at all points throughout the distribution system consistent with DOH regulations described in WAC 246-290-230(6) during maximum day demand (MDD) conditions.

3.2.3 Water Quality Responsibility

The City will provide water that meets all state and federal water quality standards to all water system customers.

Discussion

The City will continue to take the actions necessary to ensure that water quality standards are met. This includes monitoring compliance with all Department of Health and Federal Environmental Protection Agency water quality regulations applicable to drinking water systems.

3.3 System Reliability

3.3.1 Service Reliability

The City will invest the resources necessary to construct, maintain and rehabilitate water system infrastructure and equipment to ensure that customers are provided consistent, reliable service in accordance with WAC 246-290-420. In addition, all new developments shall meet the requirements set forth in WSP Policy 3.7.3, Water System Planning and Design (ICP Policy U-C4).

Discussion

Wherever possible, the City should anticipate system interruptions by designing and operating the system to minimize the impact of such interruptions on customers. The City establishes reliability criteria for water system components as an element of its water system criteria. The goal is to have 100 percent operational redundancy in the system. Fore new development, the water system infrastructure, storage facilities, water mains, hydrants, pump stations, and related facilities, shall be designed to meet all applicable codes, criteria, and standards in force at the time of permit issuance.

Implementing Criteria:

General System Reliability. The City continues to evaluate the water system to ensure redundancy wherever possible. For all new developments and future CIP projects, a thorough evaluation of the affected water system will be completed. Site specific measures will be taken to assist in making the system more reliable, in the event of an emergency. Evaluation of City facilities will consider potential power outage situations. The evaluation will consider such events as windstorms, snow, and ice that interrupts power distribution within the City, minimizing the probability of a water supply outage for customers during these times.

Mechanical Equipment. For mechanical equipment that might be occasionally out-of-service for repair or maintenance, the City has redundant components and equipment in place, significantly limiting interruption of service.

Supply System. Supply reliability is critical to provide an uninterrupted level of service to City utility customers. Malfunction of any of several supply components could cause a temporary limitation of the supply capacity.

Storage Reservoirs. The goal is to provide redundant storage reservoirs to help maximum the probability of uninterrupted service to City utility customers.

Booster Pump Stations. Primary malfunctions that would limit pump station capacity to boost water are pump failure, motor failures and electrical power failure. Redundancy criteria, described in Water System Design Criteria section 3.7, significantly limit the time required to correct any problems with pumps, motors, or electrical gear.

Distribution System. The most common malfunction of the distribution system is pipeline failure. Under such conditions it is important to have a distribution network that allows water to be re-routed to affected customers. Therefore, providing system looping and redundant pipeline connections are important distribution system criteria. Providing redundant connections between service zones is particularly important. Distribution system reliability also depends upon maintaining an inventory of pipe and pipe repair materials on hand for the most commonly used pipe materials and sizes.

3.4 Fire Protection

3.4.1 Fire Fighting

The City will provide, maintain, and improve the infrastructure system necessary to supply water for fire fighting purposes to all utility customers (ICP Policy U-C5). The water supply shall meet or exceed all minimum applicable standards and regulations for fire flow, storage and peak-use periods, except under emergency conditions created by major disasters such as earthquake or flood.

Discussion

Additions to the water system shall be designed to meet all applicable codes at the time of permit issuance. The City maintains, repairs, or replaces mains, lines, hydrants and valves as necessary to provide adequate water service to all customers.

3.4.2 Fire Flow Requirements

Fire flow requirements for building-specific fire flow and the municipal water system level of service must both be provided as a condition of development and as a condition of any extension of the City water system (consistent with ICP Policy CF-B1).

Discussion

The level of service standard has two parts to the water system fire flow requirements within the City service area. The first is a fire flow requirement established as a building-specific fire flow based on building use and materials of construction. The second is the system-wide fire flow criteria for single-family or other uses as established in this Water System Plan Update for the entire water system.

Implementing Criteria

Fire Flow Rates. The quantity or flow rate of water available for fire fighting establishes an important level of service for a water system. The system-wide fire flow rates are summarized in Table 3-2.

Fire flow rates are to be provided during MDD at the pressure requirements as discussed in Water System Design, Section 3.7. The fire flow rates are required for the water line that is providing the fire protection supply to hydrants immediately adjacent to or surrounding a facility, and is therefore not required from an individual hydrant.

For new construction, fire flow demands shall not cause water velocity in any main to exceed seven (7) feet per second. These criteria apply to all improvement projects within the water system, including those necessary to provide service to new customers or to serve modified property uses or occupancies by existing customers.

Pipe diameters that would be acceptable to use for a development without prior approval from the public works department to achieve a desired fire flow and velocity of 7 ft/s are summarized in Table 3-1.

Table 3-1. Minimum Pipe Sizes without Public Works Department Approval

Development Type Served	Minimum Pipe Size
Single Family Residential via Looped Water Main	8-inch
Multi-family Residential, Commercial, and Non-Residential via Looped Water Main	12-inch

The fire flow criteria described above are minimum requirements. Fire flows in excess of the above criteria may be required to provide fire protection for specific types of building construction and use. If it is determined that higher fire flows are required, the higher flow will be the criterion used to determine the required system improvements.

Fire Flow Duration. The time or duration for which a fire flow is to be provided is dependent on the required fire flow rates. Minimum fire flow durations are defined in the International Fire Code Appendix B. Any fire flow requirement 3,500 gpm or greater shall have duration of four hours. The City has adopted criteria for fire flow durations, summarized in Table 3-2.

Table 3-2. Fire Flow Duration Criteria

Type of Construction	Minimum Fire Flow (gpm) [a]	Duration (hours)	Volume (gal)
Single-family residential (8-foot property line setback)	1,000	2	120,000
Single-family residential (No setback requirement)	1,500	2	180,000
Multi-family, commercial and non-residential	3,500	4	840,000

[a] The design fire flow rate may be increased to provide fire protection for specific types of building construction and use.

3.4.3 Fire Flow Improvements

The minimum fire flow requirements for existing structures and uses or occupancies are those that were required at the time of permit issuance, as determined by the City. For existing water system infrastructure upgrades, the City may allow pump stations to supplement fire flow volume provided by storage if the additional pumping does not degrade other pressure zones.

Discussion

Based on the discretion of the public works department, minor improvements to existing structures are not required to upgrade the water system to meet current fire flow and development standards unless the addition increases the fire flow requirements significantly. Similarly, the City shall not be obligated to upgrade the existing water system infrastructure to meet current fire flow criteria and standards as a result of structural improvements that do not change the use or occupancy of the building. The City may allow fire flow volume from storage to be supplemented by pump stations on existing systems provided the additional pumping does not degrade other pressure zones. New development and redevelopment, including changes in use or occupancy, shall meet the full fire flow and storage requirements without pumping. The developer shall be responsible for installing all necessary facilities needed to serve their property and for complying with the City's development, design and construction standards in order to meet these requirements.

3.4.4 Fire Flow Improvement Program

As resources become available, the City shall make water system improvements to meet current fire flow criteria. When prioritizing and scheduling system improvements, the City Capital Facilities planning procedures will consider the severity of deficiencies. The City seeks opportunities to make improvements in conjunction with other City projects to achieve economic efficiency. The City will only correct existing velocity deficiencies when other deficiencies exist. (ICP Policy U-C6 Fire Flow Improvement Program)

3.5 Emergency Management Plan

3.5.1 Emergency Management Plan

Regularly update the Emergency Management Plan as part of the City's operations program. The Plan will assist in verifying that adequate emergency provisions are in place to provide for and organize responses to the most likely kinds of emergencies that may endanger public health and safety or operation of the water system, and will focus on problems created by major disasters, such as earthquakes, wind storms, or floods.

Discussion

It is key that the City respond to the needs of customers during a time of crisis. The focus of the emergency management plan is to address problems created by major disasters, such as a wind storms or other disasters that may cause system interruption. The continued availability of potable water during a disaster is critical.

3.5.2 Water Supply Shortage Response

Take reasonable actions to increase the probability that the essential needs of its customers are met and that available supplies are equitably distributed to all affected customers in the event of a water-supply shortage caused by a drought or supply interruption. (ICP Policy U-C7 Water Supply Shortage Response)

Discussion

This provision requires that the necessary steps be taken by the City and its customers to reduce the demand if an unforeseen water supply shortage occurs. The City will take the necessary steps to increase the likelihood that all essential uses are met, such as customers with medical problems that require water service. Additionally, the City will continue to monitor well aquifer levels in an effort to prepare for and manage water shortage emergencies.

3.6 Coordination / Cooperation with Other Utilities

3.6.1 Regional Participation

The City will coordinate and cooperate with other adjacent and regional water purveyors and state regulators to identify, protect and maintain a reliable and sustainable water supply. Withdrawals from the aquifer greater than the sustainable yield for water supply needed to meet concurrency requirements shall not be allowed as per water rights law.

Discussion

Regional planning efforts promote compatible planning that provides the framework for coordinated water system improvement and new sources of supply to be anticipated and planned on a timely basis. Additionally, the City will continue to coordinate and cooperate with other adjacent and regional water purveyors and state regulators to identify, protect and maintain the sustainable yield of the aquifer and other water supplies.

3.6.2 Assumptions of Other Jurisdictions

The City shall assume (or use some other method) municipal and special purpose district water utilities to provide direct retail service within the City of Issaquah Corporate Limits. Work cooperatively with neighboring municipalities and special purpose districts during the assumption of special purpose districts within the City limits or potential annexation areas (ICP Policy U-C9).

Discussion

Where possible, per City policy, the City prefers to be the provider of direct retail service within the City of Issaquah Corporate Limits. The City prefers to accomplish these assumptions through cooperative, collaborative, and cost-efficient measures. The City's intent is to provide direct retail service to all citizens within the City Limits. However, the City has an Interlocal Agreement (ILA) with Sammamish Plateau Water that precludes, until 2026, a unilateral assumption of that portion of Sammamish Plateau Water within the City Limits.

3.6.3 Emergency Interties

Support emergency interties with adjacent water systems where there is a benefit to the water systems.

Discussion

Interties increase reliability of water systems during emergencies and other unusual operating circumstances.

3.6.4 Water Supply Interties

The City will consider water supply interties on a case-by-case basis.

Discussion

Water supply interties should provide clear benefits to Issaquah and should not compromise the City's ability to serve its existing customers or its future water supply needs.

3.6.5 Wheeling Water

Allow wheeling water (transporting water through the City water system for the benefit of another municipality or special-purpose district) if the proposal supports regional water supply needs, is consistent with adopted City policies, and is at no cost to the City except as it chooses to participate to benefit the overall system.

Discussion

This enables the City to provide resources to another purveyor that may request water supply assistance. Wheeling water through the City water system to neighboring purveyors supports the City's goals of regional water supply coordination and cooperation.

3.6.6 Mutual Aid Agreement

Participate in a mutual aid agreement. Coordinate and cooperate with adjacent and regional water purveyors and state regulators to identify, protect and maintain a reliable and sustainable water supply. (ICP Policy U-C8)

Discussion

A mutual aid agreement allows agencies to share with each other to provide services. This enables agencies to provide resources to agencies that request assistance to handle a disaster or emergency.

3.7 Water System Design

3.7.1 Water Supply Source

Pursue a combination of strategies to extend existing water supplies and obtain additional new sources of water supply needed to meet the needs of the City that balance the environmental and economic cost. (ICP Policy U-C10 Water Supply Source)

Implementing Criteria

Future Water Supply. Future water demands will be estimated using existing water usage patterns and projected future populations provided by the City and Puget Sound Regional Planning Council. Effects of future water conservation, based upon current conservation levels considered to be current standards of the industry will be factored into projecting future water needs.

System Water Supply Requirements. The City should have sufficient water supply facilities available to meet the Maximum Daily Demand (MDD) from supply facilities under normal conditions. Because any of the City's supply facilities might fail as a result of a rare or catastrophic emergency event, system-wide supply facilities should be able to meet MDD with the single largest supply facility out of service.

Operating Areas - Water Supply Requirements. The City should provide sufficient supply facility capacity to meet MDD as a minimum for the operating areas of the water system. In case of an emergency, demand management will be implemented to meet supply requirements.

Environmental Stewardship. City water supplies should avoid or reduce, minimize and mitigate regional and local environmental impacts to water quality, habitat and natural resources. Additional consideration shall be made for endangered or threatened species and be based upon scientific data, studies and adaptive management practices and principles.

Climate. Evaluate and incorporate changing climate conditions into long-term system water supply plans. In addition, the utility should implement measures to assess and reduce its climate impact as a result of system operations.

3.7.2 Water Supply Separation

The Council should consider and evaluate blending of water supplies to meet the demands projected within the City based on future demand forecasts. Approval by the City Council of the blending of water supplies for these purposes shall be considered, if beneficial. The City may blend water supplies in emergency situations if needed to stay in compliance with State law or when supply is needed.

Discussion

The Issaquah Highlands are currently supplied only with CWA water but can be delivered a blend of groundwater/CWA water, and Talus (currently supplied by groundwater) can be switched between the two supplies. Blended water may be considered to meet applicable water quality criteria and, to meet future demands, potentially the entire water system will eventually be served with blended water.

3.7.3 Water System Planning and Design

Plan and design water system facilities that can deliver continuous, safe water supply to meet customer demands under normal conditions, consistent with all applicable federal, state and local regulations. If the water system facilities are required to be installed or up-graded as a result of a developer's impact, this shall be accomplished at the developer's expense. (Consistent with ICP Policy CF-C4)

Discussion

New water system facilities that are required as a result of developer extension shall be planned and designed to meet the City's current policies and criteria for the water system. If upgrading existing water system facilities to meet current regulation creates a substantial financial or environmental impact to the City, the City may choose to allow a deviation for the improvement. However, the deviation shall still remain in compliance with State law.

Implementing Criteria:

Storage Volume. Storage facilities are required for each operating area serving single-family residential and non-single-family service areas. In single-family residential service areas, a maximum of three cascading pressure zones can be served by a storage facility[1]. Each operating area shall be provided with at least two separate storage facilities, where the volumes of each facility are divided nearly equally. The total volumes of these facilities when added together shall equal at least the total storage requirement for the operating area.

System storage volume requirements consist of four separate components: operational, equalizing, fire flow and standby/emergency volumes. Storage facilities may also contain a "dead storage" component of volume that is unused primarily due to the configuration of the facility. Storage facilities shall be sized to accommodate the four required volume components.

For new construction or redevelopment of storage facilities, fire flow and standby/emergency storage shall be stacked.

- <u>Operational Volume</u>
  Operational Volume is the volume of distribution storage associated with source or booster pump cycling times under normal operating conditions (WAC 246-290-010). The Operational Volume is included within the Equalizing Volume, and is large enough to allow normal cycling of source or booster pumps.

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[1] The Montreux Operating Area has seven cascading pressure zones; however, supply is from an intertie with Bellevue and no City of Issaquah storage facilities are within the operating area.

- Equalizing Volume
  Equalizing Volume is the total volume required to satisfy peak system demands that exceed the capacity of the supply and pumping facilities. Equalizing Volume requirements are greatest on the day of maximum demand and must be located at an elevation that provides the minimum pressure requirements to all customers served by the tank.
- Fire Flow Volume
  Washington Administrative Code (WAC 246-290-230) and Department of Health (DOH) design criteria require that new or expanding water systems have the storage capacity to provide design fire flows during MDD conditions. Fire flow volume requirements are computed based on the size and duration of the largest required fire flow within the service area of the storage facility. For multi-family, commercial and high-risk areas, fire flow volume is calculated based on a minimum 3,500 gpm fire flow for a four-hour duration (i.e., 840,000 gallons). Fire flow volume requirements are calculated based on 1,000 gpm fire flow for two hours (i.e. 120,000 gallons) for single-family detached dwellings in residential zones requiring a minimum eight (8) foot property line setback or 1,500 gpm fire flow for a two-hour duration (i.e. 180,000 gallons) in residential zones allowing a property line setback of less than eight (8) feet. This criterion is a minimum requirement for defining and providing an important level of service for the water system. Fire flow volumes in excess of the above criteria may be required to provide fire protection for specific types of building construction and use.
- Emergency and Standby Volume
  Emergency and standby volume is required to supply reasonable system demands during a foreseeable system emergency or outage, such as major pipeline failure, power outage, valve failure, or another system outage. Emergency and reserve volume requirements are dependent upon system demand, duration of the system outage and available remaining supply capacity to the system at the time of the emergency. These volumes can be shared within the valley operating areas supplied by the City wells and regional supply line. The City has established a minimum standby storage volume criterion of 200 gallons per equivalent residential connection (consistent with DOH guidelines).

Pressure and Velocity. The function of the distribution system is to convey water to customers at adequate service pressures for typical system demand conditions. The distribution system should also provide fire flows with adequate minimum residual pressures throughout the service area. During a fire, system pressures must be maintained above the minimum of 20 psi at all points throughout the distribution system consistent with DOH regulations described in WAC 246-290-230(6).

The City has established a criterion for all new facilities to provide a minimum pressure within the distribution system of 40 psi at the second floor elevation, with the storage at the lowest Equalizing Volume elevation. For existing facilities, the City should meet WAC minimum requirements. WAC 246-290-230(5) states, “New public water systems or additions to existing systems shall be designed with the capacity to deliver the design peak hour demand (PHD) quantity of water at 30 psi (210 kPa) under PHD flow conditions measured at all existing and proposed service water meters or along property lines adjacent to mains if no meter exists, and under the condition where all equalizing storage has been depleted.”

The City’s goal is that maximum static pressure at the lowest elevation should not exceed 100 psi. Recognizing the complexity involved in restricting maximum pressures to 100 psi in developments located on the surrounding hills, a maximum pressure in the water mains of up to 150 psi is permitted. Individual PRVs are required on service lines where pressures exceed 80 psi. Pipe velocities should not exceed seven feet per second during MDD plus fire flow conditions for new construction. In addition, the distributions system must also meet conditions in WAC 246-290-230 - Distribution Systems.

Materials and Configuration. The minimum size for new distribution piping shall be 8-inch diameter for single family residential and 12-inch diameter for all other uses. All new developments shall be looped.. Pipe material for new pipes shall be cement mortar lined ductile iron, class 52, minimum, however if exceptional conditions warrant other materials may be considered on a case by case basis. Pipe sizes larger than stated above may be required for major transmission and distribution lines, or to meet fire flow requirements. Fire hydrants shall be spaced per City Code (currently every 500 feet along distribution system mains in residential areas and every 300 feet in all other areas). Closer fire hydrant spacing may be required to serve specific developments.

Where the distribution system is divided into separate hydraulic operating areas (zones), each zone should have multiple supplies, i.e. booster pumps or PRVs, to reduce the likelihood that failure of a single component interrupts service. Two supplies feed into each new operating area and looping of distribution systems in all zones shall be required. Where practical, additional benefits for two supply feeds include improved water quality, redundancy, reliability and increased fire flow capacity. Water system looping will often require off-site improvements to developing areas. Off-site improvements required to meet a development's needs will be done at the developer's expense.

Pump Stations. Redundancy in pump station facilities should be required to supply water to new operating areas, where feasible. The pump stations shall not be located within the same hazard area. A minimum of two pumps are required at each pump station to provide flexibility and system redundancy. The pumps in booster stations shall be sized so that the station can meet MDD conditions with the largest pump out of service.

To increase emergency reliability, each pump station should be supplied with on-site standby power or have the capability to connect to a portable power supply. This capability allows some emergency supply capacity, even during a general power outage.

Pump Stations that are required to provide a portion fire flow should be supplied with on-site standby power capable of providing 125 percent of the station needs with an automatic startup/transfer feature to supply power during a general power outage. Pump systems that provide a portion of the fire flow must also be capable of maintaining a minimum pressure of 20 psi at all points where required in a pressure zone while supplying fire flow under the MDD condition as described in WAC 246-290-230(6).

Unaccounted for Water. Through a regular program of leak detection, meter testing, metering of mainline flushing and other appropriate measures, the City should maintain levels of unaccounted for water at less than 10 percent (WAC 246-290-820).

3.7.4 Sustainability in Design and Operations

Design and operate water system facilities to minimize total life cycle costs of facility construction, operation and maintenance. Design and operations of facilities should also minimize negative environmental impacts, energy use, and associated air and climate emissions. The water utility should conduct audits of the water system and identify, prioritize and implement associated improvements which meet sustainability objectives. Regularly monitor energy use and consider renewable energy systems where appropriate.

3.8 Environmental Stewardship

3.8.1 Environmental Protection

Develop, implement, monitor and adapt: programs, procedures and practices to improve and protect water quality, habitat, the aquifer and other environmental values in areas where the City must construct, operate, maintain, or replace water system infrastructure. (ICP Policy U-C11 Environmental Protection)

Discussion

The programs, procedures and practices developed should include consideration of best management practices and adaptive management concepts. Consideration shall be given to threatened or endangered species identified under the provisions of the National Endangered Species Act or other applicable environmental legislation.

3.8.2 Wellhead Protection Implementation

Implement the Wellhead Protection Program to protect the City's groundwater supplies from degradation (based on the Wellhead Protection Plan (Golder Associates)) and coordinate implementation with SPW. These methods shall include but not be limited to:

1. Regulation of land use;
2. Public outreach and education;
3. Construction of capital facilities in appropriate areas, which will aid in protection of the wellheads.

Discussion

Minimize the risk to, and protect the aquifer recharge quantity and quality through the regulation of types of land use allowed and mitigation required on the uses within the identified recharge areas and wellhead capture zones.

3.8.3 Facility Abandonment

Facility abandonment will be conducted in a safe and environmentally sound manner, consistent with all applicable federal, state and local regulations at the time of abandonment. Abandoning water system infrastructure shall not leave remaining, unutilized, pressurized sections since this may become a source of leaks, breaks, and/or contamination.

Discussion

The City may no longer need the use of particular water system infrastructure. For example, when asbestos cement (AC) pipe is no longer in use, the pipe should be abandoned in-place whenever feasible to minimize the release of asbestos fibers. Metal or iron water mains should also be abandoned in-place to significantly lessen the financial burden of capital costs to the City. The City shall document all abandoned infrastructure in perpetuity.

3.9 Water Conservation

3.9.1 Water Conservation

Continue implementation and enhance the current conservation program that addresses the need for adequate supply and protection of water resources. Water conservation measures shall be consistent with, and strive to exceed, all local, state, and federal laws and regulations, as well as any contractual obligations of any water purchase agreements that Issaquah is party to.

Discussion

Efforts may include, but are not limited to: public education, water reuse and reclamation, encouraging use of native and/or drought resistant landscaping, water conservation kit distribution, conservation rate structures, leak detection and monitoring, and utility financed retrofits and rebates.

3.9.2 Water Right Usage

Limit the amount of well production such that it does not exceed the City's water rights. The City shall monitor water consumption to ensure that there is sufficient warning of production that approaches water right constraints.

Discussion

As the demand for water increases, the available well production will approach the limits of the water rights. The City will monitor the well production data and increased consumption to determine that the annual (Qa) and instantaneous (Qi) capacities are not exceeded.

3.9.3 Sustainable Yield

Identify, protect and maintain the sustainable yield of the aquifer in order to avoid permanently affecting water tables in a manner which would damage related ecosystems.

3.9.4 Aquifer Recharge

Protect the aquifer recharge quantity and quality through the regulation of types of land use allowed, encouraging low impact development, and mitigation required on the uses within the identified recharge areas and wellhead capture zones. (ICP Policy U-C12 Aquifer Recharge)

3.9.5 Sustainable Development and Best Available Conservation Technology

Design, develop, construct, operate and maintain new development in such a manner as to encourage for efficient and non-wasteful use of water that incorporates the best available proven water conservation technology prevailing at the time of development.

Discussion

Examples of best available conservation technology include dual flush low-volume toilets, evapotranspiration-based irrigation scheduling, retention or replacement of native soils or soils of equivalent quality in landscaped areas. These examples demonstrate effective conservation strategies and are consistent with and support the City's environmental stewardship policies and practices.

3.9.6 Reclaimed Water Use

Issaquah will support Cascade Water Alliance's (CWA) study of reclaimed water use opportunities and will work with CWA and others to identify potential reclaimed water demand.

3.10 Financial Policies

3.10.1 Fiscal Stewardship

Manage the water utility funds and resources in a manner that is in compliance with applicable laws, regulations and city financial policies.

Discussion

Responsible fiscal stewardship requires on-going monitoring of revenues and expenses in order to make prudent business decisions and report to city officials, as needed, regarding the status of utility operations.

3.10.2 Self-Sufficient Funding

Maintain the water utility fund as a self-supporting enterprise fund. General Fund revenues may also be used to fund water utility programs if specifically budgeted.

Discussion

Water utility revenues come primarily from customer charges and are dependent upon established rates. The Revised Code of Washington requires that utility funds be used only for stated utility purposes. Although General Fund revenues can be used to fund water utility programs, the City has a general policy of not doing so. The City budgeting process should include a balanced and controlled annual water utility budget. This requires careful preparation of expense and revenue projections that may be reviewed by City management, the public, and the City Council before approval of any rate increases.

3.10.3 Capital Improvement Program Level

Fund the Capital Improvement Program (CIP) at a level necessary to ensure system integrity over the long term to allow the water system to function well both today and into the future.

Discussion

To the extent that the annual level of the CIP investment can be managed by scheduling and scoping of projects, the funding should be provided at a fairly uniform level in order to avoid significant fluctuations and to reduce the impact on the operating budget and related rate increases. The City should maintain reasonable level of reserves in the CIP fund in order to manage cash flow variation caused by the nature of the cost and timing of projects. Utility sold revenue bonds, Utility Local Improvement Districts (ULID), State Public Works Trust Fund loans, any available grants, general facility charge (GFC), and developer contributions should be considered for funding the future Capital Improvement Program projects.

Implementation Criteria

CIP Prioritization. Projects identified in the Capital Improvement Program shall initially be prioritized within the Water System Plan Update and will be updated annually during the City budget process. The highest priority shall be given to improvements that benefit all customer classes and that protect health and safety. Projects that provide increased fire protection within the water system shall be given a high priority, such as pipeline improvements and booster pump station upgrades. Prioritization should also be given for projects that increase the system reliability by providing redundancy.

3.10.4 Capital Facilities Plan

Adopt and update a Capital Facilities Plan as required by the Washington State Growth Management Act.

Discussion

The Plan should include capital projects for the water utility for a ten-year period. Projects should be financially constrained and broken-down into capacity and non-capacity projects.

3.10.5 Development Charge Cost Recovery

Maintain fees and charges to recover City costs related to development. General Facility Charges (GFCs) shall be charged to all new development properties to reimburse the utility for historical and future asset investments that provide overall benefits to the City's water system.

Discussion

Fees shall be established by City Ordinance for routine services such as meter installation. Developers shall pay the fees and charges in effect at the time that the permits are picked up. All new connections to the water system shall be charged a service installation fee to recover the costs of connecting to the water line and setting a service meter. These rates should be reviewed periodically to ensure that the cost methodology is appropriate and adjusted as needed.

In addition, when another developer or the City has, at its own expense, constructed new water mains, new customers connecting to that portion of the water main shall pay appropriate fees and charges for connection. The City may enter into a recovery contract with the party constructing the improvement to recover appropriate costs from the new customers when they connect to the system.

GFCs will also be used to charge new developments. In general, the purpose of a GFC is to bring equity between existing customers and new (future) customers connecting to the City's water system. An important nexus for a GFC is the connection between the anticipated future growth on the system and the needed facilities required to accommodate that growth. The GFC is based on the planning and engineering design criteria of the City's water system, the value of the existing assets, and past financing of the system. By establishing cost-based water GFCs, the City attempts to have "growth pay for growth" and existing water customers should then be sheltered from the financial impacts of growth. Additionally, the GFC should be implemented according to the capacity requirement or impact each new development has on the water system. This way, the GFC is related to the impact the customer places on the water system, and to the benefit they derive from the service provided.

3.10.6 Water Rate Levels

Establish Water Rate levels, to be reviewed annually, that cover utility expenses, infrastructure improvements, encourage conservation and maintain reserves.

Discussion

Water rates are set as low as possible while providing for the on-going promotion of conservation, maintenance of reserves, operations, maintenance, repair, replacement, capital improvement, and administration of the water utility. The City's budget process should be used as an opportunity to increase or reduce current rate levels. The final budget should include the total authorized expenses and establish the amount of revenue and /or use of reserves required for balancing the expenses.

3.10.7 Frequency of Water Rate Adjustments

Evaluate Water Rate levels, to be reviewed as part of the water utility budgeting process.

Discussion

This will ensure that budgeted expenses are reflected in current rates.

3.10.8 Water Rate Structure

Support water conservation and wise use of water resources objectives. The water rate structure shall allocate costs equitably among customers.

Discussion

Rates should be established on a "Cost of Service" basis so that each customer class pays its prorata share of the total costs needed to operate and maintain the water utility. A Cost of Service and Rate Study should be performed periodically to ensure on-going equity between customer classes.

3.10.9 Operational Fiscal Responsibility

Operate the water system in compliance with applicable laws and regulations in a manner that minimizes operational costs to the City.

Discussion

Operating the system with a fiscal perspective will minimize excessive costs.

3.10.10 Rate Assistance Programs

Provide rate assistance programs for low-income senior citizens and other low-income customers. (City Code section 13.92)

Discussion

Provides water-rate assistance for senior citizens and low-income citizens who meet the qualifications and requirements.

3.10.11 Water Financial Reserve Levels

Maintain water utility cash balances to serve as a contingency reserve fund.

Discussion

The working capital component should be based on no less than 75 days of the current year's average budgeted operation and maintenance expenses.

3.10.12 Infrastructure Asset Management

Pursue an asset management approach to evaluating and managing capital investments and infrastructure operations and maintenance in order to reduce overall total life cycle costs of the water system while meeting level of service standards, environmental and sustainability goals and regulatory requirements.

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Chapter 4. Planning Considerations

This chapter reviews the planning considerations that are pertinent to the City's water system. Included are descriptions of the City's land use, population and estimates of households and commercial development within the service area.

4.1 Land Use

Land-use designations and regulations provide an important factor in determining future water requirements. Land use determines the area available for various types of development including both single-family residential (SFR) and multi-family residential (MFR) development, as well as commercial and other types of land use that provide the economic base necessary to support residential development.

The City is geographically located within a valley, surrounded by mountains and plateaus, and bordered on the northeast by Lake Sammamish. Over the last several decades, Issaquah has evolved from a small, relatively independent community supported primarily by coal mining, agriculture, forest products and fisheries, to a suburban area made up of a series of communities and neighborhoods. Each of these communities is unique. Currently most of Issaquah's new developments are in the Issaquah Highlands and Talus urban communities, which are a mix of commercial, retail, SFR, and MFR zoning. However, new growth is planned for the Lakeside area and substantial redevelopment within the Central Issaquah area—particularly within the Regional Growth Center.

Existing business services for Issaquah area residents include office parks, hotels and motels; limited light industry including retail, financial, insurance, and real estate services; and transportation, communication, and utility services. Darigold operates a dairy processing plant located in downtown Issaquah.

Land use within Issaquah is governed by the City of Issaquah Comprehensive Plan. The plan addresses current land use within the City and proposed future land use. The City has seven land-use areas: conservancy, community facilities, low density residential, MFR, retail, commercial/office, and urban village. The largest categories by area are low-density residential and urban village. Figure 4-1 illustrates the City's land use map.

All zoning within the city limits conforms to the Issaquah Comprehensive Plan (ICP), as required by the Growth Management Act. Figure 4-2 is the City zoning map. It should be noted that for unincorporated areas of King County, there might be minor discrepancies between the ICP and King County's Comprehensive Plan. King County planning takes precedence in these unincorporated areas and should be referenced for specific zoning and planning information until the area in question is annexed to the City.

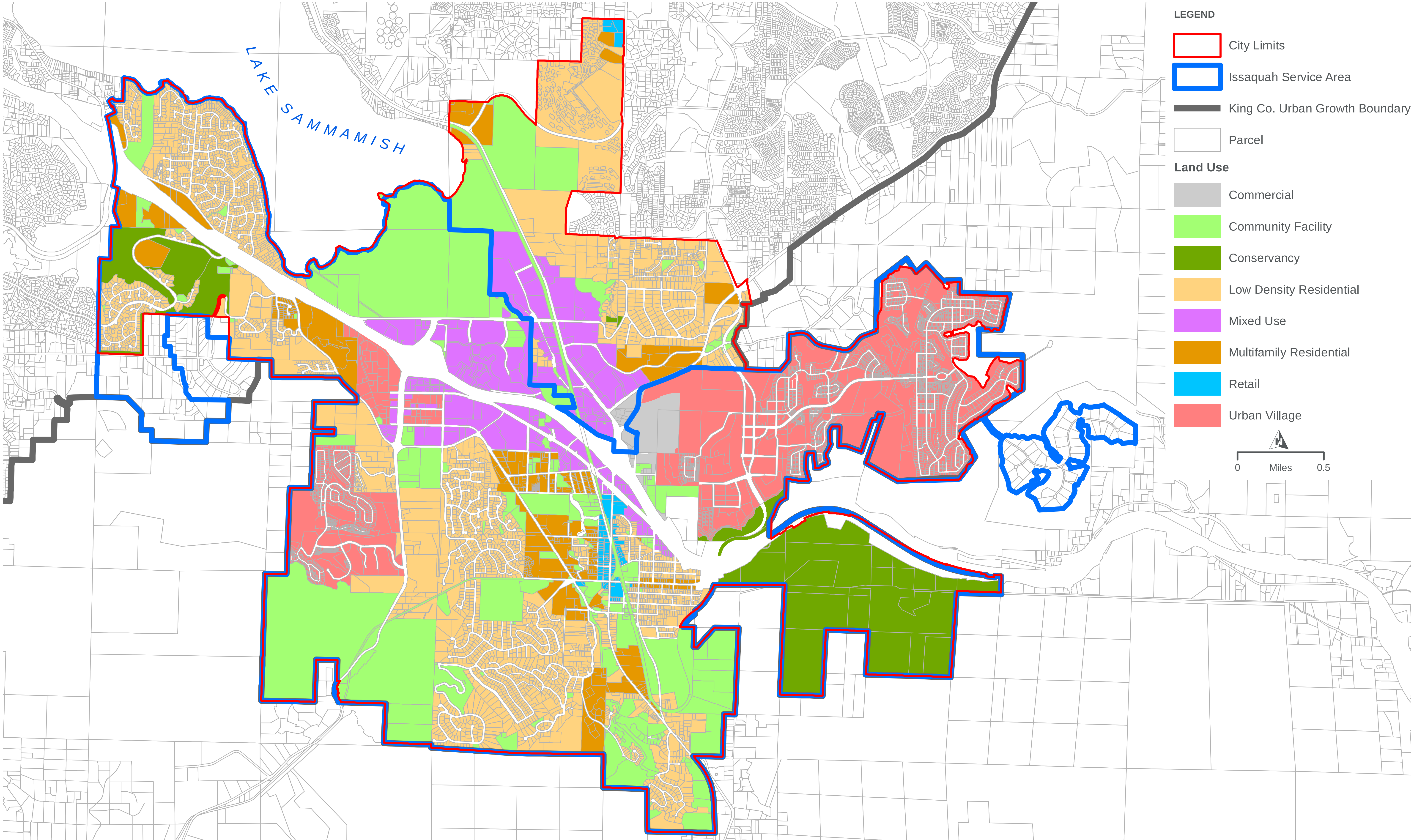
Table 4-1 represents the zoning districts for each land-use designation. The "intent statements" for each land-use designation are in Table L-3 of the ICP Land Use Element. Consult the City's official zoning map for specific zoning boundary information and the Table of Permitted Land Uses in the City's Land Use Code for allowable uses within the zoning districts.

Future land-use patterns for the service area are expected to correspond to existing uses. The Comprehensive Land Use Plan was developed based on the projected needs of the City for 20 years. The King County Comprehensive Plan used similar approaches for the unincorporated portion of the City's service area. This consistency of approach is encouraged by the Washington State Growth Management Act and should result in predictable and stable land uses over longer planning periods.

While it is likely the City will annex much of the unincorporated lands within the City's potential annexation areas (PAAs) in the service area, over the next 20 years annexation should have little impact on current land-use patterns. The ICP recognizes the need for a variety of residential land uses and anticipates that areas to be annexed to the City will remain primarily residential as defined in existing county planning documents.

Table 4-1. Comprehensive Plan Land Use and Zoning

Comprehensive Plan Land-Use Designations	Comparable Zoning Districts	
Conservancy	TP-NRCA C-REC	Tradition Plateau-Natural Resource Conservation Area Conservancy Recreation
Community Facilities	CF-OS CF-R CF-F	Community Facilities – Open Space Community Facilities – Recreation Community Facilities - Facilities
Low Density Residential	C-RES SF-E SF-S SF-SL SF-D	Conservancy Residential – 1du/5acs Single-family Estates – 1.24 du/ac Single-family Suburban – 4.5 du/ac Single-family Small Lot – 7.26 du/ac Single-family Duplex – 7.26 du/ac
Multi-family Residential	MF-M MUR MF-H VR	Multi-family Medium – 14.52 du/ac Mixed Use Residential – 14.52 du/ac Multi-family High – 29 du/ac Village Residential
Retail	PO CBD	Professional Office Cultural and Business District
Mixed Use	UC MU DR	Urban Core Mixed Use Destination Retail
Commercial	IC M	Intensive Commercial Mineral Resources
Urban Village	UV UV-EV UV-R UV-L	Urban Village – the UV designation recognizes that master planning of larger parcels provides the opportunity for mixed-use development, clustering, phasing of infrastructure, and protection of critical areas. The UV designation is implemented by the adoption of a UV development agreement and UV zoning by City Council. A UV development agreement has been adopted for Issaquah Highlands and Talus.



HDR
CITY OF ISSAQUAH WASHINGTON

LAND USE MAP

FIGURE 4-1

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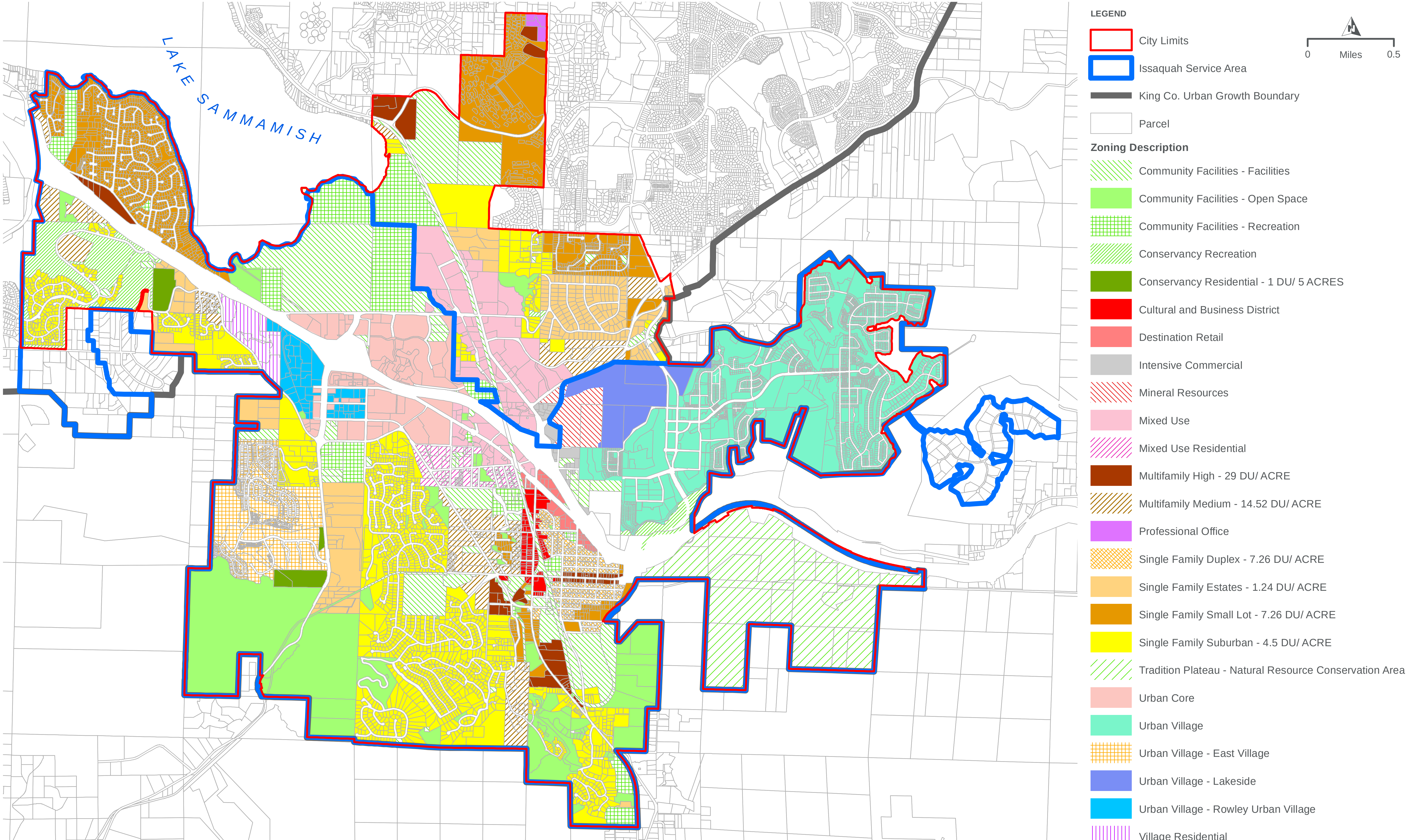

HDR CITY OF ISSAQUAH WASHINGTON

ZONING MAP

FIGURE 4-2

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4.2 Population

The City was incorporated in 1892 and has evolved from a small, relatively independent community to a suburban community with an economy that is integrated with the economy of the Seattle metropolitan area.

Table 4-2. Historical Population and Growth Rate

Year	Population	Average Annual Growth Rate
1930	763	0.6%
1940	812	1.6%
1950	955	7.0%
1960	1,870	8.7%
1970	4,313	2.5%
1980	5,536	3.5%
1990	7,786	3.7%
2000	11,212	10.5%
2010	30,434	2.8%
2017	37,000	--

The City currently has a population of approximately 37,000 (in 2017) within its 10.85 square miles with about 29,700 jobs. By 2023 it is expected that there will be 33,800 jobs and by 2038 there will be 49,700 jobs. The City is experiencing economic growth due to an increasing residential community as well as substantial commercial development. Continued residential and commercial expansion is expected in addition to the potential for substantial annexations.

The City has seen steady growth with periods of rapid growth over the past four decades as shown in Table 4-2.

The City's future population has been projected by the City Planning Department and is summarized in Table 4-3. The population in the city limits is projected to increase at an annual rate of approximately 1.6 percent as indicated in the Comprehensive Plan Table L-3, in Appendix F. The Issaquah Highlands and Talus urban village developments are expected to be built-out by approximately 2020 with an estimated population of 11,400 persons, for both developments combined. Group quarters refer to living situations that do not reflect ordinary household life; primarily represented in Issaquah by nursing homes.

Table 4-3. Population Projections

Area	2016	2020	2025	2031
City Limits minus Urban Villages and Regional Growth Center	22,963	23,842	24,728	26,003
Urban Villages and Regional Growth Center	11,272	19,076	24,486	32,680
Group Quarters	353	365	434	634
Total City Population	**34,588**	**43,283**	**49,648**	**59,317**
PAA	227	231	236	250
Total in City & PAA	**34,815**	**43,514**	**49,884**	**59,567**

Source: Table L-3 of 2017 Issaquah Comprehensive Plan

4.3 Households and Commercial Building Areas

The service areas existing demographics include approximately 5,500 SFR households, 6,400 MFR households, and 9.9 million square feet of commercial building floor area[1]. This is an increase of approximately 23 percent, 38 percent, and 63 percent, respectively, from the 2012 Water System Plan.

[1] SFR based on the number of SFR connections billed in 2016. MFR based on the number of MFR households in 2017 assuming a 95% occupancy, and commercial square footage is based on the square feet of commercial space in 2017 assuming an 80% occupancy.

Chapter 5. Water Requirements

The existing water demand and projected water requirements for the City's service area are presented in this chapter. Future water demands are used as input conditions for the water system analysis and for development of the capital improvement program. Historical and existing sales and production data were used to develop the water consumption value of an equivalent residential unit (ERU).

5.1 Historical Water Consumption

5.1.1 Historical Demand by Water Use Classification

The City divides its water users into eight customer billing categories, plus non-revenue water. The billing categories are single-family, duplex, multi-family, apartment, commercial, private irrigation, public irrigation, and public. For the purpose of this water system plan, the billing categories are consolidated into five water use classes: single family residential, multifamily residential (includes multifamily residential, duplex, and apartment billing categories), commercial, public, and irrigation (includes public and private irrigation billing categories). The demand forecast also includes non-revenue water (which includes the difference between retail water sales and water production).

Table 5-1 provides a summary of the number of active service connections by water use class while Table 5-2 provides the historical annual consumption. Figure 5-1 shows the historical annual consumption for the entire system broken down by the source of supply. Table 5-3 summarizes each water use class's percentage of production. Figure 5-2 provides a summary of typical water consumption by month. No water is sold to other water systems.

Table 5-1. Number of Active Service Connections by Water Use Class

Water Use Class	2014	2015	2016	2017
Single Family Residential	5,385	5,586	5,714	6,720
Multifamily Residential	606	630	632	667
Commercial	458	464	463	464
Public	38	38	39	38
Irrigation	293	311	306	313

Note: Numbers shown include the total number of unique water meters billed in the calendar year.

Table 5-2. Historical Annual Consumption by Water Use Class

Water Use Class	Consumption (MG)		
	2014	2015	2016
Single Family Residential	284.5	304.2	293.4
Multifamily Residential	157.0	162.8	172.2

Table 5-2. Historical Annual Consumption by Water Use Class

Water Use Class	Consumption (MG)		
	2014	2015	2016
Commercial	152.3	174.1	216.3
Public	8.9	8.7	10.8
Irrigation	105.6	136.2	106.7
Non-Revenue	79.4	96.0	72.1
TOTAL	787.6	881.9	871.6

Figure 5-1. Historical Annual Consumption

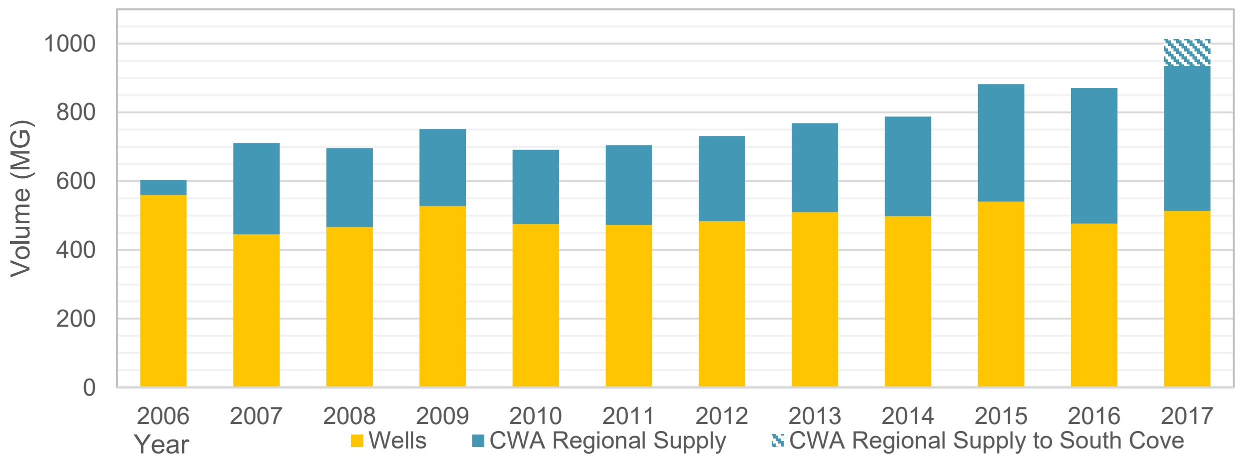
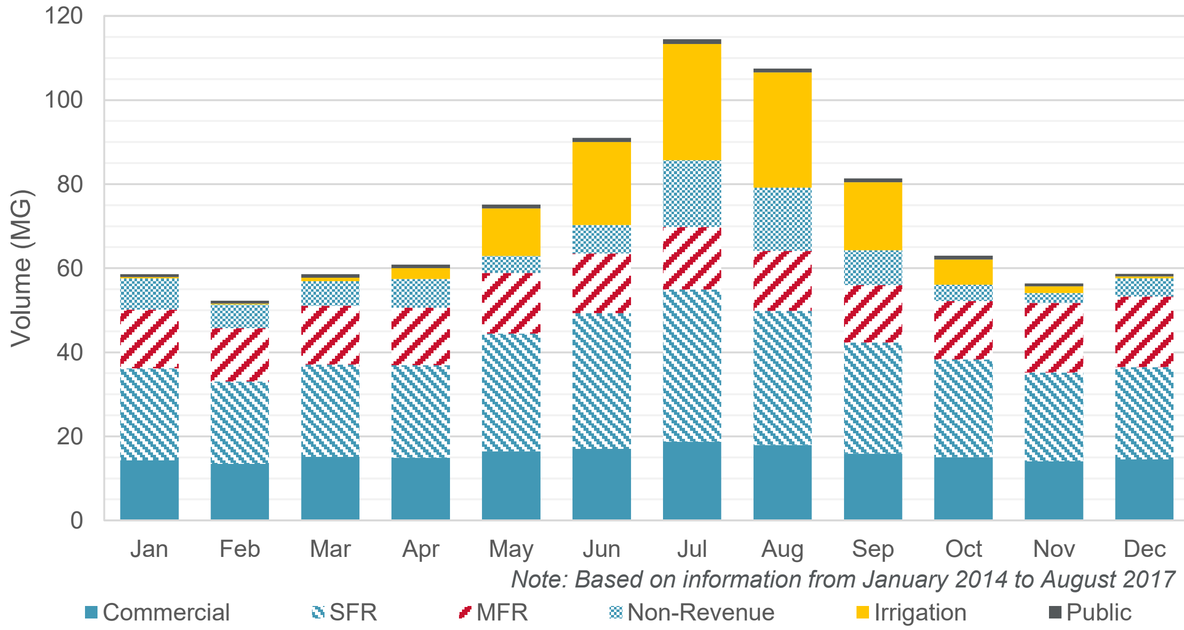


Table 5-3. Historical Water Use Percent of Total Production by Water Use Classification

Water Use Class	2014	2015	2016	2014 – 2016 Average
Single Family Residential	36.1%	34.5%	33.7%	34.8%
Multi-family Residential	19.9%	18.5%	19.8%	19.4%
Commercial	19.3%	19.7%	24.8%	21.3%
Public	1.1%	1.0%	1.2%	1.1%
Irrigation	13.4%	15.4%	12.2%	13.7%
Non-Revenue	10.1%	10.9%	8.3%	9.7%

Note: Multifamily residential water use class includes multifamily residential, duplex, and apartment billing categories; irrigation water use class includes public and private irrigation billing categories.

Figure 5-2. Average Monthly Consumption by Customer Class



5.1.2 Water Use Classifications

Single-Family Residential

The single-family residential (SFR) water use class is the group with the largest water usage in the City. Approximately 35 percent of total water production goes to single-family residential water use[1]. The water is used for domestic purposes and landscape irrigation for single family residences on individual lots (without separate irrigation meters). The water used within this class can double in the summer, primarily due to landscape watering and other outdoor recreation activities.

Multi-family Residential

The multi-family residential (MFR) water use class includes duplex, multiplex (apartment) units, and trailer courts. Approximate 19 percent of total water production goes to multi-family water use. The MFR category does not have high peak seasonal use compared to single-family customers. This can be attributed to the separation of irrigation demands, for which there are separate irrigation meters for most multiplex accounts.

Commercial

The accounts in this category include commercial businesses, office complexes, light industrial, mineral resources, restaurants, and shopping centers. Commercial demand almost doubles in the summer peak periods with the majority of this demand occurring between 7 a.m. and 7 p.m. Seasonal variations are greater for the commercial class than for single-family, likely as a result of commercial landscape irrigation. Approximately 21 percent of total water production goes to commercial water use.

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[1] Total water production is equal to the total amount of water produced by the City's wells, plus water delivered to the City through interties.

Public

The accounts in this category include schools, parks and other public facilities as well as city-owned vacant property and fire meters. Approximately 1 percent of total water production goes to public water use.

Irrigation

The irrigation water use class includes both private and public irrigation use where the use is measured using a separate meter. Approximately 14% of total water production goes to irrigation water use with that demand occurring mostly in the drier parts of the year.

Non-Revenue

The difference between the total water produced and the total water sold comprises the amount of non-revenue water. The total water produced includes the master meter records at the well sources plus the supplies from Cascade Water Alliance (CWA) and Bellevue interties. Non-revenue water may include system flushing, construction hydrant usage, and distribution system leakage (DSL). Non-revenue water use makes up about 10 percent of total water production. Further discussion of DSL is contained in Section 5.3.

5.1.3 Seasonal Variation

The seasonal variation of total water production and of the various water use classes is shown in Figures 5-2 through 5-7. Note that the vertical scale varies from one chart to the next. (Customer class data depict consumption up to July 2017, while source production is shown through the end of 2016, the most recent information available at the time of writing.)

Figure 5-3. Seasonal Variation of Total Production

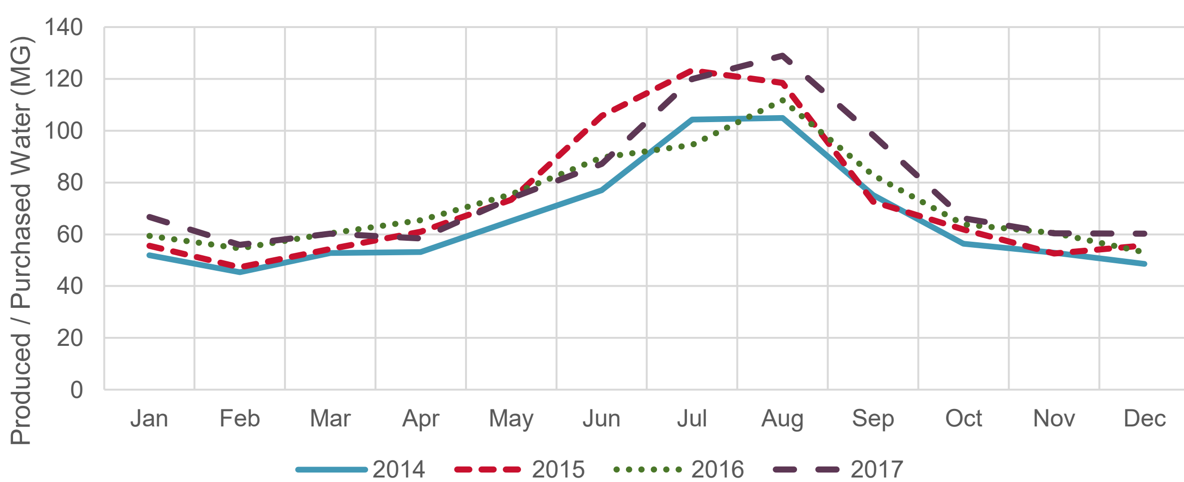


Figure 5-4. Single Family Residential Seasonal Variation

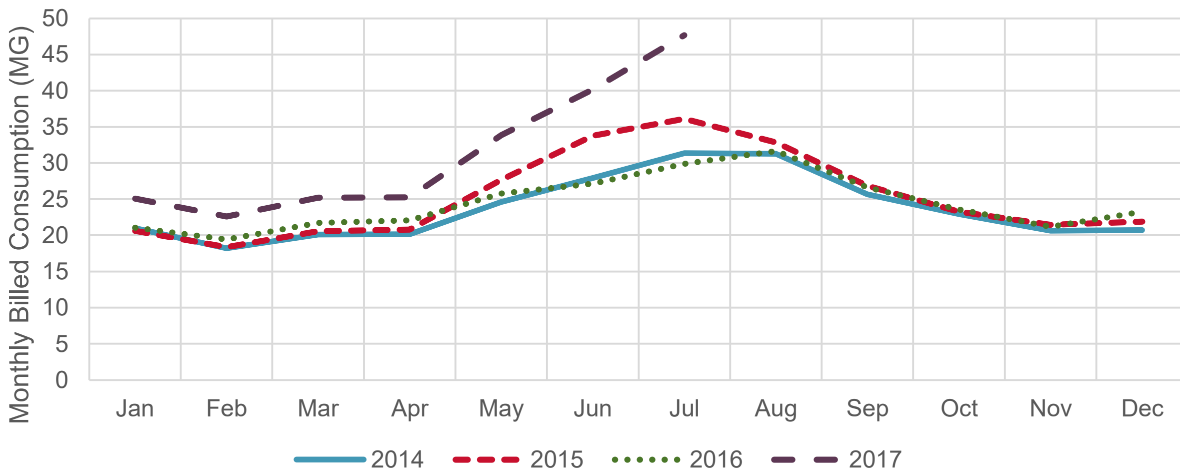


Figure 5-5. Multi-Family Seasonal Variation

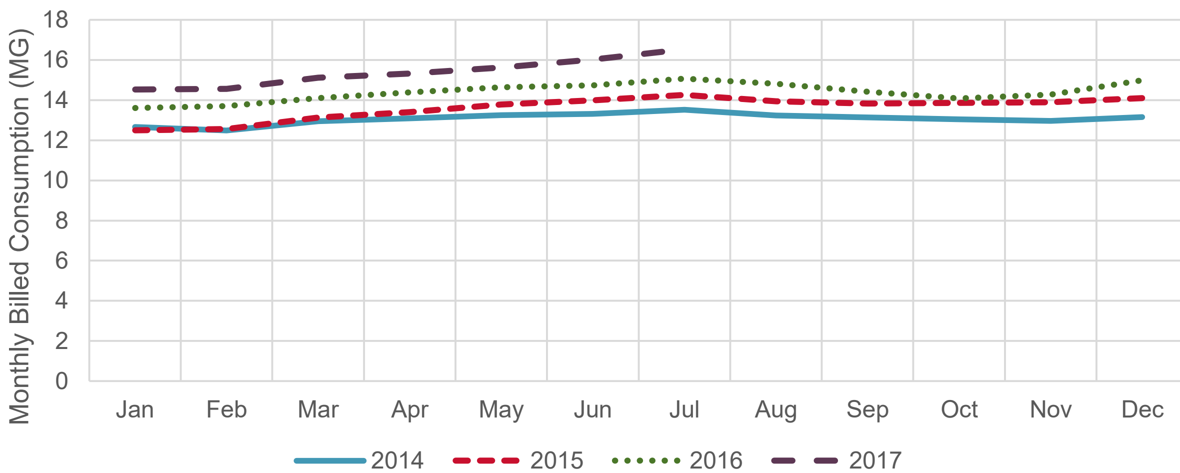


Figure 5-6. Commercial Seasonal Variation

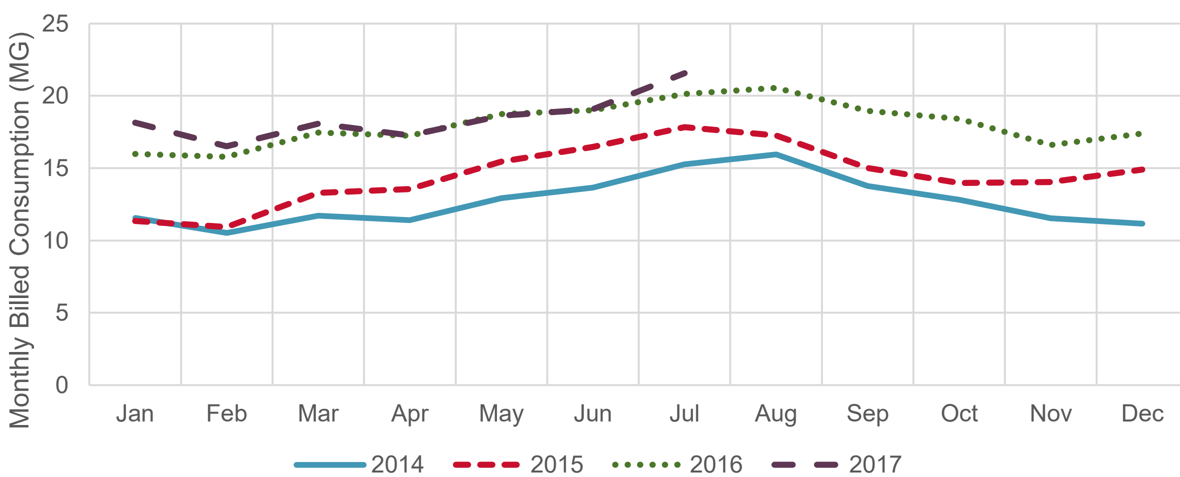


Figure 5-7. Public Seasonal Variation

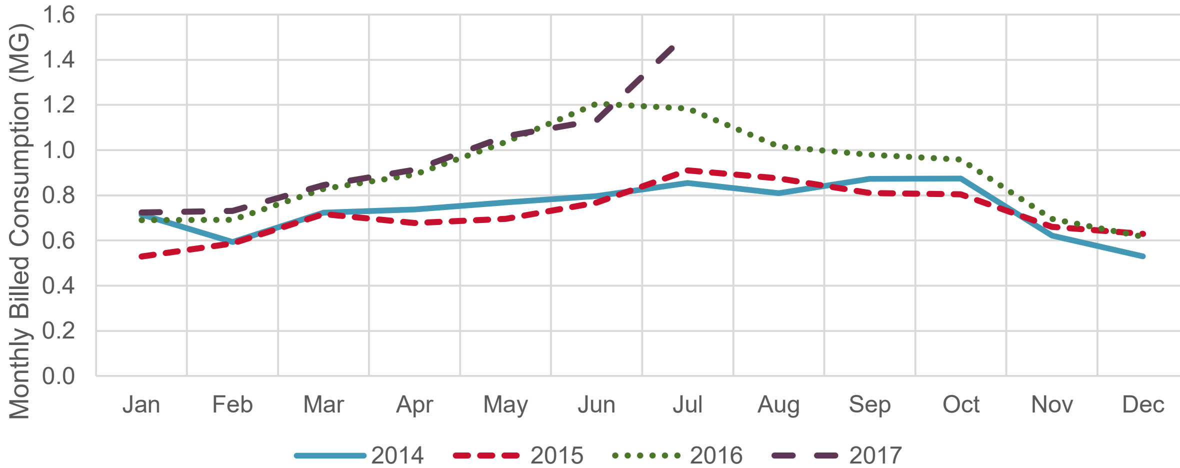
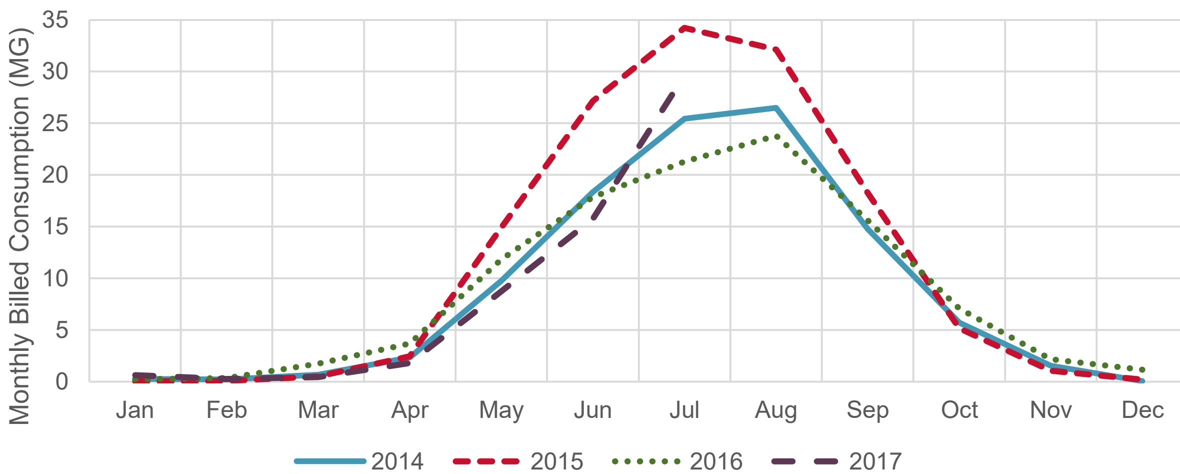


Figure 5-8. Irrigation Seasonal Variation



5.2 Historical Water Production

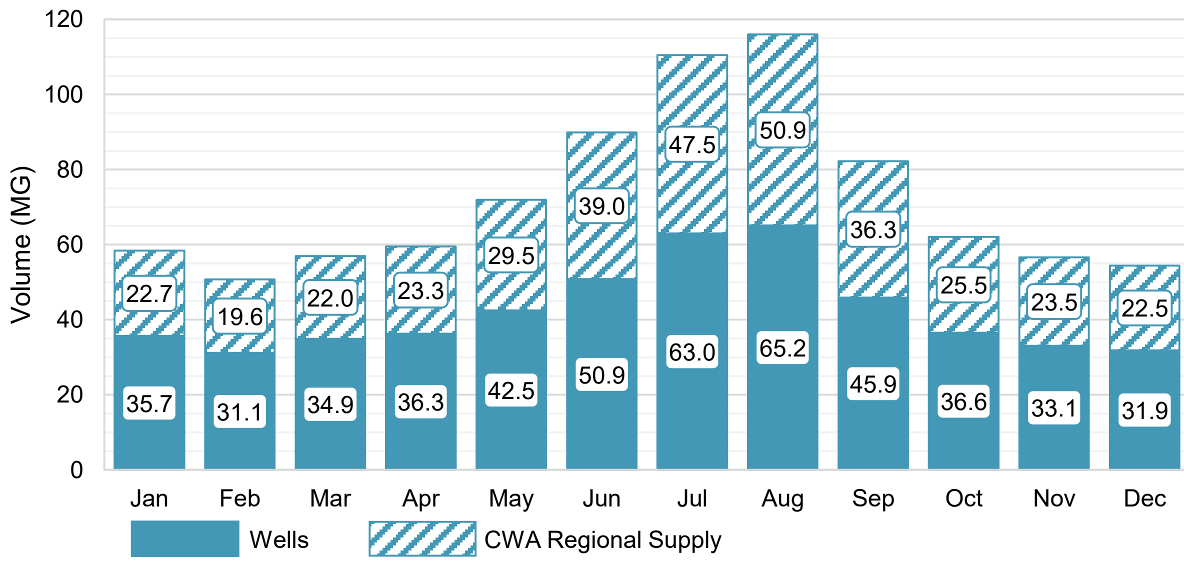
Water provided to the system comes from the City's four active groundwater wells and from the CWA regional supply. The CWA regional supply is provided either directly through the Bellevue-Issaquah Pipeline (BIP), or by wheeling through the Bellevue water system and delivered through Bellevue-Issaquah interties (as is the case for the South Cove, Montreux, and Lakemont Operating Areas). The historical annual source production is summarized in Table 5-4. The typical monthly water production by source is shown in Figure 5-9.

As seen in Table 5-4, there has been a trend of increasing proportions of water from the CWA Regional Supply being used to supply the system's demand. Part of this is due to new growth in areas that are typically supplied by the CWA Regional Supply (Issaquah Highlands Summit and Central Park Operating Areas). However, part of this is due to a decrease in well use related to the discovery of elevated levels of Perfluorooctane Sulfonate (PFOS) in Well 4. Groundwater use may begin increasing with the treatment system now installed and operational at Well 4.

Table 5-4. Historical Source Production

	2011	2012	2013	2014	2015	2016	2017	'15 – '17 Average
Total Annual Production (MG)								
Wells	472.7	482.8	510.3	497.7	540.2	476.4	513.6	510.1
CWA Regional Supply	231.8	248.8	257.7	289.9	341.6	395.2	499.3	412.1
Total Production	704.4	731.6	768.0	787.6	881.9	871.6	1,012.9	922.1
% of Total Production								
Wells	67.1%	66.0%	66.4%	63.2%	61.3%	54.7%	50.7%	55.6%
CWA Regional Supply	32.9%	34.0%	33.6%	36.8%	38.7%	45.3%	49.3%	44.4%

Figure 5-9. Average Monthly Source Production



Note: Monthly values based on average production from 2015 through 2017.

5.3 Distribution System Leakage

Distribution system leakage (DSL) is a component of non-revenue water use. Per WAC 246-290-820, DSL includes all unauthorized uses, water system leakage, and any authorized use the water system does not estimate or track. DSL forms a part of non-revenue water, with the other part of non-revenue water being authorized consumption that is tracked (maintenance flushing, fire-fighting, cleaning water tanks, etc.).

For the City's water system, total DSL was between 5.0 percent and 10.1 percent of the total production from 2011 through 2016, with the latest three year average (2014 – 2016) being 6.4 percent. The historical values of DSL are given in Table 5-5. DOH requires that the three-year average DSL not exceed 10 percent. Issaquah's record of approximately 6.4 percent DSL meets this standard.

Table 5-5. Historical Distribution System Losses

	2011	2012	2013	2014	2015	2016	'14 – '16 Average
Total Production (MG)	**704.4**	**732.6**	**768.0**	**787.6**	**881.9**	**871.6**	**847.0**
Accounted for Water (MG)							
Total Retail Sales	614.6	659.2	669.9	708.2	785.9	799.5	764.5
Wholesale (Grand Ridge) [a]	0.7	0.9	0.8	2.56	0	0	0.9
Leak Adjustments [b]	3.4	8.1	5.5	4.4	6.9	9.5	6.9
Non-Revenue, Accounted For Water [c]	14.8	19.2	28.1	16.6	27.2	19.3	21.0
Total Accounted for Water	**633.5**	**687.4**	**704.3**	**731.8**	**820.0**	**828.2**	**793.3**
Distribution System Losses							
Distribution System Losses (MG) (= Total Production – Accounted for Water)	70.9	45.2	63.7	55.8	61.8	43.4	53.7
Distribution System Losses [d] (Percent of Production)	10.1%	6.2%	8.3%	7.1%	7.0%	5.0%	6.4%

[a] Wholesale deliveries made to Grand Ridge through 2014. Grand Ridge was assumed into the water system after 2014.

[b] Leak adjustments account for adjustments made to retail sales numbers when a leak on the customer side of the meter is removed from billing.

[c] Includes uses such as pipe flushing, firefighting, analytical equipment, system maintenance, etc.

[d] The numbers presented in the table for 2014 – 2016 are marginally different than the DSL numbers previously to DOH. The calculations used for the water system plan analysis of DSL used a different method for totaling monthly retail consumption by accounting for meters being read in the middle of the month and for bi-monthly read meters. For example, if a meter is read in the middle of the month, this analysis allocated a portion of the demand to the month of the meter read as well as to the previous month instead of assuming the total demand in the month of the meter read.

5.4 Water Use Factors

A water use factor provides consumption per unit for a given customer class. Water use factors used in the demand forecast include equivalent residential units (ERUs), typical water use per multifamily household, and typical water use per commercial building square foot.

5.4.1 Equivalent Residential Units

The demand of each customer class can be expressed in terms of ERUs for forecasting and planning purposes. One ERU is defined as the average quantity of water consumed per day by one typical, full-time, single-family residence. It is calculated by dividing the total annual consumption of the SFR classification by the number of SFR accounts for a given year. The historical values of an ERU are given in Table 5-6. The most recent three year average (2014 – 2016) of annual ERU values is 145 gpd per ERU. A peak ERU value of 149 gpd per ERU occurred in 2015. For planning purposes, an ERU value of 150 gpd per ERU will be used to forecast future demand, which is the same as the value used in the 2012 Water System Plan.

Table 5-6. Historical Equivalent Residential Unit Values

	2013	2014	2015	2016	2014 – 2016 Average	Value Used for Planning
Equivalent Residential Unit Value (gpd/ERU)	128	145	149	141	145	150

5.4.2 Typical Multifamily Demand

The typical water use of a household within a multifamily development was calculated by using the total 2016 multifamily demand and dividing it by the total number of occupied multifamily household units. The number of occupied multifamily household units was assumed to be 95%[2] (a value used in past water system planning) of the total number of multifamily household units within the water service area[3]. This equates to a typical multifamily household unit water use of 84 gpd per MF household, or approximately 0.6 ERU per multifamily household unit. However, this is a significant decrease from the 2012 Water System Plan which used a value of 124 gpd per household unit, which was calculated using a similar approach. The decrease in the value may be attributed to a combination of the potential for more units to be unoccupied due to new developments being constructed but not yet filled during 2016, and by multifamily complexes having a trend of using separate irrigation meters from domestic demand. The demand per unit of multiple multifamily complexes that were constructed in the last 10 years were examined and it was found that water consumption (when considering irrigation demands) were closer to the 2012 Water System Plan value. To account for irrigation demands for future multifamily growth and to not underestimate water demand, the 2012 Water System Plan value of 124 gpd per multifamily household unit was used in the demand forecast.

5.4.3 Typical Commercial Demand

The typical water use of a commercial customer was calculated by using the total 2016 commercial billing category water demand and dividing it by the total occupied square feet of commercial building space. The occupied square feet of commercial building space was calculated by assuming 80% of the total square feet of commercial building space within the water service area[4] (a value used in past water system planning). This equates to a typical commercial water use of 73 gpd per 1,000 square feet of commercial building space, or approximately 0.5 ERU per 1,000 square feet of commercial building space. This is a decrease from the 2012 Water System Plan which used a value of 92 gpd per 1,000 square feet of commercial building space, which was calculated using the same approach. However, demands for commercial customers can vary greatly depending on the type of commercial property (i.e. offices, warehouse, retail, etc.). To account for these possible variations and irrigation demands, the 2012 Water System Plan value of 92 gpd per 1,000 square feet of commercial building space was used in the demand forecast.

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[2] The University of Washington Runstad Center for Real Estate Studies reported an apartment vacancy of 3.4 percent for King County for Spring 2017. A vacancy of 5 percent will be assumed for Issaquah.

[3] Determined by using the number of multifamily units per parcel from the King County Assessor's office.

[4] Determined by using the square footage of commercial building space per parcel from the King County Assessor's office.

Table 5-7. ADD Water Use Factors Assumed for Planning

Customer Class	Water Use Factor
Single Family Residential	150 gpd / household
Multifamily Residential	124 gpd / household unit
Commercial	92 gpd / 1,000 square feet

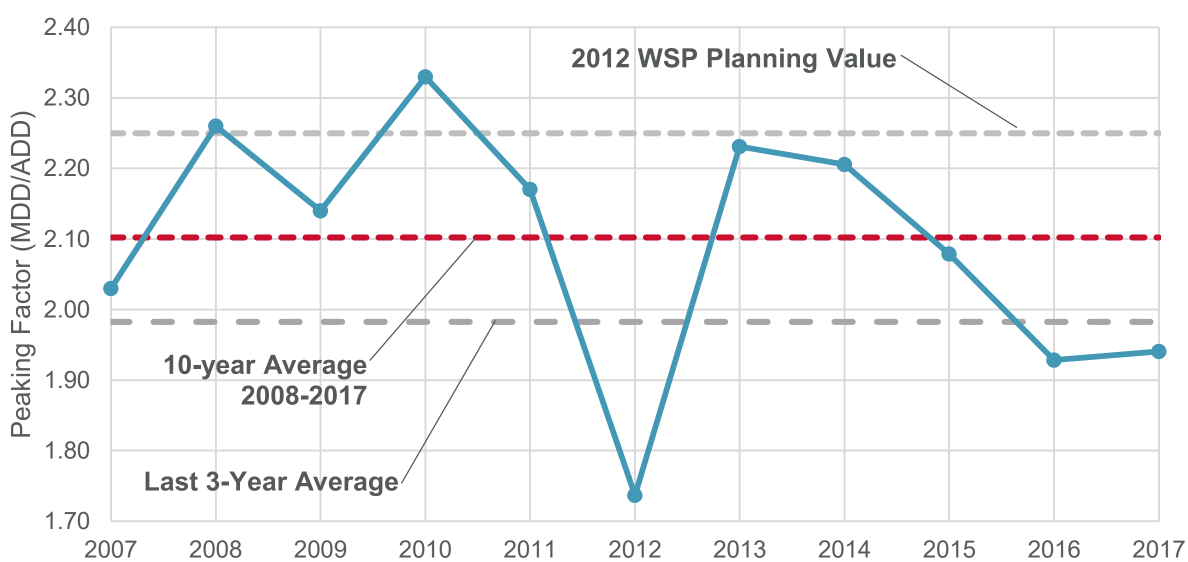
5.5 Peaking Factors

Peaking factors are used to convert an average day demand (ADD) to either a maximum day demand (MDD) or peak hour demand (PHD).

5.5.1 MDD Peaking Factor

The peaking factor for converting ADD to MDD is calculated as the ratio of the maximum day production for a year to the average day production for that year. The historical peaking factors are shown in Figure 5-10 and summarized in Table 5-8. The most recent three year average (2015 – 2017) of peaking factors is 1.98 while the most recent ten year average (2008 – 2017) is 2.10. The demand forecast uses a peaking factor of 2.11 (the ten year average for 2007-2016[5]) for converting ADD to MDD. The ten year average was chosen over the most recent three years of data because, although peaking factors have been trending lower, partial annual water use data for 2017 (see Section 5.1.3) indicate that peaking factors for 2017 may increase over previous years, so the more conservative value was used. The 2.11 peaking factor is a decrease from the 2012 Water System Plan which used a value of 2.25.

Figure 5-10. Historical Peaking Factors (MDD/ADD)



[5] At the time of beginning work on the demand forecast analysis, 2016 was the most current year of available peak day data.

Table 5-8. Historical Peaking Factors (MDD/ADD)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Peaking Factor (MDD/ADD)	2.03	2.26	2.14	2.33	2.17	1.74	2.23	2.21	2.08	1.93	1.94
3-year (2014-2016) Average								**1.98**			
10-year (2007-2016) Average								**2.10**			
MDD/ADD Peaking Factor Assumed in Demand Forecast								**2.11**			

5.5.2 PHD Peaking Factor

For determining the PHD, equation 5-1 of the DOH Water System Design Manual is used. The equation calculates PHD based on the number of ERUs within the area being analyzed (whether that is system-wide or an individual pressure zone) and the MDD of the area. Therefore the PHD peaking factor depend on the demand of the area being analyzed. However, for the total system the PHD to ADD peaking factor is 3.41. PHD is used in the storage capacity analysis found in Chapter 9.

5.6 Demand Forecast

5.6.1 Methodology

The demand forecast predicts future water use for the water system plan's 20-year planning horizon. Since 2017 was not complete at the time the forecast was prepared, the demand forecast uses a starting baseline demand (demand for 2017) based on the average of demands from 2015 and 2016.

Because the water system assumed the South Cove area at the start of 2017, the South Cove demand was added to the historical baseline demand by using current retail consumption trends of the South Cove area and assuming the same percentage of non-revenue water in South Cove as the rest of the water system.

Different growth rates were assumed for different parts of the water service area, as described below. These growth rates were based on a combination of information from the Issaquah Comprehensive Plan (effective October 2017), Central Issaquah Plan (effective March 2017), and development agreements with the City.

Valley Operating Area

Within the Valley Operating Area is the "Central Issaquah" area as defined in the Central Issaquah Plan. The Central Issaquah Plan provides projections of additional residential households and commercial square footage within Central Issaquah. Typical water use factors for the SFR, MFR, and commercial customer classes were applied against the planned quantity of additional development for the Central Issaquah area per the Central Issaquah Plan. It was assumed that commercial growth in Central Issaquah would be linear with 30 percent of planned commercial growth occurring by 2031 and build-out of commercial growth by 2064 (approximately 2.1% of total planned commercial growth added per year). It was also assumed that residential growth in Central Issaquah would be linear with 70 percent of residential growth completed by 2031 and build-out of residential growth occurring by 2037 (approximately 5% of total planned residential growth added per year). The resulting demand was then added to the current demand to determine the total future demand of the Central Issaquah Area.

Outside of the "Central Issaquah" area, the rest of the Valley Operating Area assumed a 1.6 percent annual growth in all customer billing categories. In addition to that growth, an elementary school is planned to be built within the King County Island area which was annexed in 2017. The forecast assumed the school would be in place in 2018 with a demand of 67 ERU[6].

Lakeside Operating Area

The Lakeside Operating Area is comprised of the Lakeside Development. A portion of the Lakeside Development (neighborhood "A") has already been constructed and is included in demands for the Issaquah Highlands Central Park Operating Area. The rest of the development is included in its own operating area with projected demands based on the 2013 Lakeside Development Agreement. The agreement shows a total of 1,500 ERUs at build-out in 2043. The agreement's annual projections are used, but exclude the demands associated with neighborhood "A."

Montreux, Lakemont, and Issaquah Highlands Summit Operating Areas

The Montreux, Lakemont, and Issaquah Highlands Summit Operating Areas are assumed to be at build-out currently, so water demands are held constant in the demand forecast.

Talus Shangri-La and Talus Foothills Operating Areas

The forecast assumes that build-out will occur in 2024 in both Talus operating areas, per the Talus Development Agreement. Based on City planning information, the remaining number of residential units and commercial area to be built were applied to the build-out year, and typical water use factors were applied to these quantities. A linear growth in water demand was then assumed between 2017 and 2024. Build-out demand is estimated to be 1,978 ERUs.

Issaquah Highlands Central Park Operating Area

The Issaquah Highlands Central Park Operating Area assumes that build-out will occur in 2021. Based on City planning information, the remaining number of residential units and commercial area to be built were applied to the build-out year, and typical water use factors were applied to these quantities. A linear growth in water demand was then assumed between 2017 and 2021. Build-out demand is estimated to be 4,318 ERUs.

Grand Ridge Operating Area

It is assumed that the Grand Ridge Operating Area will have a total build-out of 60 ERUs taking place by 2027. A linear growth was assumed from the current 2017 demand to the build-out demand in 2027.

Cougar Mountain Operating Area

The Cougar Mountain Operating Area is a future potential operating area and is not currently within the water service area. The area is currently served by a combination of the Edgehill Water Association and by private wells. The demand forecast assumes the area is served before the 6-

[6] 67 ERU demand based on assuming a school with 500 pupils and a water demand of 20 gpd/pupil per Table 5-2 of the DOH Water System Design Manual (2009).

year (2023) planning horizon with a 1.6% annual growth in demands. The area is estimated to have 122 ERUs by 2037.

Bergsma Operating Area

The Bergsma Operating Area is a future potential operating area and is not currently within the water service area and does not have any growth. The demand forecast assumes the area has a linear growth in water use from zero demand in 2017 to a build-out of 34 ERUs by 2025.

All Other Operating Areas

In all operating areas of the system not mentioned above (i.e. Forest Rim, Highwood, Wildwood, and Mount Hood) the forecast assumes a 1.6 percent annual growth in all customer billing categories except for commercial. No commercial growth is expected in these areas.

5.6.2 Projected Equivalent Residential Units by Operating Area

The ERUs for each operating area were determined for the current (2017), 6-year, 10-year, and 20-year planning horizons. This information is summarized in Table 5-9.

Table 5-9. Projected Equivalent Residential Units by Operating Area

Operating Area	2017	2023	2027	2037
Cougar Ridge	75	81	86	99
Forest Rim	117	129	137	161
Grand Ridge	26	46	60	60
Highwood	439	483	514	603
Issaquah Highlands Central Park	2,790	4,318	4,318	4,318
Issaquah Highlands Summit	1,932	1,932	1,932	1,932
Lakemont	274	274	274	274
Montreux	311	311	311	311
Mount Hood	1,045	1,150	1,225	1,436
South Cove	1,313	1,444	1,539	1,803
Talus Foothills	509	649	672	672
Talus Shangri-La	986	1,260	1,305	1,305
Valley	7,462	9,932	11,557	15,708
Wildwood	116	128	136	160
Bergsma (future service area)	0	26	34	34
Cougar Mountain (future service area)	89	98	104	122
Lakeside (future service area)	0	358	516	996
Total for Current Service Area	**17,395**	**22,137**	**24,068**	**28,842**
Total Include Future Service Areas	**17,484**	**22,619**	**24,723**	**29,994**

5.6.3 System-wide Demand Forecast

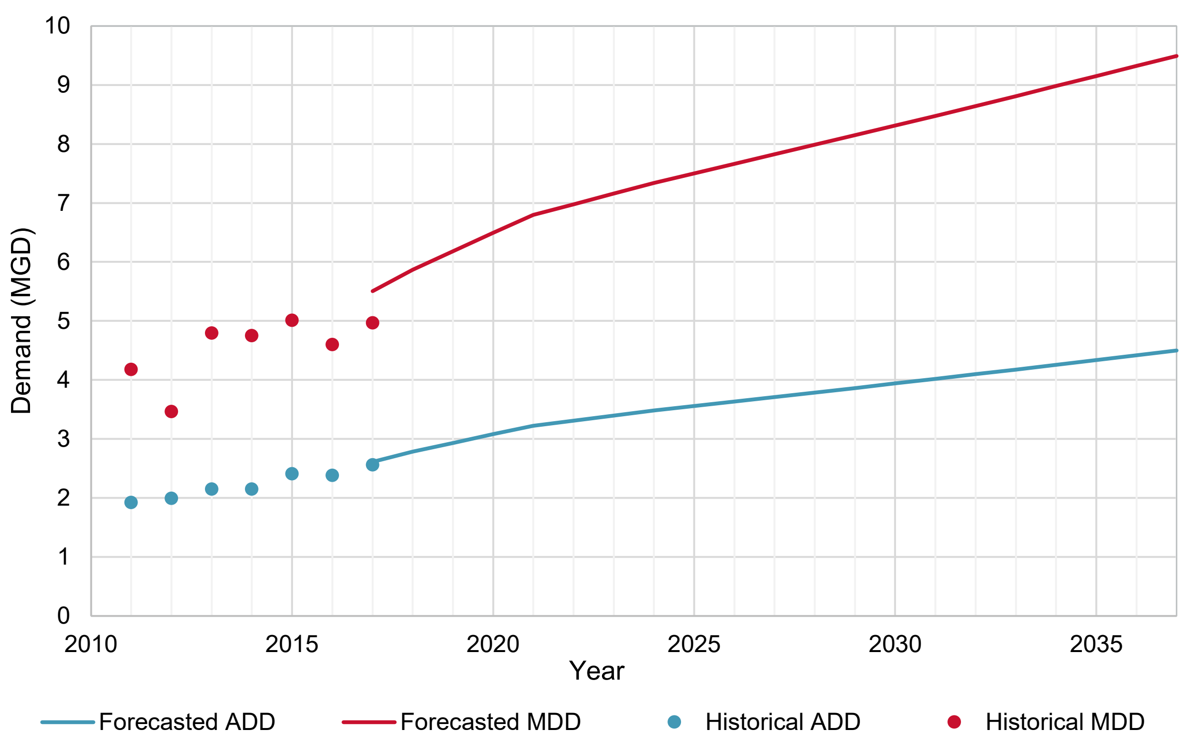
The demand forecast for the entire system is provided in Figure 5-11. This includes projected demands for the current service area as well as the future retail water service area. Table 5-10 provides the forecasted demands for the current, 6-year, 10-year, and 20-year planning horizons.

The demand forecast when incorporating water use efficiency is given in Chapter 6.

Table 5-10. System-Wide Demand Forecast

Demand (MGD)	2017	2023	2027	2037
Average Day Demand	2.61	3.39	3.71	4.50
Maximum Day Demand	5.51	7.16	7.82	9.49

Figure 5-11. System-Wide Demand Forecast



Chapter 6. Water Use Efficiency

Conservation is termed a demand-side management program. As a supply alternative, it serves to decrease consumption, allowing a utility to delay procurement of additional water supplies, reduce withdrawals and associated impacts from existing water resources, manage peak demand and reduce wastewater flows. A conservation program is now mandatory through the State Water Use Efficiency Rule for all utilities of sufficient size, and DOH has established requirements for water system planning, metering, distribution system leakage, goal setting and annual reporting. Water conservation must be addressed in all water system plans.

Water conservation is the implementation of structural and nonstructural programs designed to improve water use efficiency and reduce current demand as well as reducing the rate of increase of demand. The City's water conservation program is described in this chapter. Example components of the program include City ordinances that encourage efficient use of water, the establishment of inverted block water rates designed to make the efficient use of water economically attractive, efficient plumbing fixtures in new construction, meter testing, leak detection and repair, promoting the use of efficient irrigation practices, and increased storm water reuse to irrigate parks, open spaces and home landscapes.

6.1 History of Water Use Efficiency Goals

6.1.1 1989 East King County Regional Water Association Coordinated Water System Plan

In 1989, the East King County Regional Water Association (EKC RWA) formed to develop a Coordinated Water System Plan (CWSP). The CWSP included a water conservation element outlining regional and local conservation objectives, including a target 6.5 percent reduction in usage per ERU by the year 2000, for purveyors such as the City, with less than 10,000 customers at that time. The City met this goal by reducing its water usage by 9 percent from 1996 to 2000, to 209 gallons per day per ERU. No target reductions have been established by the EKC RWA beyond 2000.

6.1.2 1996 Conservation Program

The City's 1996 Water Conservation Program specified an objective of 13 percent reduction in the water used per ERU from the year 1996 to the year 2015. This would have reduced the 1996 ADD water usage of 228 gpd per ERU to an ADD usage of 198 gpd per ERU by 2015. The interim goal for 2000 was approximately 221 gpd per ERU. By 2000 the City (with the exception of Montreux) achieved a reduction in water usage of 9 percent or 209 gpd per ERU, exceeding the interim target.

6.1.3 2001 Conservation Program

In 2001, with the update to the City's Water System Plan, the City accelerated its conservation goal by establishing a plan to reduce ADD consumption to 198 gpd per ERU by the year 2010 and ultimately to 195 gpd per ERU by 2015. This represents a reduction of 6.7 percent from 209 gpd per ERU in 2000. An extensive conservation program was implemented in 2002 to foster the achievement of this goal.

These goals have been met to date; the 2010 usage was approximately 150 gpd per ERU, while usage was 149 gpd per ERU in 2015.

6.1.4 Cascade Water Alliance Conservation Coordination

Since 2004, the City has worked with the Cascade Water Alliance (CWA) to plan, design, and implement coordinated conservation programs across member areas. In 2005, a regional conservation potential assessment (CPA) was completed, analyzing costs, market size and potential savings for 22 water conservation measures across five sectors. The CPA was completed for 6-year and 20-year timeframes, to coincide with the 2005 Transmission and Supply Plan (TSP).

A regional CWA water conservation plan was adopted in 2008. Following the adoption of the State Water Use Efficiency Rule in 2007, the City adopted additional interim water use efficiency goals in January 2008 based upon work with CWA. These goals set into place additional procedures for monitoring distribution system leakage and established annual reporting of conservation and leakage reduction program activities to the community. They also provided goals for a reduction in water use of 51,000 gallons per day on an annual average basis and 67,000 gallons per day during the peak season by 2013.

CWA's commitment to conservation was reinforced by the conservation plan goals and elements incorporated in the 2012 TSP. Chapter 3 of the TSP (Water Conservation Program) can be referenced for more information regarding the regional conservation efforts that underpin the City's conservation program.

6.1.5 Historical Water Savings

As shown in Table 6-1, usage has decreased in the single-family, commercial, and public authority customer classes due to conservation efforts. The ADD water use for an ERU has decreased to 141 gallons per day per 2016 data; however, the demand forecast uses a planning value of 150 gallons per day to be conservative in determining the needs of future facilities. Additional detail regarding recent usage by various customer classes can be found in Chapter 5.

Table 6-1. ADD Water Use by Customer Class

Customer Class	Units	1996	2001	2010	2016	Apparent Reduction from 2010 to 2016 [a]
Single-family	Gpd/connection	228	209 [b]	150	141	6%
Multi-family	Gpd/unit	135	135	124	84	32%
Commercial	Gpd/1000-sq ft floor space	181	134	92	73	22%
Public Authority	% of total production	4%	3%	2.6%	1.2%	
Non-Revenue, accounted for water	% of total production	10%	10%	2.2%	2.2%	
Distribution System Leakage	% of total production			9.6%	5.0%	

Notes:

[a] Apparent reduction in water use may be due to new developments coming on line in 2016 (eg. Atlas Apartments).

[b] Excludes Montreaux.

[c] Values exclude South Cove.

Overall, recent system-wide average day savings are depicted in Table 6-2. This reflects a continued trend in water savings.

Table 6-2. Water Savings From Issaquah Conservation Programs

Year	GPD Saved
2011	14,388
2012	12,000[a]
2013	10,377
2014	9,330
2015	6,662
2016	7,912

Source: Cascade Water Alliance
[a] Estimated

6.2 Regulatory Requirements and City Response

The DOH established Water Use Efficiency (WUE) requirements in 2007 (WAC 246-290). The WUE requirements include five primary components: meters, data collection, planning requirements, distribution system leakage, and annual reporting. A summary of these requirements is included below.

6.2.1 Water Meters

The State Water Use Efficiency (WUE) requirements specify both production and service meters be installed by 2007 and 2017, respectively.

The City has had both production meters and service meters in place for several decades. Production meters are located at all production well facilities. All primary and emergency interties with the exception of Lakemont have meters. All service connections are metered.

6.2.2 Data Collection

Collection of source, intertie, and service meter data is required on a monthly, annual, and seasonal basis, depending upon the meter type. In addition, water supply characteristics must also be described.

Production and intertie meters provide data on water produced, purchased and wheeled through the City's water system. This data is collected on a monthly and annual basis. Service meter data is collected on a bi-monthly basis. Water supply characteristics are described in detail in Chapter 5.

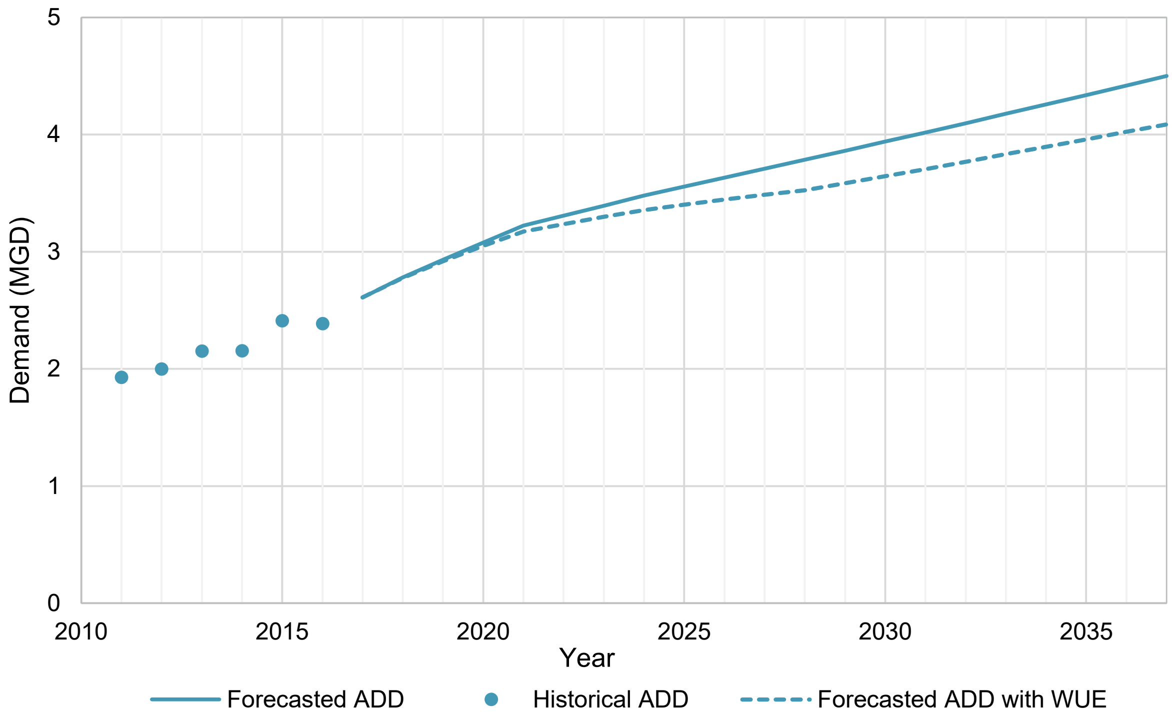
6.2.3 Demand Forecasting

Demand forecasts must project demand with and without savings from conservation program measures. In addition, a third demand forecast including all cost-effective water use efficiency measures is required if all cost-effective measures are not selected for implementation.

The baseline (i.e., without conservation) water system demand forecast is presented in detail in Chapter 5. Figure 6-1 presents the baseline average day demand forecast along with one that incorporates savings from conservation. Details regarding assumed savings associated with conservation are provided in Section 6.3.

Because the City is implementing more than the required minimum number of measures, a demand forecast reflecting 'all cost effective' measures is not required.

Figure 6-1. Water Demand Forecast with Water Use Efficiency



6.2.4 Water Use Efficiency Program

A water use efficiency program is required to be implemented and must be included in water system plan updates.

The City's water conservation program is detailed later in this chapter.

6.2.5 Evaluation of Rate Structure

A rate structure that encourages water demand efficiency is required to be considered.

The City's current rate structure is based upon customer classes and includes five inclining blocks for single-family residential, four inclining blocks for duplex, and two inclining blocks for apartments, trailer courts, commercial and public authority. In addition, irrigation rates are separate and feature a two-step inclining rate structure. The overall rate structure encourages conservation and avoidance of wasting water. Separation of irrigation water use also reflects peak season demand and the higher relative cost of this water. Bills are designed to show water use history to provide customers a basis for comparison of their current consumption with their historical consumption patterns.

6.2.6 Evaluation of Reclaimed Water Opportunities

Water systems with 1,000 or more connections must collect information on reclaimed water opportunities and include information in planning documents.

Cascade Water Alliance evaluated the potential sources and users of reclaimed water as part of its Transmission and Supply Plan. This evaluation identified King County's Brightwater Treatment Plant in Woodinville and South Treatment Plant in Renton as potential suppliers which are not located near the Issaquah service area. The cost of reclaimed water distribution piping and distance from reclaimed water sources was identified as the primary obstacle to reclaimed water use. Issaquah will continue to consider regional efforts to develop reclaimed water supplies, where appropriate.

At this time, reclaimed water does not appear to be an economically viable option in Issaquah due to the City not located near reclaimed water sources. However, the City continues to work with CWA and other regional suppliers to identify and evaluate other feasible opportunities.

Emerging technologies such as on-site water recycling and zero discharge facilities are not precluded or discouraged by this policy. Such facilities operating independently from Issaquah's water and/or sewer systems may be subject to the jurisdiction of plumbing codes, King County Public Health Department, and/or the Washington State Department of Health.

6.2.7 Distribution System Leakage

Water systems must measure and calculate distribution system leakage and implement a distribution system leakage standard of 10% on a rolling three-year average. Transmission lines are not required to meet a leakage standard, but transmission line leakage and efforts to control leakage must be described in planning documents.

Since 2007, the City monitors and reports transmission and distribution system leakage on an annual basis. Leakage between 2014 and 2016 has averaged 6.4 percent as noted in Table 5-5 in Chapter 5.

Leakage data is reported to customers in the annual distribution of the City's Consumer Confidence Report.

6.2.8 Goal Setting and Performance Reporting

Water systems must set water use efficiency goals through a public process. Goals must be adopted by the governing body for the water system. Water use efficiency performance must be reported to the DOH and the public.

The City's current water use efficiency goals are described in the following section.

6.3 Current Water Use Efficiency Goals

Water use efficiency goals were first established in January 2008, following public notice and a public meeting on January 10, 2008. These goals have been modified over time as interim milestones have been achieved. Annual reports have been prepared for DOH and the information has been communicated to the public through incorporation into the City's Consumer Confidence Report, which has been mailed to all water customers by July 1st of each year since 2008.

As a member of CWA, the City participates in the regional efforts that are tied to the adopted regional water use efficiency goals CWA has established for its member water utilities in consultation with the DOH. As such, CWA's WUE goal is adopted by the City as its formal WUE goal, and is stated as: "Cascade will dedicate resources necessary to achieve a cumulative drinking water savings of 0.6 million gallons per day on an annual basis and 1.0 million gallons per day on a peak season (June – September) basis by 2020." – Adopted by CWA's Board of Directors, October 23, 2013 for the period 2014 to 2019.

As stated in its 2016 WUE annual report, the City notes that CWA's conservation programs and services resulted in approximately 20,000 direct customer interactions promoting water efficiency and a savings of an estimated 257,728 gallons of water per day, or 43 percent of CWA's 2014 – 2019 WUE goal.

For the purpose of presenting a demand forecast that incorporates continued savings from water conservation, the City has established a target of reducing water usage to 134 gpd per ERU by 2026, representing a 5 percent reduction in water use from actual ERU water use seen in 2016, and a 11 percent reduction as compared to the ERU planning value (150 gpd per ERU) used in the demand forecast. For context, in the 2012 WSP, the City established a target of reducing water use to 141 gpd per ERU by 2020. With the observed value of an ERU being 141 gpd per ERU in 2016, the pervious WSP's target has been met.

As discussed in Chapter 5, data show a major decrease in the water use factors for commercial and multi-family water use. Because of the large decrease that has been seen in recent years, a smaller reduction is assumed in the future for commercial and multi-family water use factors, assuming that many conservation-based gains have been met. The City has established a target of reducing commercial water use to 71 gpd per 1,000 square feet of commercial space by 2026, representing a 2 percent reduction in the water use factor from the 2016 observed water use factor, and a 23 percent reduction in the planning water use factor used in the demand forecast.

For multi-family water use, the City has established a target of reducing multifamily water use to 82 gpd per dwelling by 2026, representing a 2 percent reduction in water use factor from the 2016 observed water use factor, and a 34 percent reduction in the planning water use factor used in the demand forecast.

Given the above targets, in 10 years (i.e., in 2027) the annual savings would be 228,000 gpd. During the period of 2018-2027, this equals an annual average savings of 89,000 gpd, relative to the baseline forecast. This is depicted in the demand forecast with conservation, presented previously in Figure 6-1. This assumes that baseline water use is based on the planning water use factors (Chapter 5) from 2017 with the conservation-based forecast represented by a straight-line decrease to the target water use factors in 2026.

Through the 2018 Water System Plan adoption process, the regional CWA water use efficiency goal and the City-specific target have been highlighted for discussion in public meetings, including the City's Utilities, Technology and Environment Committee meetings and full Council meetings. The adoption of the water conservation goal occurs in tandem with overall water system planning to ensure the integration of measures into demand forecasting and overall system considerations for future local and regional design and permitting.

6.4 Historical and Ongoing Water Use Efficiency Program

As noted previously, the City's conservation program makes use of the programs and services provided by CWA. In 2016 CWA administered 15 distinct activities including showerhead and aerator installation at commercial accounts, residential gardening classes, irrigation system upgrade rebates, classroom presentations on water topics, free online ordering of shower timers, rain gauges, and other conservation items through CWA's website, water audits at King County Housing Authority and Hopelink properties, free conservation items shipped to multifamily properties, training for landscape contractors, parks and school district staff, students, and others on the fundamentals of efficient irrigation management, and implementation of a WaterSense Labeled New Homes program for builders.

Specific activities undertaken recently specifically by the City, as documented in the 2016 WUE annual report, include:

- In 2016, the City focused on reducing peak-season demand from commercial irrigation. Customers received reminders to adjust their irrigation settings, and heard more about best practices to use water efficiently, while also saving money.
- The City also participated in the National Mayor's Water Conservation Challenge which encourages residents to pledge to conserve water.
- The City continues to encourage water efficiency in new construction through the City's green building program, internal Green Building and Infrastructure Team, green building permit incentives, landscape code, soil amendment standards, inclining block and irrigation only rates and rate structures. City continues work on aging watermain replacement and has established procedures to manage water loss for water main flushing

6.5 Evaluation of Potential Program Measures

The City currently provides conservation programs through a combination of local and regional efforts. The City works in partnership with CWA to develop regional water conservation measures to be implemented throughout its member utility service areas. In previous years, the City has also implemented local conservation programs such as the Powerful Choices school program, toilet distributions, irrigation and landscape classes, neighborhood natural yard care program, sustainable building program, commercial irrigation audits and other measures that complement regional efforts.

CWA has produced several documents that plan for conservation activities throughout its regional wholesale service area: Conservation Potential Assessment, 2005; Regional Water Conservation Plan, 2008; and Water Conservation Study, 2011.

The Conservation Potential Assessment provided a detailed review of the water saving potential of 22 conservation measures across three sectors. The associated costs and service area considerations provide a foundation for development of the measures, which have been included in both the City’s and the Regional Water Conservation Plan.

6.6 Cost/Benefit Analysis

In 2012, four packages of conservation investments were evaluated at the regional level through the CWA conservation program, assessing total program cost and return on investment of different approaches. This analysis considered implementation costs and water savings, but did not account for natural resource, societal or customer costs or benefits directly. The packages incorporated a range of conservation measures including rebates, direct installation, education, promotion and other measures, which are included in the City’s Water Use Efficiency Program. The regional conservation package is estimated to provide an average day conservation savings of 2.2 mgd and a peak season conservation savings of 3.1 mgd from 2011 to 2020 throughout the region. Each of the conservation packages were assessed for cost-effectiveness, providing a range of $0.26 to $0.71 per ccf of saved water. Additionally, the rate of return of the conservation packages evaluated ranged from approximately 9.2–14.5 percent overall. Additional detail is available from CWA.

6.7 Future Water Use Efficiency Program

The City is committed to continuing its water conservation efforts. This will involve continued participation in CWA's regional conservation programs, with additional emphasis placed on the activities described in Section 6.4.

In 2017, the City evaluated water use by neighborhood and by season. This data will be used in future years to target the location and types of conservation programs and outreach. The City also passed a Sustainable Building Action Strategy which takes a holistic approach to sustainable building and will help the City conserve its natural resources in the future, including water.

Chapter 7. Supply Evaluation

This supply evaluation includes a description of the City's groundwater sources of supply, existing water rights, summary of purchased water supply, the areas in the system in which groundwater or surface water supply is used, and recommendations for future supply facilities.

7.1 Groundwater Supply Sources

7.1.1 Aquifer Conditions

The City's wells are in the Issaquah Valley Aquifer, a highly productive glacial sand and gravel delta deposit. These sand and gravel deposits were once the bottom of Lake Sammamish and are hundreds of feet thick. The nature of these deposits can be seen in the Lakeside Gravel Pit adjacent to I-90. The aquifer is estimated to be approximately 300 feet thick and, on a regional scale, acts as a single unconfined aquifer (Golder, 1993). Hydraulic conductivity of the aquifer is estimated to be between 200 and 300 feet per day (Golder, 1993). Groundwater recharge occurs primarily along the more permeable surficial sediments located along the margins of the aquifer, including the Lake Tradition Plateau, western Grand Ridge and possibly the upper reaches of Issaquah Creek.

The City's wells are completed at depths of 97 to 412 feet in the aquifer. The thickness and lithology of the aquifer varies locally and strongly affects well production. Where the aquifer is thick (75 to 80 feet) and consists of clean sand, gravel and cobbles, well yields of up to 2,000 gpm are reported. Wells completed in thinner areas of the aquifer, less than 40 feet thick, with considerable amounts of fine silty materials, yield approximately 100 to 200 gpm. A detailed description of the Issaquah aquifer conditions is provided in the Lower Issaquah Valley Wellhead Protection Plan, Volume I Report[1].

7.1.2 Existing Supply Facilities

Prior to 1967, the City received its water from a series of surface water springs flowing from the East Issaquah Watershed. The City relinquished this surface water right, #1087, on October 2, 1970. The City currently operates four of its six wells. These wells, grouped as the Risdon, Gun Club, and Gilman Wells, are shown in Chapter 2's Figure 2-3 and are described in detail below.

Risdon Well No. 1

Constructed in 1967, Risdon Well No. 1 is located just south of the I-90 right-of-way, east of SE 72nd Street. It has a primary, certificated water right, Ground Water Certificate No. 6343-A, (G1-*08632CWRIS) with a priority date of March 30, 1967. Well No. 1 has an authorized Qi of 630 gpm (0.91 MGD) and a Qa of 1,000 ac-ft/year (0.89 MGD). It is located within the NW 1/4 SW 1/4 Sec. 27, T24N, R6E.

Well No. 1 was constructed to a depth of 107 feet with a 12-inch casing and screen. The screen is set with a #60 slot size between depths of 90 feet and 106 feet. Well No. 1 is equipped with a vertical turbine pump driven by a 60-horsepower (hp) motor with a capacity of 450 gpm. Well No.1 pumps directly to the 297 Zone which is hydraulically tied to the Westside Reservoir and the

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[1] *Lower Issaquah Valley Wellhead Protection Plan, Volume I Report*, Golder Associates, November 1993.

Cemetery Reservoir. Well No. 1 serves as a primary well supply to the Valley 297 Pressure Zone and is normally controlled by the water level in the Westside Reservoir. The well has produced an annual average of 0.30 MGD in the last four years (2014-2017).

Risdon Well No. 2

Constructed in 1969, Risdon Well No. 2 is located in the same location as Well No.1, just south of the I-90 right-of-way, east of SE 72nd Street. It is a primary, certificated water right, Ground Water Certificate No. 7031-A, (G1-*10071CWRIS), with a priority date of March 11, 1969. Well No. 2 has an authorized Qi of 1,200 gpm (1.73 MGD) and a Qa of 1,600 ac-ft/year (1.43 MGD). It is located within the NW 1/4 SW 1/4 Sec. 27, T24N, R6E.

Well No. 2 was constructed to a depth of 200 feet with a 12-inch diameter casing and screen. The screen is set with a #40 slot size between a depth of 82 feet and 87 feet and with a #100 slot size between depths of 87 feet to 97 feet. Well No. 2 is equipped with a vertical turbine pump driven by a 100-HP motor and has a capacity of 1,050 gpm.

Well No. 2 pumps directly to the Valley 297 Pressure Zone. The well has produced an annual average of 0.55 MGD in the last four years (2014-2017).

The wells and equipment are housed in the same masonry building. Disinfection (12.5 percent sodium hypochlorite) is provided at Well No. 1 and Well No. 2. The pump house is equipped with a transfer switch for a portable engine-generator.

Gun Club Well No. 3

Constructed in 1976, Gun Club Well No. 3 is located east of Gun Club Rd. SE on SE Evans St., 200 feet north of Well No. 3a. It is a certificated water right with a non-additive annual quantity water right (G1-22734C) to the primary rights for the Risdon Wells, with a priority date of September 1, 1976. Well No. 3 has an authorized Qi of 500 gpm (0.72 MGD) and a Qa of 645 ac-ft/year (0.58 MGD). The well is located within the SE1/4 NW1/4 Sec. 34, T24N, R6E.

Well No. 3 was constructed to a depth of 205 feet with an 8-inch diameter casing and screen. The well was decommissioned in 1988 and has been abandoned following the sale of the property to the Issaquah School District.

Gun Club Well No. 3a

Constructed in 1975, Gun Club Well No. 3a is located east of Gun Club Rd. SE on SE Evans Street. It is a certificated water right (G1-22733C) with a non-additive annual quantity water right to the primary water rights for the Risdon Wells, with a priority date of September 1, 1976. Located within the SE 1/4 NW 1/4 Sec. 34, T24N, R6E, Well No. 3a has an authorized Qi of 300 gpm (0.43 MGD) and a Qa of 119 ac-ft/year (0.11 MGD).

Well No. 3a was constructed to a depth of 168 feet with an 8-inch casing and screen. The screen is open to the aquifer between depths of 160 feet and 180 feet. The well was decommissioned in 1988 and has been abandoned following the sale of the property to the Issaquah School District.

Gun Club Wells – Change in Point of Withdrawal

Because certificated water rights for the Gun Club Wells are on file at the Ecology, the City has some options for reestablishing the use of these wells. The first option is to drill new wells as replacement wells within the published location of the existing wells. Alternatively, applications for change can be filed to change the points of withdrawal for the Gun Club wells' water rights. These two wells have non-additive water rights and while they cannot be used as a new annual supply, the wells can provide additional instantaneous supply to meet peak demands.

In May 1997, the City submitted applications to change the point of withdrawal from the two Gun Club Wells to a new location. The test-drilling program located new point of withdrawal and the City submitted revised applications in February of 1998. The new site was proposed at 525 1st Avenue NW in the SE 1/4 Sec. 28, T24N, R6E. The applications for change of point diversion were denied by Ecology on the basis that the proposed changes would be detrimental to the public interest. This was based on the potential impact of the proposed changes in point of withdrawal to streamflows in East Fork of Issaquah Creek and Issaquah Creek. Copies of the file materials for this are in Appendix G.

The City intends to perform a study to investigate options for future utilization of the Gun Club water rights.

Gilman Well No. 4

Constructed in 1987, Gilman Well No. 4 is located south and east of where I-90 crosses Issaquah Creek. It is a primary, certificated water right (G1-24809CWRIS), with a priority date of March 10, 1986. Well No. 4 has an authorized Qi of 250 gpm (0.36 MGD) and a Qa of 200 ac-ft/year (0.18 MGD). It is located within the NW 1/4 NE 1/4 Sec. 28, T24N, R6E.

Gilman Well No. 4 was constructed to a depth of 112 feet with a 16-inch casing and screen. The screen is open to the aquifer between depths of 77 feet and 102 feet. Well No. 4 is equipped with a 250-gpm, vertical turbine pump driven by a 30-HP motor. Well No. 4 pumps directly to the Valley 297 Pressure Zone. It acts as a secondary well and operates during peak demand periods to refill the Westside Reservoir. The well is normally controlled by the water level in the Westside Reservoir and has produced an annual average of 0.17 MGD in the last four years (2014-2017).

In Gilman Well No. 4, the presence of perfluorinated compounds (PFCs), principal of which is perfluorooctanesulfonic acid (PFOS), was found. Currently, the EPA has no regulatory limit for PFOS in drinking water. However, the EPA has established a Provisional Health Advisory Level (PHAL) for PFOS which concentrations in the well currently exceed. A temporary PFOS treatment system is located at the well, further details of which are discussed in Chapter 8. Chapter 8 also includes an evaluation of long-term treatment options for the City.

Gilman Well No. 5

Constructed in 1987, Gilman Well No. 5 is located south and east of where I-90 crosses Issaquah Creek in the same location as Well No. 4. It is a certificated water right (G1-24633CWRIS), with a priority date of April 3, 1985. Well No. 5 is non-additive to the primary water rights for Risdon Wells with an authorized Qi of 1,000 gpm (0.1.44 MGD) and a Qa of 1,600 ac-ft/year (1.43 MGD). It is located within the NW 1/4 NE 1/4 Sec. 28, T24N, R6E.

Gilman Well No. 5 was constructed to a depth of 412 feet with a 16-inch casing and screen. The screen is open to the aquifer between depths of 323 feet and 405 feet. Well No. 5 is equipped with a vertical turbine pump driven by a 125-HP motor that has a capacity of 1,150 gpm. Well No. 5 pumps directly to the Valley 297 Pressure Zone. Well No. 5 acts as a secondary well, operates during peak demand periods to refill the Westside Reservoir, and is normally controlled by the water level in the Westside Reservoir. The Gilman Wells are also used when necessary to increase the pH of the water supply. The well has produced an annual average of 0.37 MGD in the last four years (2014-2017).

The wells and equipment are housed in the same masonry building. Disinfection (12.5 percent sodium hypochlorite) is provided for both Well No. 4 and Well No. 5. The building is wired to a portable engine generator for emergency power.

Gilman wells No. 4 and No. 5 are operated in conjunction in order to meet several water quality objectives: 1) lower arsenic levels, 2) increased pH, and 3) lower manganese levels. Blending the sources is accomplished by utilizing the City SCADA system with well start/stop setpoints.

Currently, no results have shown PFOS levels above the practical quantification limit (0.04 ug/L) in Well No. 5); however, there is a concern that if Well No. 4 is taken offline that PFOS will spread to the aquifer drawn by Well No. 5. In 2006, the Cascade Water Alliance (CWA) Board of Directors (See “Purchased Water” section), agreed to obligate members to maximize production of member-owned water sources. Issaquah-owned water sources would have to increase production to meet CWA’s production minimum standard. Because an increase in production would come from Well No. 4 and Well No. 5, with the latter being a significant aesthetic issue due to increased manganese levels, manganese sequestrate equipment was installed in 2008 for injection before disinfection.

7.2 Water Rights and Water Right Self-Assessment

The City holds Ecology certificated rights to annually withdraw 2,800 acre-feet (2.50 MGD) of groundwater with a maximum instantaneous withdrawal of 3,880 gpm (5.59 MGD) including the Gun Club well rights. Copies of the Certificates of Water Rights and supporting file materials are provided in Appendix G.

The DOH Water Right Self-Assessment Form can be found in Table 7-1 and Table 7-2.

7.3 Purchased Water Supply

All of the City’s purchased water is supplied by CWA. The City has three connections with Bellevue, as shown on Figure 2-3, for the purpose of wheeling water provided by CWA through Bellevue to serve the Lakemont, Montreux, and South Cove operating areas. There are two additional supply connections to the CWA regional transmission main (Bellevue-Issaquah Pipeline).

The terms of the CWA supply agreement are detailed in the Cascade Water Alliance Interlocal Contract, Amended and Restated in March 2012 (Appendix D). According to this agreement, CWA is obligated to provide a Full Supply Commitment to each founding member to meet current and future supply needs within the member’s service area. Modification or extensions of the service area must be approved by CWA to guarantee CWA’s commitment of full supply. Any Full Supply Commitment is subject to shortages; if the needed supply is not available, the shortage is shared by all CWA members in accordance with CWA’s shortage management plan.

Table 7-1. Water Right Self-Assessment

<table>
<tr><th rowspan="2">Water Right Certificate # and Well Name</th><th rowspan="2">WFI Source #</th><th colspan="4">Existing Water Rights</th><th colspan="4">Current (2016) Source Production</th><th colspan="4">10-Year (2027) Forecasted Source Production</th><th colspan="4">20-Year (2037) Forecasted Source Production</th></tr>
<tr><th>Primary Qi</th><th>Non-Additive Qi</th><th>Primary Qa</th><th>Non-Additive Qa</th><th>Total Maximum Qi</th><th>Current Qi Excess or (deficiency)</th><th>Total Qa</th><th>Current Qa Excess or (deficiency)</th><th>Total Maximum Qi</th><th>Current Qi Excess or (deficiency)</th><th>Total Qa</th><th>Current Qa Excess or (deficiency)</th><th>Total Maximum Qi</th><th>Current Qi Excess or (deficiency)</th><th>Total Qa</th><th>Current Qa Excess or (deficiency)</th></tr>
<tr><td>G1-*08632CWRIS Risdon No. 1</td><td>S01</td><td>630</td><td>0</td><td>1,000</td><td>0</td><td>600</td><td>30</td><td>382.3</td><td>617.7</td><td rowspan="4">3,436</td><td rowspan="4">(356)</td><td rowspan="4">2,627</td><td rowspan="4">173</td><td rowspan="4">4,427</td><td rowspan="4">(1,347)</td><td rowspan="4">3,385</td><td rowspan="4">(585)</td></tr>
<tr><td>G1-*10071CWRIS Risdon No. 2</td><td>S02</td><td>1,200</td><td>0</td><td>1,600</td><td>0</td><td>1,056</td><td>144</td><td>701.5</td><td>898.5</td></tr>
<tr><td>G1-24809CWRIS Gilman No. 4</td><td>S04</td><td>250</td><td>0</td><td>200</td><td>0</td><td>355</td><td>(105)</td><td>195.4</td><td>4.6</td></tr>
<tr><td>G1-24633CWRIS Gilman No. 5</td><td>S05</td><td>1,000</td><td>0</td><td>0</td><td>1,600</td><td>1,078</td><td>(78)</td><td>182.8</td><td>(182.8)</td></tr>
<tr><td>G1-22733C Gun Club No. 3a</td><td>S03</td><td>300</td><td>0</td><td>0</td><td>119</td><td>0</td><td>300</td><td>0</td><td>0</td><td rowspan="2">0</td><td rowspan="2">800</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">800</td><td rowspan="2">0</td><td rowspan="2">0</td></tr>
<tr><td>G1-22734C Gun Club No. 3</td><td>S03</td><td>500</td><td>0</td><td>0</td><td>645</td><td>0</td><td>500</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">TOTALS</td><td>3,880
A</td><td></td><td>2,800
B</td><td></td><td>3,089
C</td><td>791
=A-C</td><td>1,462
D</td><td>1,338
=B-D</td><td>3,436
E</td><td>444
=A-E</td><td>2,627
F</td><td>173
=B-F</td><td>4,427
G</td><td>(547)
=A-G</td><td>3,385
H</td><td>(585)
=B-H</td></tr>
</table>

Notes:

1. Qi = Instantaneous Water Right in units of gpm, Qa = Annual Volume Water Right in units of ac-ft/year
2. Current and forecasted production is based on demands by operating areas currently served by the ground water wells and does not include areas served by interties with Bellevue or by CWA regional supply.
3. Gun Club wells are both currently inactive.
4. Table does not include water supplied to Issaquah from CWA (either wheeled through Bellevue through interties or delivery through the Bellevue-Issaquah Pipeline. CWA. Discussion of water supplied from CWA is discussed in Section 7.4.
5. There are no pending water right applications or interruptible water rights.

Table 7-2. Water Right Self-Assessment - Interties

Name of Wholesaling System Providing water	Quantities Allowed in Contract		Expiration Date of Contract	Currently (2016) Purchased				10-Year (2027) Forecasted Purchase				20-Year (2037) Forecasted Purchase			
	Maximum Qi	Maximum Qa		Maximum Qi	Current Qi Excess or (deficiency)	Maximum Qa	Current Qa Excess or (deficiency)	Maximum Qi	Current Qi Excess or (deficiency)	Maximum Qa	Current Qa Excess or (deficiency)	Maximum Qi	Current Qi Excess or (deficiency)	Maximum Qa	Current Qa Excess or (deficiency)
Cascade Water Alliance	17,280 *A*	13,442 *B*	None	2,716 *C*	14,564 *=A-C*	1,213 *D*	12,229 *=B-D*	1,998 *E*	15,282 *=A-E*	1,527 *F*	11,915 *=B-F*	2,165 *G*	15,115 *=A-G*	1,655 *H*	11,787 *=B-H*

Notes:

1. Qi = Instantaneous Water Right in units of gpm, Qa = Annual Volume Water Right in units of ac-ft/year
2. Current and forecasted production is based on demands of operating areas currently not served by the ground water wells.
3. CWA is obligated to provide the City with a Full Supply Commitment, which is not defined by any flow limit. The “Quantities Allowed in Contract” shown in the table are based on the maximum flow capacity of the Issaquah-Bellevue Pipeline.

In October 2005, CWA and Tacoma Public Utilities (Tacoma) executed a contract for the wholesale purchase of water from Tacoma by CWA. Tacoma's available excess supply helps fulfill CWA's supply needs. A portion of the water purchased (4 MGD average daily supply) is a permanent supply for CWA. Tacoma will also reserve an additional 6 MGD (average daily supply) for CWA through 2026. From 2026 through 2030, the amounts of water reserved for CWA decline. The contract provides a schedule of minimum annual purchase amounts through 2025. CWA may request additional water if Tacoma has excess supply available.

In late 2008, CWA and Seattle Public Utilities approved amendments to the 50 Year Declining Block Agreement effective January 1, 2009. The 2008 amendments created a supplemental block of supply that is available to CWA until 2023.

In 2009, CWA completed the purchase of Lake Tapps and associated water rights and infrastructure from Puget Sound Energy with the intent of converting it to a municipal water supply project. In 2010 final water rights needed for this conversion were issued by the State of Washington.

7.3.1 Historical Water Consumption and Production

A summary of the City’s annual water consumption and production from 2014 through 2016 is presented in Table 7-3. Total water production includes well production and the amount of wholesale water purchased from CWA through Bellevue. Table 7-4 represents water use for the entire service area. Chapter 5 includes additional details on production and consumption.

Table 7-3. 2014-2016 Annual Consumption and Production

	Million Gallons (MG)				
	Average 2014-2016	2014	2015	2016	2017
Supply					
Well Production	504.77	497.70	540.22	476.39	513.55
Wholesale Purchase	342.25	289.90	341.65	395.20	499.30
Total Supply	847.02	787.60	881.86	871.59	1,012.85
Consumption					
Metered Retail Consumption	764.53	708.22	785.89	799.47	N/A [a]
Non-Revenue Use	82.49	79.37	95.98	72.12	N/A [a]

[a] At time of writing, retail use day for 2017 was not yet available.

The total annual well production and additional purchased water is shown graphically in Figure 7-1. A breakdown of the production from each individual well is shown in Figure 7-2. Variations in water production between years typically reflect changes in customer demands based on a variety of factors such as seasonal weather patterns, growth within the service area and City policies.

Figure 7-1. 2014-2016 Annual Well Production and Purchased Water

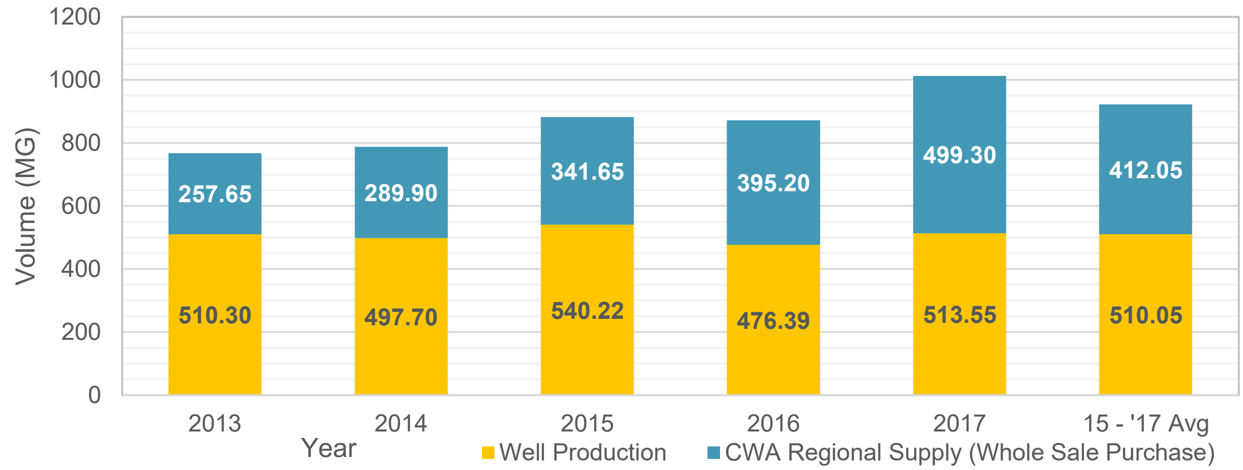
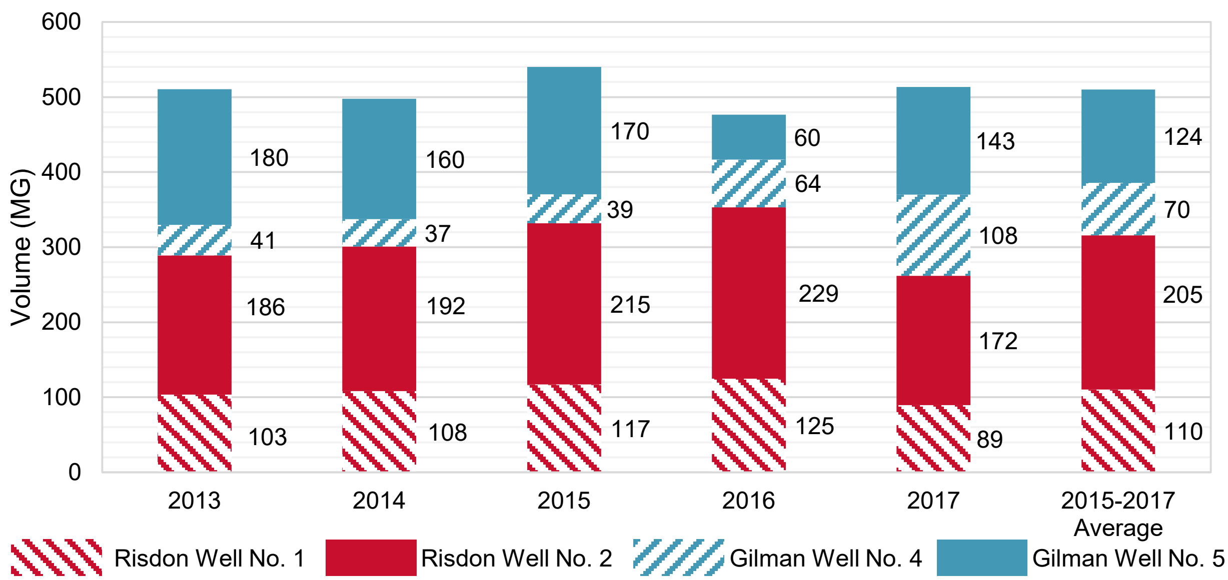


Figure 7-2. Breakdown of 2013-2017 Annual Well Production



7.4 Supply Evaluation and Strategies

This section takes a look at the water supply into different parts of the water system given current and forecasted water demands. Several different levels of the water system are considered as described below:

- **System-Wide Supply** – A look at the supply of water for the entire water system.
- **Groundwater / CWA / Bellevue Supply Areas** – A look at the supply to groupings of operating areas that have a common main supply. This includes (1) the operating areas served by Bellevue interties (South Cove, Montreux, and Lakemont), (2) the operating areas served by groundwater wells, and (3) the operating areas served by the CWA regional supply.
- **Operating Areas** – A look at each booster pump station and the operating area(s) each booster pump station serves to determine their adequacy across the planning horizon.

7.4.1 System-Wide Supply

The City has developed a water supply strategy comprised of multiple elements to help meet projected future demands and to increase reliability. Brief descriptions of each element are provided below:

- **Groundwater Supplies.** The City has historically been served by quality groundwater supplies. It is the City's goal to continue using its existing groundwater wells as its primary source of supply into the future utilizing the groundwater rights as much as feasible. The water rights and capacities of the City wells are not sufficient to accommodate demands through the planning horizon of 2037. Therefore, the City plans to utilize CWA water as needed to fully meet its water demands.
- **Regional Supplies.** As a member of CWA, the City obtains regional water either directly through the Issaquah-Bellevue Pipeline or by wheeling CWA water through Bellevue interties. The CWA water currently supplies Issaquah Highlands, Montreux, Lakemont, and South Cove. The regional pipeline and connections owned by CWA could be used to supply the entire City in the event of multi-well failure.
- **Sammamish Plateau Water (SPW) Interties.** These emergency interties allow the City or SPW to provide mutual aid in the event of either party losing its water supply. An emergency supply from Lake Sammamish, including treatment and transmission to distribution systems, is being considered (SPW would be involved in any development of an emergency supply to determine whether the supply would be an acceptable alternative for both the City and SPW).

The water from CWA is surface water originating from the City of Seattle. Seattle adds fluoride at the source whereas Issaquah does not fluoridate the well supply. Purchased water is currently delivered to Lakemont, Montreux, South Cove, and Issaquah Highlands, and only these operating areas currently receive fluoridated water. The water booster stations for the Issaquah Highlands have fluoridation equipment installed for when the City chooses to pump any percent of groundwater to these urban villages. These developments will be delivered fluoridated well water and then purchased water will be used to meet peaking demands by blending the two supplies together.

The Issaquah Highlands Operating Areas have the capability to be served by City groundwater, CWA water, or blended. The Talus Operating Areas can be served by either City groundwater or CWA water. Current operation has the Issaquah Highlands served with CWA water and Talus with groundwater. The City plans to eventually serve the entire retail service area except Montreux, Lakemont, and South Cove with blended well/regional water. In the event of a disruption of the regional water main supply, the four wells could supply the City with groundwater with necessary restrictions on the amount of water used, except for Montreux, Lakemont, and South Cove.

To evaluate supply adequacy, the future water demand for each supply area as summarized in Chapter 5 was compared to sources of supply capacities. Table 7-4 summarizes this comparison for the entire system. CWA is obligated to provide the City with a Full Supply Commitment[2], which is not defined by any flow limit. The physical supply delivery capacity of the regional transmission main is 13.0 MGD. The regional transmission main supplies both the City and SPW. The current minimum

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[2] A "Full Supply Commitment" means those needs, as projected in the Cascade Water Supply Plan and as agreed to by Issaquah shall be met from the CWA supply, net of Issaquah's own supply (ground water wells), and will be provided on an equal parity with other CWA members with Full Supply Commitments.

purchase requirements are 0.75 MGD for the City and 1.0 MGD for SPW. The regional transmission main could be upgraded in the future to deliver greater supply quantities. As the pipe capacity is approached, regional demands will be evaluated and provided by CWA. The regional supply capacity available to Issaquah shown in Table 7-4 reflects the physical delivery capacity of the regional transmission main of 13.0 MGD minus the forecasted values (extrapolated) for water needed from additional sources to serve SPW's demands from SPW's 2010 water system plan.

Table 7-4 shows that on a system-wide perspective, total supply exceeds total forecasted demand.

Table 7-4. Evaluation of Operational Supply Capacities

Source of Supply	Capacity (MGD)							
	2017		2023		2027		2037	
	Ave Day	Max Day	Ave Day	Max Day	Ave Day	Max Day	Ave Day	Max Day
City Wells [a]	2.5	4.4	2.5	4.4	2.5	4.4	2.5	4.4
Regional Supply [b]	10.1	10.1	9.0	9.0	8.2	8.2	6.2	6.2
Total Supply	12.6	14.5	11.5	13.4	10.7	12.6	8.7	10.6
Demand Based on Current Trends								
Total Demand	2.6	5.5	3.4	7.2	3.7	7.8	4.5	9.5
Supply Surplus	10	9.0	8.1	6.2	7.0	4.8	4.2	1.1

[a] Average day capacity of 2.5 MGD based on total Qa of water rights of 2,800 ac-ft. Maximum day capacity of 4.4 MGD based on total Qi of water rights excluding the Gun Club Wells (which are currently not used).

[b] Based on CWA's obligation to supply full capacity of the regional transmission main of 13.0 MGD less the difference in SPW forecasted peak demand to their current well sources per SPW's 2010 Water System Plan.

7.4.2 Bellevue Intertie Supply Evaluation

Future demand for the Montreux, Lakemont, South Cove, and Cougar Mountain operating areas must be compared against the facility limitations expressed in the 2016 Water Facilities Agreement between the City and Bellevue (Appendix D), which allows the City to use Bellevue's water system infrastructure for the delivery of a limited amount of water to these zones. Table 7-5 presents a comparison of the demand to facilities limitations for these four operating areas. The limits are met for all operating areas for the 20-year planning horizon except for South Cove. The agreement may need to be revisited as growth occurs in this area or another supply connection may need to be revisited in the 20 year planning horizon.

Table 7-5. Comparison of Bellevue Intertie Demand and Facility Limits

Operating Area	Limit	Demand (ERUs)			Compliance with Agreement
		2017	2027	2037	
Lakemont	400 ERUs or 600 MF Units	274	274	274	Complies for 20-year planning horizon.
Montreux	700 ERUs less Cougar Mountain Demand	311	311	311	Complies for 20-year planning horizon.

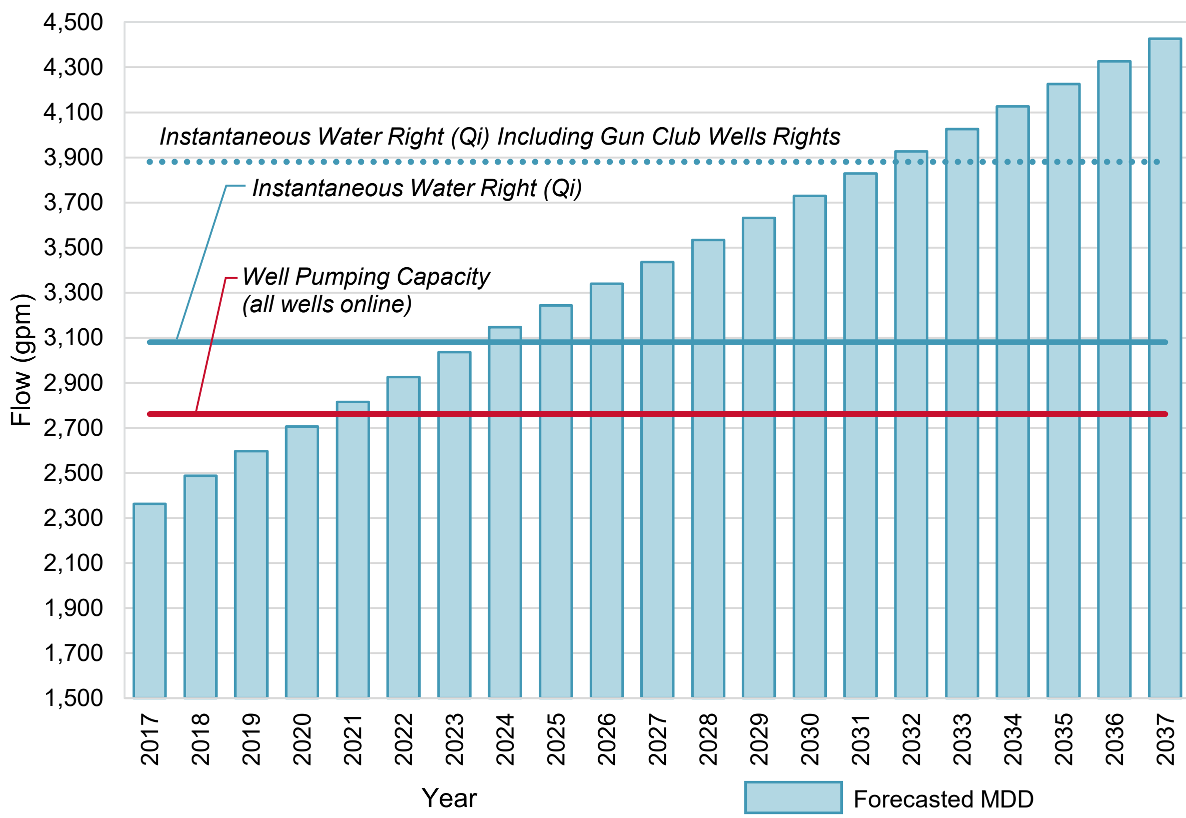
Table 7-5. Comparison of Bellevue Intertie Demand and Facility Limits

Operating Area	Limit	Demand (ERUs) 2017	Demand (ERUs) 2027	Demand (ERUs) 2037	Compliance with Agreement
South Cove	1,600 ERUs	1,313	1,539	1,803	Complies for 10-year planning horizon. Exceeds agreement for 20-year planning horizon. A new CWA connection to supply South Cove would be provided to prevent exceeding agreement.
Cougar Mountain	150 ERU	89	104	122	Complies for 20-year planning horizon

7.4.3 Supply Evaluation for Areas Supplied by Wells

The City's groundwater wells serve as the primary supply to the Valley, Cougar Ridge, Mount Hood, Wildwood, Highwood, and Forest Rim Operating Areas. Well water is not fluoridated. Areas receiving water exclusively from the groundwater supply receive unfluoridated water. Areas receiving CWA regional supply water, or a blend of groundwater and CWA water, is fluoridated (such as the case for the Issaquah Highlands and Grand Ridge Operating Areas. Figure 7-3 shows the MDD of the well supplied operating areas compared to the well pumping and instantaneous well water right (Qi) capacities.

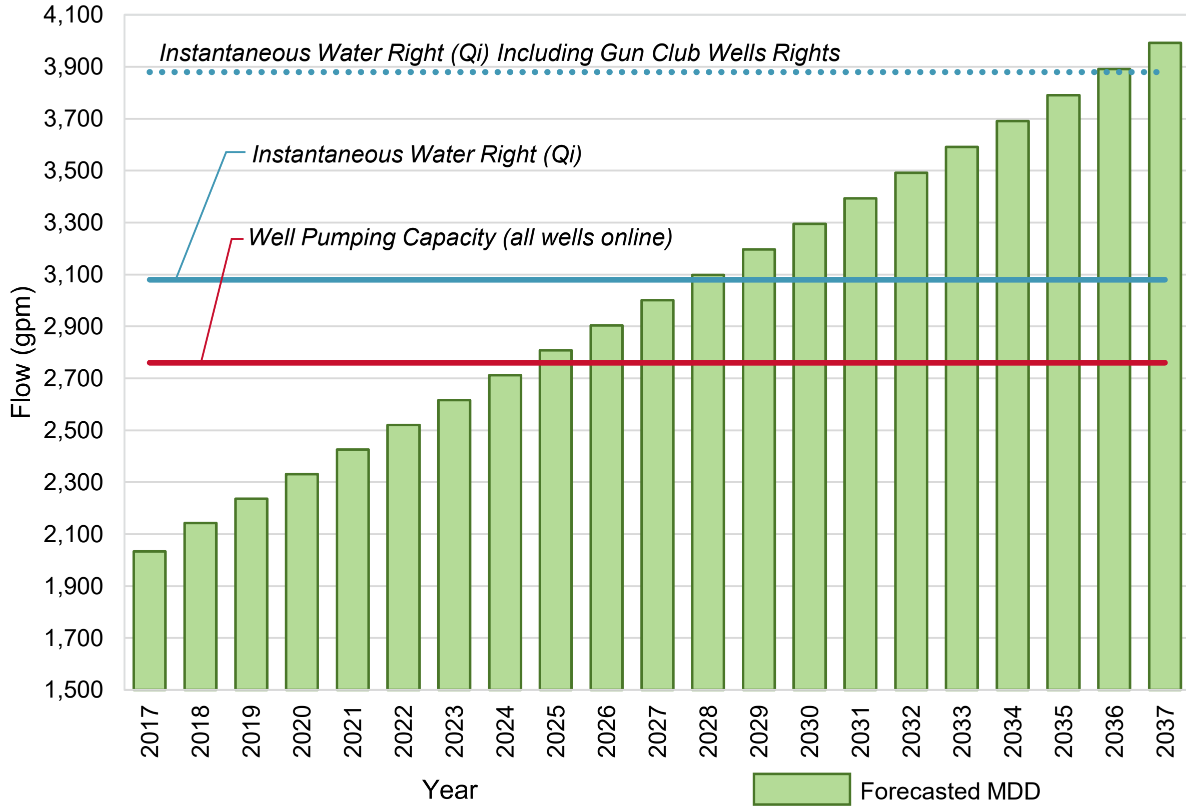
Figure 7-3. Maximum Day Demand of Well Supplied Areas



capable of meeting MDD until 2021. If well pumping capacity is expanded to take advantage of the complete instantaneous water right of the Risdon and Gilman Wells, the wells would be capable of meeting MDD until 2024.

The supply evaluation was also completed without the demand of the Talus Operating Areas (under a scenario in which they become fully supplied with CWA regional water). This is shown in Figure 7-4.

Figure 7-4. Maximum Day Demand of Well Supplied Areas without Talus Operating Area



pumping capacity is capable of meeting MDD until 2025. If well pumping capacity is expanded to take advantage of the complete instantaneous water right of the Risdon and Gilman Wells, the wells would be capable of meeting MDD until 2028. If the water rights of the Gun Club Wells are also utilized, MDD could be met until 2036.

A comparison of demands was also made to the annual volume of water rights (Qa) which is shown in Figure 7-5 and Figure 7-6. The figures show that the annual volume of water rights would be exceeded in 2030. When looking at the forecasted annual demand excluding Talus, the annual volume of water rights would be exceeded in 2034.

Figure 7-5. Annual Demand of Well Supplied Areas

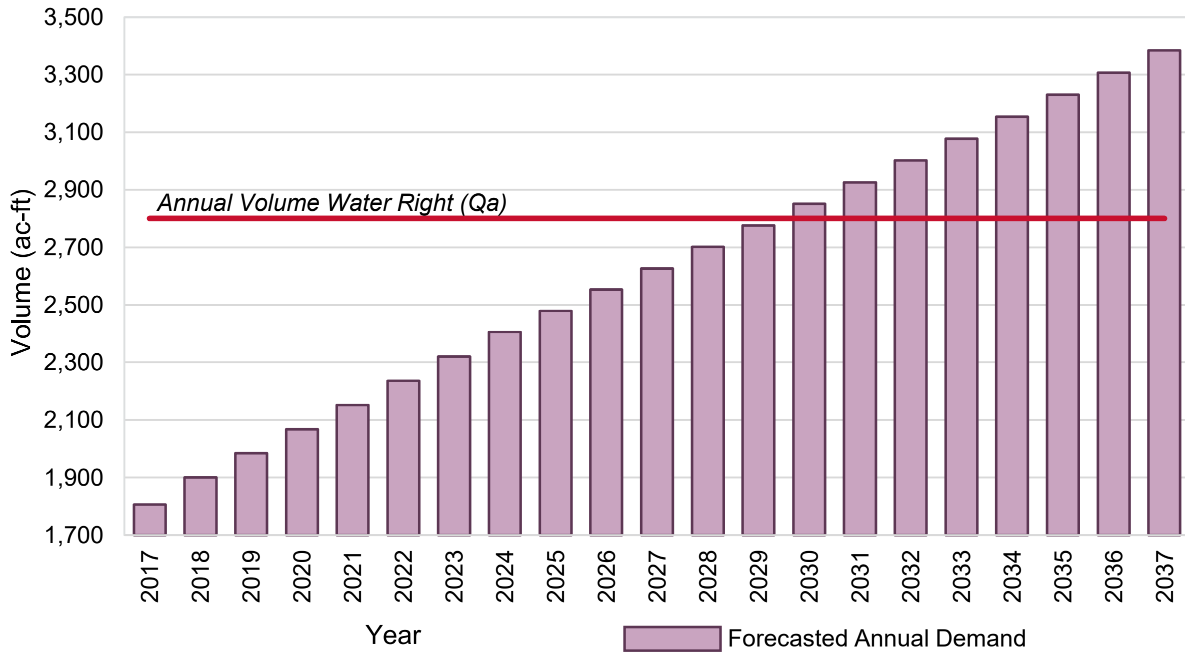
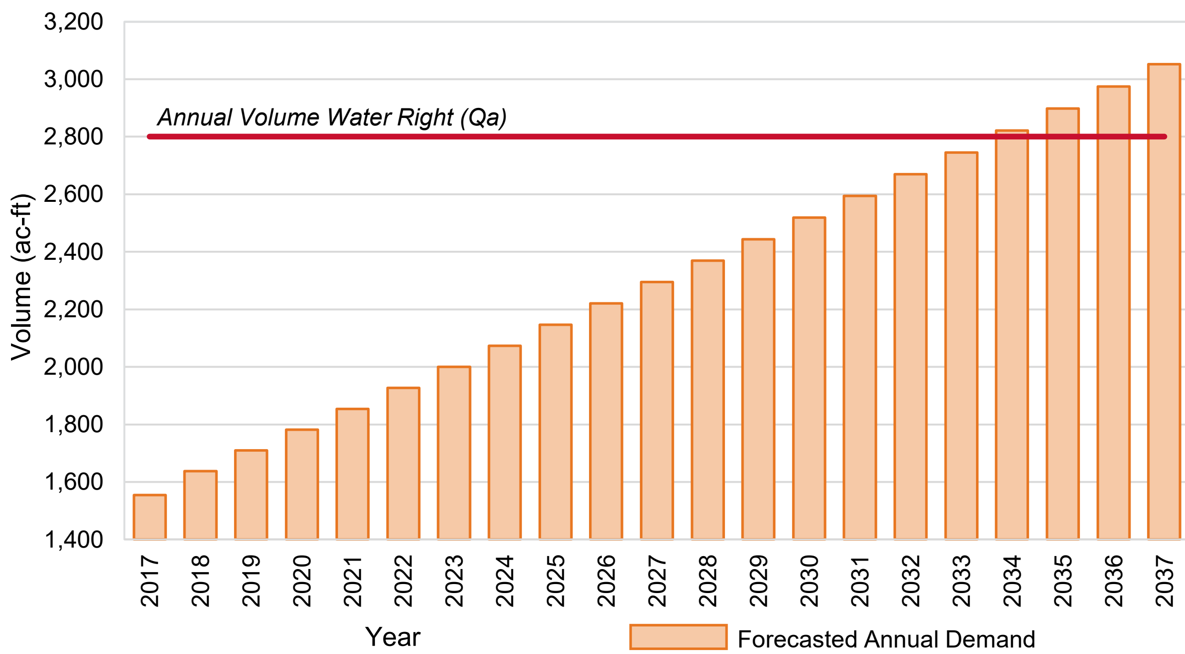


Figure 7-6. Annual Demand of Well Supplied Areas without Talus Operating Area



Summary of Supply Evaluation for Areas Supplied by Wells

The analyses shown in Figure 7-3, Figure 7-4, Figure 7-5, and Figure 7-6 show that well supply capacity is limited first by pumping capacity, followed by instantaneous water rights, and finally by annual water rights. The figures also show that the wells would be capable of continuing to supply the current set of operating areas served until 2021. At that time, improvements would need to be made to increase pumping capacity to optimize the use of the available instantaneous water rights or the Talus Operating Areas would need to switch to being supplied solely with CWA regional water. If changing the Talus Operating Areas to regional water, the existing wells would be capable of supplying the remaining operating areas until 2025.

Table 7-6 provides a summary of the amount of CWA regional supply necessary to supplement well supply to areas currently served by the wells.

Table 7-6. Required CWA Regional Supply for Areas Currently Served by Wells

	CWA Regional Water Necessary [a]	
	To Meet Maximum Day Demand Limited by Current Pumping Capacity (gpm)	To Meet Annual Demands Limited by Annual Water Right Volume (ac-ft)
Year CWA Water Necessary	2021	2030
10-year Planning Horizon (2027)	969	0
20-year Planning Horizon (2037)	1,667	584.5

[a] Calculated as the difference between: a) what is available from current pumping capacity or water rights, and b) projected demands for areas currently supplied by wells.

7.4.4 CWA Supply Analysis

Table 7-7 provides an analysis of the water supply needs using CWA regional water and variations in those demands across the planning horizon.

Table 7-7. CWA Supply Analysis

Water Supply Area	Demands Based on Current Trends			
	2017 [e]	2023	2027	2037
Maximum Day Demand (gpm)				
Bellevue Interties [a]	417	468	490	552
Issaquah Highlands BIP Connection [b]	1,044	1,463	1,500	1,606
Talus BIP Connection [c]	0	420	435	435
Total	1,461	2,351	2,425	2,593
Annual Demand (MG)				
Bellevue Interties [a]	104	116	122	137
Issaquah Highlands BIP Connection [b]	260	364	374	400
Talus BIP Connection [c, d]	0	105	108	108
Total	364	585	604	645

Notes (Table 7-7):

[a] Includes the Cougar Mountain (in 2023 and beyond), Montreux, Lakemont, and South Cove Operating Areas.

[b] Includes the Lakeside (in 2023 and beyond), Issaquah Highlands Summit, Issaquah Highlands Central Park, and Grand Ridge Operating areas.

[c] Includes the Talus Foothills and Talus Shangri-La Operating Areas.

[d] Values based on Talus being fully supplied by CWA water year-round once CWA water is needed to meet MDD (Table 7-6).

[e] 2017 is forecasted based on 2015-2016 data. Actual 2017 water supply values may differ from the forecast.

7.5 Operating Area Supply Analysis

This section provides a supply analysis for individual and groups of operating areas by looking at the capacities of the existing booster pump stations (BPSs) to determine if there is sufficient firm capacity to meet current and future MDD. Firm capacity is the capacity of the pump station with the largest pump out of service. It is also a City design policy that two separate BPSs supply water to new operating areas where each BPS is capable of meeting MDD. The analysis also includes a demand associated with replenishing depleted fire suppression storage within 24-hours per City design policy.

Equivalent Residential Units (ERUs)

The tables in the Operating Area Supply Analysis include the projected number of ERUs. This does not correlate to the number of single family residential (SFR) lots within the area being analyzed. The projected ERUs represents the number of SFR units with average consumption that would equal the projected demand for the area.

An important consideration in this analysis is the fact that some pump stations serve several operating areas. For example, water supplied to the Forest Rim Operating Area must pass through the Mountain Park, Mount Hood, Wildwood and Forest Rim BPSs to reach the Forest Rim Operating Area. In these cases, each pump station must supply the combined downstream MDD.

Forest Rim BPS

As shown in Table 7-8, the Forest Rim BPS has adequate capacity for the 20-year planning horizon.

Table 7-8. Forest Rim BPS Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Forest Rim 1178 Zone	117	129	137	161
Projected Demand (gpm)				
Average Day Demand	12.2	13.4	14.3	16.7
Maximum Day Demand	25.7	28.2	30.1	35.3
Flow to Replenish Fire Suppression Storage in 24 hours	83.3	83.3	83.3	83.3
Sources (gpm)				
Pump 1 [a]	300	300	300	300
Pump 2 [a]	300	300	300	300
Total Capacity with Largest Pump Offline	300	300	300	300
Source Surplus/(Deficiency) (gpm)	**191.0**	**188.4**	**186.6**	**181.4**

Wildwood BPS

As shown in Table 7-9, the Wildwood BPS has adequate capacity for the 20-year planning horizon.

Table 7-9. Wildwood BPS Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Forest Rim 1178 Zone	117	129	137	161
Highwood 920, 782, 715, 677 Zones	439	483	514	603
Total ERUs	**556**	**611**	**651**	**763**
Projected Demand (gpm)				
Average Day Demand	58	64	68	80
Maximum Day Demand	122	134	143	168
Flow to Replenish Fire Suppression Storage in 24 hours	83	83	83	83
Sources (gpm)				
Wildwood BPS				
Pump 1	450	450	450	450
Pump 2	450	450	450	450
Total Capacity with Largest Pump Offline	450	450	450	450
Source Surplus/(Deficiency) (gpm)	**245**	**232**	**224**	**199**

Mount Hood BPS

As shown in Table 7-9, the Mount Hood BPS has adequate capacity for the 20-year planning horizon.

Table 7-10. Mount Hood BPS Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Forest Rim 1178 Zone	117	129	137	161
Highwood 920, 782, 715, 677 Zones	439	483	514	603
Wildwood 625, 588 Zones	116	128	136	160
Total ERUs	**672**	**739**	**787**	**923**
Projected Demand (gpm)				
Average Day Demand	70	77	82	96
Maximum Day Demand	148	162	173	203
Flow to Replenish Fire Suppression Storage in 24 hours	83	83	83	83
Sources (gpm)				
Mount Hood BPS				
Pump 1	500	500	500	500
Pump 2	500	500	500	500
Total Capacity with Largest Pump Offline	500	500	500	500
Source Surplus/(Deficiency) (gpm)	**269**	**254**	**244**	**214**

12th Avenue and Mountain Park BPSs

The storage analysis for the Mt. Hood Reservoir (Chapter 9) found that the reservoir does not have the capacity to fully contain the entire fire suppression storage volume. It is assumed that the difference between the firm pumping capacity (capacity with largest pump offline) for the operating area and the maximum day demand is fully utilized for fire flows with the remainder of the fire flow provided by fire suppression storage within the Mt. Hood Reservoir as shown in Table 7-11. Using this assumption, the BPSs have adequate firm capacity to serve the fire flow demand during maximum day demand if the largest pump is offline. However, there is not enough capacity to meet fire flows during maximum day demand if the largest pump station is completely offline.

Table 7-11. 12th Avenue and Mountain Park BPS Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Forest Rim 1178 Zone	117	129	137	161
Highwood 920, 782, 715, 677 Zones	439	483	514	603
Wildwood 625, 588 Zones	116	128	136	160
Mount Hood 480 Zone	1,045	1150	1225	1436
Total ERUs	**1,717**	**1,889**	**2,013**	**2,359**
Projected Demand (gpm)				
Average Day Demand	179	197	210	246
Maximum Day Demand	377	415	442	518
Fire Flow Available for Mt. Hood Zone [a]	3,143	3,105	3,078	3,002
Sources (gpm)				
12th Avenue BPS				
Pump 1	760	760	760	760
Pump 2	760	760	760	760
Mountain Park BPS				
Pump 1	1,000	1,000	1,000	1,000
Pump 2	1,000	1,000	1,000	1,000
Pump 3	1,000	1,000	1,000	1,000
Total Capacity with Largest Pump Offline	3,520	3,520	3,520	3,520
Source Surplus/(Deficiency) (gpm)	**0**	**0**	**0**	**0**
Total Capacity with Largest BPS Offline	1,520	1,520	1,520	1,520
Source Surplus/(Deficiency) (gpm)	**(2,000)**	**(2,000)**	**(2,000)**	**(2,000)**

[a] Storage for Mt. Hood Zone does not have capacity to include entire fire suppression storage volume. It is assumed that the difference between the pumping capacity with the largest pump offline for the operating area and the maximum day demand is used for fire flows (leading to zero surplus/deficiency). The remainder of the fire flow is provided through fire suppression storage in the Mt. Hood Reservoir.

Cascade and Shangri-La BPSs

As shown in Table 7-12, the Cascade and Shangri-La BPSs have adequate capacity for the 20-year planning horizon.

Table 7-12. Cascade and Shangri-La BPS Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Talus Foothills 912, 752 Zones	509	649	672	672
Projected Demand (gpm)				
Average Day Demand	53	68	70	70
Maximum Day Demand	112	143	148	148
Flow to replenish fire suppression storage in 24 hr	125	125	125	125
Sources (gpm)				
Cascade BPS				
Pump 1	195	195	195	195
Pump 2	195	195	195	195
Pump 3	195	195	195	195
Pump 4	195	195	195	195
Shangri-La BPS				
Pump 1	250	250	250	250
Pump 2	250	250	250	250
Total Capacity with Largest Pump Offline	1,030	1,030	1,030	1,030
Source Surplus/(Deficiency) (gpm)	**793**	**762**	**757**	**757**
Total Capacity with Largest BPS Offline	500	500	500	500
Source Surplus/(Deficiency) (gpm)	**263**	**232**	**227**	**227**

Talus I/II BPS

The storage capacity analysis for the Shangri-La Reservoir (Chapter 9) shows that for a static condition the reservoir has adequate storage capacity. However, modeling determined that due to pipe friction losses, fire flow goals were not being met for a multifamily development without pressures dropping below 20 psi. To increase the available head with fire suppression storage depleted, it is assumed that the Talus I/II BPS provide a portion of the required fire flow as shown in Table 7-13. As shown in Table 7-13, the Talus I/II BPS has adequate capacity for the 20-year planning horizon.

Table 7-13. Talus I /II BPS Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Talus Foothills 912, 752 Zones	509	649	672	672
Talus Shangri-La 616 Zone	986	1,260	1,305	1,305
Total ERUs	**1,495**	**1,909**	**1,978**	**1,978**
Projected Demand (gpm)				
Average Day Demand	156	199	206	206
Maximum Day Demand	329	420	435	435
Fire Flow to Talus Shangri-La 616 Zone	1,065	1,065	1,065	1,065
Sources (gpm)				
Talus I/II BPS				
Pump 1	500	500	500	500
Pump 2	500	500	500	500
Pump 3	500	500	500	500
Pump 4	500	500	500	500
Total Capacity with Largest Pump Offline	1,500	1,500	1,500	1,500
Source Surplus/(Deficiency) (gpm)	**106**	**15**	**0**	**0**

Terra II BPS

As shown in Table 7-14, the Terra II BPS has adequate capacity for the 20-year planning horizon.

Table 7-14. Terra II BPS Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Cougar Ridge 431 Zone	75	81	86	99
Projected Demand (gpm)				
Average Day Demand	7.8	8.5	9.0	10.3
Maximum Day Demand	16.5	17.9	18.9	21.8
Flow to Replenish Fire Suppression Storage in 24 hours	125.0	125.0	125.0	125.0
Sources (gpm)				
Terra II BPS				
Pump 1	525	525	525	525
Pump 2	525	525	525	525
Total Capacity with Largest Pump Offline	525	525	525	525
Source Surplus/(Deficiency) (gpm)	**383**	**382**	**381**	**378**

Grand Ridge BPS

As shown in Table 7-15, the Grand Ridge BPS has adequate capacity for the 20-year planning horizon.

Table 7-15. Grand Ridge BPS Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Grand Ridge 1337 Zone	26	46	60	60
Projected Demand (gpm)				
Average Day Demand	2.7	4.8	6.3	6.3
Maximum Day Demand	5.7	10.2	13.2	13.2
Flow to Replenish Fire Suppression Storage in 24 hours	83.3	83.3	83.3	83.3
Sources (gpm)				
Grand Ridge BPS				
Pump 1	293	293	293	293
Pump 2	293	293	293	293
Total Capacity with Largest Pump Offline	293	293	293	293
Source Surplus/(Deficiency) (gpm)	**204**	**199**	**196**	**196**

Central Park BPS

As shown in Table 7-16, the Central Park BPS has adequate capacity for the 20-year planning horizon.

Table 7-16. Central Park BPS Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Grand Ridge 1337 Zone	26	46	60	60
Issaquah Highlands Summit 1234, 1000, 615 Zones	1,932	1,932	1,932	1,932
Total ERUs	**1,958**	**1,979**	**1,992**	**1,992**
Projected Demand (gpm)				
Average Day Demand	204	206	208	208
Maximum Day Demand	430	435	438	438
Flow to Replenish Fire Suppression Storage in 24 hours	583	583	583	583
Sources (gpm)				
Central Park BPS				
Pump 1	1,528	1,528	1,528	1,528
Pump 2	1,528	1,528	1,528	1,528
Total Capacity with Largest Pump Offline	1,528	1,528	1,528	1,528
Source Surplus/(Deficiency) (gpm)	**514**	**510**	**507**	**507**

Holly I & II BPSs

As shown in Table 7-17, the Holly I and II BPBs have adequate capacity for the 20-year planning horizon except for the case of the largest pump station being offline in the present.

Table 7-17. Holly I & II BPSs Capacity Analysis

	Year			
	2017	2023	2027	2037
Projected Equivalent Residential Units (ERUs)				
Grand Ridge 1337 Zone	26	46	60	60
Issaquah Highlands Summit 1234, 1000, 615 Zones	1,932	1,932	1,932	1,932
Central Park 742 and Lakeside Zones	2,790	4,676	4,834	7,306
Total ERUs	**4,748**	**6,655**	**6,827**	**7,306**
Projected Demand (gpm)				
Average Day Demand	495	693	711	761
Maximum Day Demand	1,044	1,463	1,500	1,606
Flow to Replenish Fire Suppression Storage in 24 hours	583	583	583	583
Sources (gpm)				
Holly I BPS				
Pump 1	500	500	500	500
Pump 2	500	500	500	500
Holly II BPS				
Pump 1	1,300	1,300	1,300	1,300
Pump 2	1,300	1,300	1,300	1,300
Pump 3	1,300	1,300	1,300	1,300
Proposed SPAR Pump Station				
Pump 1		1,000	1,000	1,000
Pump 2		1,000	1,000	1,000
Pump 3		1,000	1,000	1,000
Total Capacity with Largest Pump Offline	3,600	6,600	6,600	6,600
Source Surplus/(Deficiency) (gpm)	**1,973**	**4,554**	**4,516**	**4,411**
Total Capacity with Largest BPS Offline	1,000	4,000	4,000	4,000
Source Surplus/(Deficiency) (gpm)	**(627)**	**1,954**	**1,916**	**1,811**

7.6 Water Supply Reliability Analysis

Analysis of the water supply reliability evaluates the sources and water rights for adequacy in consistent, uninterrupted delivery throughout the distribution system. Water supply shortages or interruptions in service can cause many problems when zero or negative main pressure occurs. Examples of such problems include backflow of contaminated water from industrial, commercial, retail, or domestic service connections into the City's water mains or leaching of surrounding groundwater into the water mains through existing main leaks or cracks. While the City actively surveys its distribution system, the potential for main leaks will always exist. Another key issue with a nonconsistent water supply is deficient service to customers caused by interrupted delivery.

The City's primary sources are the four city-owned groundwater wells. The other sources are CWA water delivered through Bellevue and the Bellevue-Issaquah Pipeline.

In the case of an emergency in which the city wells become inoperable, the City would rely on CWA water and also water supplied through the two emergency interties with SPW to serve the City. If CWA water became unavailable the City could supply its entire retail service area with groundwater from the City wells and additional water from the SPW emergency interties, if necessary, with the exception of Montreaux, Lakemont, and South Cove Operating Areas.

To be prepared for a catastrophic supply disruption event in which both CWA water and City wells are impacted, the City has a Water Shortage Contingency Plan (2001) that serves as a guide to making management decisions related to a shortage of supply due to drought as well as abrupt emergencies. The plan covers a phased approach beginning will voluntary curtailment followed by increasing levels of mandatory curtailment.

Within the distribution grid, the City has built redundancy into each pressure zone by interconnecting zones with normally-closed pressure reducing valves and providing redundant reservoirs and booster stations where possible. Currently, the South Cove Operating Area does not have a secondary source of supply, relying solely on water from Bellevue. A capital improvement project is planned to add a secondary source of supply from the Bellevue-Issaquah Pipeline (BIP) supplying CWA water to the operating area as a safety measure. When feasible, the City has made a priority to connect dead-end water mains within the water system by looping to provide a more reliable distribution system.. The City also has a fleet of mobile emergency power generators, capable of providing temporary power to any booster or well station as demand necessitates.

7.7 Groundwater Hydraulic Continuity and Water Rights

Hydraulic continuity refers to the natural interrelationship between surface waters and groundwater. The issue of hydraulic continuity has come to the forefront with respect to water supply planning for communities with groundwater sources. The central issue is that these water resources are viewed by Ecology as an integrated hydro-geologic system.

The Water Resources Act of 1971 charges Ecology to consider the "natural interrelationships of surface and groundwater" in administering water rights and making water allocation decisions (RCW 90.54.020 (8)). In addition, the 1945 groundwater code states that the right to use groundwater which adversely affects the flow of any spring, water course, lake, or other body of surface water must be considered junior to any water rights already in existence for the use of the surface water (RCW 90.44.030).

Under current laws, Ecology considers that an application for a groundwater withdrawal, shown to be in hydraulic continuity with surface water, must be treated the same as if the request was for surface water. Therefore, whenever a surface water source has limitations on it, such as instream flow requirements, permits for appropriation of groundwater are required to have limitations to protect the surface water source. Closure of a stream or a surface water source requires that applications for the appropriation of groundwater in hydraulic continuity with the surface waters be denied unless the effect on the surface water can be fully mitigated.

Because of Ecology's mandate to manage surface and groundwater as an integrated unit, the City would face significant challenges in terms of securing new permits for additional appropriation of groundwater within this aquifer. Ecology's policy is to place the burden on groundwater permit applicants to provide the technical information necessary to demonstrate the absence of hydraulic continuity in cases where adequate information is lacking.

This is demonstrated in the denial of the applications for change in point of withdrawal for the Gun Club wells discussed in Section 7.1.2. However in this denial, Ecology has also left it open in the Report of Examination for these change applications that the City could consider drilling replacement wells for the Gun Club wells. Replacement wells drilled within the same legal description as the original wells do not require a change application.

Any proposed change in location of the Gun Club wells where the proposed well would not be within the same legal description as the original well locations as it was advertised in the newspaper would require a change application and would be subject to the same rigorous review described above that Ecology followed in their denial of the change applications for the Gun Club wells.

Given these groundwater development constraints, the City is not looking to the Lower Issaquah Valley aquifer to provide future additions to its source water. Alternatively, the City plans to purchase water from CWA to meet future demands.

Chapter 8. Water Quality

8.1 Introduction

The City of Issaquah is defined as a Group A – Community Water System and must comply with the drinking water standards of the federal SDWA and its amendments, as regulated by the United States Environmental Protection Agency (EPA). The DOH adopted the updated federal standards under WAC 246-290, of which the most recent version became effective November 1, 2010.

Delivering the best quality drinking water is the City's primary concern. The City's water is supplied by groundwater wells and regional water interties, as described in Chapter 7, that are tested for the presence of contaminants at the frequencies prescribed by DOH regulations. The City's water quality results show compliance with DOH water quality requirements. The City is also in compliance with all DOH reporting requirements, including publication and distribution of an annual Consumer Confidence Report (CCR) that keeps consumers informed as to the quality of the City's water supply and water delivery systems.

This chapter includes the following components:

- Descriptions of current water quality regulations and the City's monitoring requirements.
- Summary of proposed and anticipated regulations applicable to the City.
- Summary of the City's existing water quality and compliance with EPA and DOH regulations.
- Summary of water quality monitoring plans used by the City.
- Recommendations for treatment practices or changes to existing monitoring plans based on existing or proposed regulations.
- Evaluation of long-term options for addressing emerging contaminants, including polyfluoroalkyl substances (PFAS), and other water quality issues.

This chapter utilizes information from the *Department of Health Water Quality Monitoring Schedule for the Year 2017* (Appendix H), the City's *Water Facilities Inventory (WFI) Form* (Appendix I), and the City's annual *Water Quality Reports* from 2012 to 2016 (Appendix J).

8.2 Regulatory Requirements

The SDWA of 1974, amended in 1986 and 1996, established specific roles for the federal government, state government, and water system purveyors, with respect to water quality monitoring. The EPA is authorized to develop national drinking water regulations and oversee the implementation of the SDWA. State governments are expected to adopt the federal regulations and accept primary responsibility or "primacy" for administration and enforcement of the Act. States can also regulate contaminants and set advisory levels. Public water system purveyors are assigned the day-to-day responsibility of meeting regulations by incorporating monitoring, record keeping, and sampling procedures into their operation and maintenance programs.

The SDWA regulations are summarized in Table 8-1 and are divided into those that address source water quality, distribution system water quality, surface water treatment, and reporting requirements. The City currently receives treated surface water from Cascade Water Alliance (CWA) as a constant source of supply for the Issaquah Highlands development. Although, the City can also send blended groundwater to the Issaquah Highlands development. As CWA is responsible for meeting all surface water treatment requirements for this source, surface water treatment rules are only summarized briefly herein. All other rules are summarized and monitoring requirements under each rule are noted below. This section ends with a summary of anticipated future regulatory requirements.

Table 8-1. Drinking Water Regulations

Rule	CFR	WAC 246-290	Affected Contaminants	Publication Date of Final Rule
		Source Water Quality		
National Primary and Secondary Drinking Water Standards	See below	Part 4, 300, 310, and 320	Bacteriological, IOC, VOC, SOC, Asbestos, Radionuclides, TTHMs, Lead/Copper, Phase 1, Phase II/V	Phases 1 through V promulgated 1987 through 1992
Radionuclides Rule	40 CFR 141.15 141.25 141.26	Part 4 , 300 (8), 310(6), and 320	Radionuclides	Published December 7, 2000
Arsenic Rule	40 CFR 141.23 141.24 141.16	Part 4, 300(4) and 310(3)	Arsenic	Promulgated February 2002, compliance required by January 23, 2006
Unregulated Contaminants Monitoring Rule 4		N/A	Various contaminants considered for future regulations	Promulgated December 20,2016
Groundwater Rule		Part 4, 300(3) and 320(2)	Fecal indicators in groundwater	Promulgated January 8, 2007
		Distribution System Water Quality		
Total Coliform Rule/ Revised Total Coliform Rule		Part 4, 300, 310(2), and 320(2)	Total Coliform Bacteria	TCR promulgated 1989, RTCR February 2013 with minor corrections April 2014.
Lead and Copper Rule	40 CFR 141.86 141.87 141.88	Part 4, 300(4), 310(3), and 320(4)	Lead and Copper	Promulgated January 12, 2000 Compliance by January 2003
Stage 1 Disinfectants/Disinfection Byproduct Rule	40 CFR Parts 9, 141, 142 63 FR 69390	Part 4, 300, 310, and 320	Trihalomethanes, haloacetic acids, chlorite, bromate, and disinfectant residuals	Promulgated February 16, 1999, Compliance by December 1, 2003
Stage 2 Disinfectants/ Disinfection Byproduct Rule	40 CFR Part 141, Subpart V 71 FR 388	Part 4, 300,310, and 320	Trihalomethanes and haloacetic acids	Promulgated January 4, 2006, Effective March 6, 2006

Table 8-1. Drinking Water Regulations

Rule	CFR	WAC 246-290	Affected Contaminants	Publication Date of Final Rule
Surface Water Treatment Rules				
Information Collection Rule	40 CFR, Part 141, Subpart M		Large Surface Water Systems: Bacteriological, DBP, IOCs	Promulgated June 18, 1996
Surface Water Treatment Rule	40 CFR 141		Large Surface Water Systems, Bacteriological, Viruses, *Giardia lamblia*	Promulgated June 1989
Interim Enhanced Surface Water Treatment Rule	63 FR 69478		Large Surface Water Systems: Bacteriological, incorporate *Cryptosporidium* into watershed plans	Promulgated November 1998
Long Term 1 Enhanced Surface Water Treatment Rule	40 CFR Parts 9, 141, 142	Part 4, 300	Bacteriological, Cryptosporidium	Promulgated February 13, 2002, compliance by March 15, 2005
Long Term 2 Enhanced Surface Water Treatment Rule	40 CFR Parts 9, 141, 142	Part 4, 300	Bacteriological	Promulgated in 2006
Reporting Requirements				
Consumer Confidence Report Rule	40 CFR 141 Part O	Part 7, Subpart B	Reporting Only	Published August 19, 1998
Public Notification Rule	40 CFR 141 Part Q	Part 4, 320	Reporting Only	Promulgated 2000

8.2.1 Source Water Quality

Regulations applicable to the City's water system that address source water quality are described herein.

National Primary and Secondary Drinking Water Standards

National Primary Drinking Water Standards are currently set for 87 contaminants. Maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs) have been established for 77 contaminants, while the remaining ten have treatment technique requirements. A constituent's MCL is generally based on its public health goal (PHG), which is the level of a contaminant in drinking water below which there is no known or expected health risk. Regulated constituents include microbial contaminants, inorganic chemicals (IOCs), volatile organic chemicals (VOCs), synthetic organic chemicals (SOCs), radionuclides, and disinfection by-products (DBPs). Regulations affecting DBPs are discussed below in the distribution system water quality section.

The EPA regulates most of the chemical contaminants through the rules known as Phase I, II, IIb, and V. The EPA issued the four rules regulating 69 contaminants over a five-year period as it gathered, updated, and analyzed information on each contaminant's presence in drinking water supplies and its health effects. The Phase I Rule was promulgated July 8, 1987 and included eight VOCs. The Phase II and IIb Rules (published January 30 and July 1, 1991) updated or created new limits for 38 contaminants. The Phase V Rule (published July 17, 1992), set standards for 23 additional contaminants. These rules form the basis of the Washington Department of Health regulations, WAC 246-290. Since the Phase V Rule, MCLs for additional contaminants have been established through new regulations, such as the Arsenic Rule, and must be adopted by the DOH.

The EPA has also established secondary standards for 15 contaminants to address the aesthetic quality of drinking water; these secondary standards have also been adopted within the WAC. Because the federal standards primarily address taste and odor, rather than health issues, they are often used only as a guideline. For new community water systems, the DOH requires treatment for secondary MCL (SMCL) exceedances under WAC 246-290-320 (3)(d). For existing public water systems, the WAC stipulates that the required follow-up action be determined by the DOH based on the degree of consumer acceptance of the water quality and their willingness to bear the cost of meeting the secondary standard.

Current primary and secondary MCLs for inorganic and organic constituents, respectively, are documented in the following subsections.

Inorganic Chemicals

Regulated inorganic chemicals include elemental metals such as mercury, arsenic, and iron. Some non-metallic constituents such as chloride, fluoride, and sulfate are also included in this category. Physical properties of IOCs that affect water quality in this category include turbidity, specific conductivity, total dissolved solids, and color. WAC 246-290 specifies primary and secondary MCLs for IOCs, which are summarized in Table 8-2 and Table 8-3, respectively. Asbestos samples are collected from the distribution system since the source of asbestos is asbestos cement pipe. As such, this requirement is discussed in Distribution System Water Quality 8.2.2.

Table 8-2. Primary MCLs for Inorganic Chemicals

Contaminant	Primary MCL(mg/L) [a]
Antimony	0.006
Arsenic	0.01
Asbestos	7 million fibers/liter (length >10 microns)
Barium	2
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Copper	1.3 [b]
Cyanide	0.2
Fluoride	4
Lead	0.015 [b]
Mercury	0.002
Nitrate	10
Nitrite	1

Table 8-2. Primary MCLs for Inorganic Chemicals

Contaminant	Primary MCL(mg/L) [a]
Selenium	0.05
Sodium	20 [c]
Thallium	0.002

[a] Source: State Department of Health Drinking Water Regulations (246-290), effective July 2008

[b] Lead and copper have established action levels, rather than MCLs. These are discussed further in the Lead and Copper Rule, under the Distribution System Water Quality section.

[c] EPA has established a recommended level of 20 mg/L for individuals that have restrictions on daily sodium intake. This is not an enforceable standard

Table 8-3. Secondary MCLs for Inorganic Chemicals

Contaminant	Secondary MCL(mg/L) [a]
Aluminum	0.05 to .2
Chloride	250
Color	15 Color Units
Copper	1
Corrosivity	Non-Corrosive
Fluoride	2
Foaming Agents	0.5
Iron	0.3
Manganese	0.05
Odor	3 TON (threshold odor number)
pH	6.5 - 8.5
Silver	0.1
Sulfate	250
Total Dissolved Solids (TDS)	500
Zinc	5

[a] Source: State Department of Health and Drinking Water Regulations (246-290), effective July 2008

MONITORING REQUIREMENTS

Monitoring requirements are described in the City's Water Quality Monitoring Schedule for the Year 2017, as presented in Appendix H. The City's groundwater sources must be sampled for IOCs once every nine years. Nitrate samples are required for all sources annually. Since nitrates are included in

IOC sampling, additional samples are not required in years when a complete IOC sample is taken from the source. The City does not have any current monitoring waivers for IOCs.

Volatile Organic and Synthetic Organic Chemicals

Volatile organic chemicals (VOCs) are manufactured, carbon-based chemicals that vaporize quickly at normal temperatures and pressures. VOCs include many hydrocarbons associated with fuels, paint thinners, and solvents. This group does not include organic pesticides, which are regulated separately as synthetic organic chemicals (SOCs). VOCs are divided into the two following groups:

- Regulated VOCs that have been determined to pose a significant risk to human health.
- Unregulated VOCs for which the level of risk to human health has not been established.

There are currently 21 regulated volatile organic chemicals (VOCs) and 33 regulated synthetic organic chemicals (SOCs). A list of these compounds and their MCLs is included in Table 8-4.

Table 8-4. Regulated Volatile and Synthetic Organic Chemicals

Organic Chemical	Federal Regulation	Primary MCL (mg/L)[a]	Organic Chemical	Federal Regulation	Primary MCL (mg/L)[a]
Volatile Organic Chemicals (VOCs)					
Vinyl chloride	Phase I	0.002	Monochlorobenzene	Phase II	0.1
Benzene	Phase I	0.005	Ortho-Dichlorobenzene	Phase II	0.6
Carbon Tetrachloride	Phase I	0.005	Styrene	Phase II	0.1
1,2-Dichloroethane	Phase I	0.005	Tetrachloroethylene	Phase II	0.005
Trichloroethylene	Phase I	0.005	Toluene	Phase II	1
Para-Dichlorobenzene	Phase I	0.075	Trans-1,2-Dichloroethylene	Phase II	0.1
1,1-dichloroethylene	Phase I	0.007	Xylenes (total)	Phase II	10
1,1,1-Trichloroethane	Phase I	0.2	Dichloromethane	Phase V	0.005
Cis-1,2-Dichloroethylene	Phase II	0.07	1,2,4-Trichloro-benzene	Phase V	0.07
1,2-Dichloropropane	Phase II	0.005	1,1,2-Thrichloro-ethane	Phase V	0.005
Ethylbenzene	Phase II	0.7	Chlorobenzene		0.07
Synthetic Organic Chemicals (SOC)					
Arochlor	Phase II	0.002	Benzo(a)pyrene	Phase V	0.0002
Atrazine	Phase II	0.003	Dalapon	Phase V	0.2
Carbofuran	Phase II	0.04	Di(2-ethylhexyl) adipate	Phase V	0.4
Chlordane	Phase II	0.002	Di(2-ethylhexyl) phthalate	Phase V	0.006

Table 8-4. Regulated Volatile and Synthetic Organic Chemicals

Organic Chemical	Federal Regulation	Primary MCL (mg/L)[a]	Organic Chemical	Federal Regulation	Primary MCL (mg/L)[a]
Dibromochloro-propane	Phase II	0.0002	Dinoseb	Phase V	0.007
2,4-D	Phase II	0.07	Diquat	Phase V	0.02
Ethylene dibromide	Phase II	0.00005	Endothall	Phase V	0.1
Heptachlor	Phase II	0.0004	Endrin	Phase V	0.002
Heptachlor epoxide	Phase II	0.0002	Glyphosate	Phase V	0.7
Lindane	Phase II	0.0002	Hexachlorobenzene	Phase V	0.001
Methoxychlor	Phase II	0.04	Hexachloro Cyclopentadiene	Phase V	0.05
Polychlorinated biphenyls (PCBs)	Phase II	0.0005	Oxamyl (vydate)	Phase V	0.2
			Picloram	Phase V	0.5
Pentachlorophenol	Phase II	0.001	Simazine	Phase V	0.004
Toxaphene	Phase II	0.003	2,3,7,8-TCDD (dioxin)	Phase V	3x10-8
2,4,5-TP	Phase II	0.05	Oxamyl (vydate)	Phase V	0.2

[a] Source: State Department of Health Drinking Water Regulations (246-290), effective July 2008

MONITORING REQUIREMENTS

Monitoring requirements are described in the City's Water Quality Monitoring Schedule for the Year 2017, as presented in Appendix H. Per DOH requirements, VOCs and SOCs must be sampled once every three years, unless a waiver is in place. The state grants a waiver if a chemical is not in use or previous monitoring indicates contamination would not occur. The City must apply for waivers through DOH. There are two types of waivers, risk-based or area-wide. The risk-based waiver requires a susceptibility analysis and DOH charges a fee for these waivers (purchased waivers). Area-wide waivers are issued if a chemical is not used within a region, thus DOH does not charge for these waivers. While the state issues both types of waivers, an area-wide waiver is referred to as a “State waiver.”

A waiver is in place until December 2019, during which time there are no requirements for monitoring. However, once a waiver expires, the monitoring frequency for VOCs and SOCs is one sample every three years. State waivers have been issued for Dioxin, Endothall, Diquat, Glyphosate and Insecticides.

The City has been granted waivers for all four of their active wells for Herbicides through December 2022 as well as for Insecticides through December 2019.

Radionuclides

In December 2000, the EPA announced updated standards for radionuclides. This rule became effective December 2003. All community water systems are required to meet the MCLs listed in

Table 8-5, and requirements for monitoring and reporting. The radionuclides requirements described in 40 CFR 141.26 have been adopted by DOH in WAC 249-290.

All systems were required to complete initial monitoring and phase-in the monitoring requirements between December 8, 2003 and December 30, 2007. Initially, utilities were required to undergo four consecutive quarters of monitoring for gross alpha, combined radium-226/-228, and uranium. Only systems that were considered “vulnerable” were required to monitor for gross beta (quarterly samples), tritium, and strontium-90 (annual samples). The initial monitoring was used to determine if the system would have to perform reduced or increased monitoring.

Table 8-5. Primary MCLs for Radionuclides

Contaminant	Primary MCL[a]
Alpha Particles	15 pCi/L
Beta Particles and Photon Emitters	4 millirem/year [b]
Radium 226 and 228	5 pCi/L[b]
Uranium	30 µg/L[b]

[a] Environmental Protection Agency, 40 CFR 141.66.

[b] According to EPA 40 CFR 141.66, “average annual concentration of beta particle and photon radioactivity from man- made radionuclides in drinking water must not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year.” The MCLs for Tritium and Strontium-90 are assumed to produce body organ doses equivalent to 4 millirem/year.

MONITORING REQUIREMENTS

Monitoring requirements are described in the City’s Water Quality Monitoring Schedule for the Year 2017, as presented in Appendix H. Radium 228 and gross alpha sampling was conducted by the City in 2015 for all four wells as part of standard DOH compliance. All results were non-detect except for Risdon Well No. 2. The next radionuclide sampling for all four wells is scheduled for 2020.

Arsenic Rule

In January 2001, the EPA promulgated a new standard that requires public water systems to reduce arsenic levels in drinking water. The final rule became effective in 2006 and applies to all community water systems and non-transient, non-community water systems, regardless of size. The rule not only establishes an MCL for arsenic (0.010 mg/L), based on a running annual average (RAA) of quarterly results and an MCGL for arsenic (zero), but also lists feasible and affordable technologies for small systems that can be used to comply with the MCL. However, systems are not required to use the listed technologies in order to meet the MCL. The arsenic rule has been adopted by the DOH as a revision to the arsenic MCL under WAC 249-290-310.

MONITORING REQUIREMENTS

The City is required to do one complete IOC sample between 2011 and 2019 for each well, which will include arsenic sampling, as listed in the Water Quality Monitoring Schedule for the Year 2017 (Appendix H). The most recent IOC sampling occurred in 2016.

Groundwater Rule

The EPA enacted the final Groundwater Rule (GWR) January 8, 2007, for the purpose of providing increased protection against microbial pathogens in public water systems that use untreated groundwater. The GWR applies to public water systems that serve groundwater as well as to any system that mixes surface and groundwater, if the groundwater is added directly to the distribution system and is provided to customers without providing disinfection contact time

To implement the GWR, the EPA has taken a risk-based approach to protect drinking water from groundwater sources that have been identified as being at the greatest risk of fecal contamination. This strategy includes four primary components:

1. **Sanitary Surveys.** Sanitary surveys must be conducted every three years and meet the provisions of the 1998 Interim Enhanced Surface Water Treatment Rule as it relates to populations served. In addition, the sanitary survey shall implement the eight elements of the EPA/State Joint Guidance on Sanitary Surveys. These elements relate to source protection; identification of the physical components and their condition; and description and implementation of programs for treatment, distribution, storage, pumping, monitoring, operation and maintenance; and operator certification.
2. **Source Water Monitoring.** Source water monitoring is triggered when a system does not sufficiently disinfect drinking water to achieve 4-log (99.99 percent) virus removal and identifies a positive routine sample during its Total Coliform Rule monitoring and hydrogeologic sensitivity assessment monitoring (at state discretion) targeted at high- risk systems. Once a total coliform-positive sample is found within a distribution system, the system is required to collect one source water sample per source and monitor for a fecal indictor. Washington State may choose to issue a waiver if the groundwater source has a hydrogeologic barrier.
3. **Corrective Action.** Corrective action is required for any system with a significant deficiency or evidence of source water fecal contamination. Corrective actions must be taken by “groundwater systems that have a significant deficiency or have detected a fecal indicator in their source water.” EPA guidelines recommend that corrective actions take place within 90 days, or longer if approved by the state. The problem should be solved by eliminating the contaminate source, correcting the significant deficiencies, or providing an alternate source of water supply.
4. **Compliance Monitoring.** Compliance monitoring ensures that treatment technology installed to treat drinking water reliably achieves 4-log virus inactivation. Compliance monitoring applies to all groundwater systems that disinfect as a corrective action. Systems serving greater than 3,300 individuals must continuously monitor their disinfection treatment process. If disinfection concentrations are below the required level, the system must restore disinfection concentration within four hours.

The compliance date for triggered source water monitoring and the associated corrective actions, as well as compliance monitoring, was December 1, 2009. Because assessment monitoring is at the discretion of the state, there is no timeframe associated with assessment monitoring. Initial sanitary surveys were required to be completed by December 31, 2012. However, for community water systems that have been identified by the state as outstanding performers (generally those that have treatment that provides 4 log virus inactivation or removal at all sources), the initial sanitary survey was required to be completed by December 31, 2014.

Many of the requirements of the GWR are determined by the individual state agencies. The requirements of the GWR were adopted by DOH into WAC 246-290 in November 2010. In addition, the DOH has provided a Fact Sheet for Group A utilities with recommended actions to prepare for the GWR. These actions include the following:

- Correct deficiencies from the last sanitary survey.
- Install a sample tap at each wellhead.
- Know specifically where each well's water goes. Triggered source water monitoring will require monitoring of all sources, unless it can be shown that the area of concern in the distribution system is only served by a limited number of sources.
- Update your emergency response plan, to be ready to provide alternate water, if needed.

If you currently treat groundwater from a well, contact your regional office engineer to confirm whether you currently achieve 4-log virus inactivation. Systems that treat to this level will not be required to conduct triggered source water monitoring, but will instead be required to meet treatment technique monitoring requirements.

MONITORING REQUIREMENTS

The City began chlorinating its groundwater sources in November of 2005. Because the City's wells are not under the influence of surface water, treatment design was approved to maintain detectable free chlorine residual in the system and 4-log inactivation was not required by DOH. However, the City is required to continuously monitor disinfectant residual concentration to maintain a residual of 0.2 mg/L in the distribution piping. The City is subject to triggered source water monitoring if a coliform-positive sample is detected.

Unregulated Contaminant Monitoring Rule

The 1986 amendments to the Safe Drinking Water Act require public water systems to monitor for unregulated contaminants every five years and submit these data to the states. The intent of this program is to gather scientific information on unregulated contaminants to determine if regulations are required to protect human health. Both the 1993 and 1996 amendments to the act added new lists of contaminants, which led EPA to develop a revised program for monitoring. The new program became known as the Unregulated Contaminant Monitoring Regulations (UCMR 1999). The new UCMR program began in 2001, and produces a new list of unregulated contaminants for monitoring every five years. UCMR3 was finalized in December, 2016.

Under the UCMR program, EPA asks large systems to take two sets of samples for unregulated contaminants at six-month intervals. There is one tiers of contaminants in UCMR4; List 1 - Assessment Monitoring. All systems serving more than 10,000 persons will be required to monitor for 10 List 1 cyanotoxins during a 4-consecutive month period from March 1, 2018 and November 31, 2020. All system serving more than 10,000 persons will also be required to monitor for 20 List 1 additional contaminants during a 12-month period between January 1, 2018 and December 31, 2020. The 20 List 1 additional contaminant consist of metals, pesticides, HAA, alcohols, semivolatile chemicals, and indicators.

MONITORING REQUIREMENTS

The City was required to conduct monitoring under the UCMR3. It is uncertain at this time if the City will be selected for monitoring under UCMR4.

8.2.2 Distribution System Water Quality

Regulations that address distribution system water quality are described herein.

Revised Total Coliform Rule

Coliform bacteria describe a broad category of organisms routinely monitored in potable water supplies. Though not all coliform bacteria are pathogenic in nature, they are relatively easy to identify in laboratory analysis. If coliform bacteria are detected, then pathogenic organisms may also be present. Bacterial contamination in a water supply can cause a number of waterborne diseases, therefore these tests are strictly monitored and regulated by DOH.

The EPA published the Revised Total Coliform Rule (RTCR) in February 2013 with minor corrections in February 2014. The RTCR is the revision to the 1989 Total Coliform Rule (TCR) and is intended to improve public health protection. Provisions of the RTCR include:

- Setting a maximum contaminant level goal (MCLG) and maximum contaminant level (MCL) for E. coli for protection against potential fecal contamination.
- Setting a total coliform treatment technique (TT) requirement.
- Requirements for monitoring total coliforms and E. coli according to a sample siting plan and schedule specific to the PWS.
- Provisions allowing PWSs to transition to the RTCR using their existing TCR monitoring frequency, including PWSs on reduced monitoring under the existing TCR.
- Requirements for seasonal systems to monitor and certify the completion of state-approved start-up procedures.
- Requirements for assessments and corrective action when monitoring results show that PWSs may be vulnerable to contamination.
- Public notification (PN) requirements for violations.
- Specific language for CWSs to include their Consumer Confidence Reports (CCRs) when they must conduct an assessment or if they incur an E. coli MCL violation.

MONITORING REQUIREMENTS

The City's Coliform Monitoring Plan (Appendix K) was updated in 2017. The City currently collects 30 samples per month from locations throughout the distribution system. The City is in compliance with the rule and is designated a disinfected system.

Asbestos

Asbestos is the name for a group of naturally occurring, hydrated silicate minerals with fibrous morphology. Included in this group are chrysotile, corcidolite, amosite, and the fibrous varieties of anthophyllite, tremolit, and actinolite. Most commercially-mined asbestos is chrysotile. Historically, the flexibility, strength, and chemical and heat resistance properties of asbestos have adapted it to many uses including building insulation, brake linings, and water pipe.

In recent years, there has been much concern with the health risks associated with the use of asbestos in the everyday environment. Several studies and case histories have documented the hazards to internal organs as a result of inhalation of asbestos fibers. Data is limited on the effects of ingestion of asbestos fibers or on the effects of inhalation exposure from drinking water. Ingestion studies have not caused cancer in laboratory animals, though studies of asbestos workers have shown increased rates of gastrointestinal cancer.

MONITORING REQUIREMENTS

The reporting period for asbestos is nine years, with the latest period ending December 2010. Because of the City's aggressive water main replacement program, specifically targeting asbestos cement (AC), wrapped steel, and undersized water mains, fewer than one percent (1 percent) of the City's water mains are AC. Since the City's water distribution system has less than ten percent (10 percent) asbestos cement pipe, an asbestos sample is not required by DOH.

Stage 1 Disinfectants and Disinfection By-Products Rule

The Stage 1 Disinfectants and Disinfection By-Products Rule (DBPR) was promulgated in December 1998 and is applied to systems that apply a chemical oxidant/disinfectant. The portions of the Stage 1 DBPR relevant to the City are the MCLs for total trihalomethanes (TTHMs) and haloacetic acids (HAA5) of 0.080 and 0.060 mg/L, respectively. The four regulated trihalomethanes are chloroform, bromodichloromethane, dibromochloromethane, and bromoform. The five regulated HAAs are monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. Compliance with the TTHM and HAA5 MCLs is based on a system-wide running annual average (RAA) of quarterly samples taken in the distribution system. The Stage 1 DBPR also introduced a maximum residual disinfectant level (MRDL) of 4 mg/L for free chlorine, based on an RAA of samples collected concurrent with TCR monitoring.

Stage 2 Disinfectants and Disinfection By-Products Rule

The Stage 2 DBPR was promulgated by the EPA on January 4, 2006 and was adopted by DOH in WAC 246-290. The key provisions of the Stage 2 DBPR consist of:

- An Initial Distribution System Evaluation (IDSE) to identify distribution system locations with high DBP concentrations. Further information is provided below.
- Site-specific locational running annual averages (LRAAs) instead of system-wide RAAs to calculate compliance data. LRAAs will strengthen public health protection by eliminating the potential for groups of customers to receive elevated levels of DBPs on a consistent basis.

The MCLs for TTHM and HAA5 remain unchanged from the Stage 1 DBPR at 0.080 and 0.060 mg/L, respectively, although they will now be calculated as LRAAs.

The IDSE is the first step in Stage 2 DBPR compliance. Its intent is to identify sampling locations for Stage 2 DBPR compliance monitoring that represent distribution system sites with high TTHM and HAA5 levels. For systems serving more than 500 people, three options were available for the IDSE:

- 40/30 Waiver, which allows systems with no samples exceeding TTHM and HAA concentrations of 40 and 30 µg/L, respectively, during 8 consecutive quarters to apply to waive the IDSE requirements.
- Standard Monitoring Program (SMP), which involves a 1-year distribution system monitoring effort to determine locations that routinely show high THM4 and HAA5 concentrations.
- System-Specific Study (SSS), based on historical data and a system model.

MONITORING REQUIREMENTS

The City performed an IDSE in 2008, which included bimonthly sampling at eight sites to identify locations in the distribution system with elevated disinfection by-product concentrations. The IDSE Report is included in Appendix M. Transition from Stage 1 DBPR to Stage 2 DBPR monitoring protocol occurred in 2012. Under Stage 1, the City conducted TTHM/HAA5 monitoring quarterly at 12 sites. For Stage 2 DBPR, the City is required to conduct TTHM/HAA5 monitoring quarterly at four distribution system locations as described in the City's Stage 2 DBPR Compliance Monitoring Plan (Appendix L).

Lead and Copper

In 1991, the EPA promulgated the Federal Lead and Copper Rule (LCR). The State of Washington adopted this rule in 1995 with minimal changes. The LCR is intended to reduce the tap water concentrations that can occur when corrosive source water causes lead and copper to leach from water meters and other plumbing fixtures. Possible treatment techniques to reduce lead and copper leaching include addition of soda ash or sodium hydroxide to the source water prior to distribution.

The LCR establishes an action level (AL) of 0.015 mg/L for lead and 1.3 mg/L for copper based on 90th percentile level of tap water samples. The most recent revisions (2007) added the following requirements (required as of 12/10/09):

1. **Monitoring.** The rule adds a new reduced monitoring requirement, which prevents water systems above the lead action level to remain on a reduced monitoring schedule.
2. **Treatment.** Water systems must provide advanced notification and gain the approval of the primacy agency for intended changes in treatment or source water that could increase corrosion of lead.
3. **Consumer notification.** All utilities must now provide a notification of tap water monitoring results for lead to owners and/or occupants of homes and buildings who consume water from the taps that are part of the utility's sampling program.
4. **Lead service line replacement.** Utilities must reconsider previously "tested-out" lines when resuming lead service line replacement programs. This provision only applies to systems that have:
    a. Initiated a lead service line replacement program;
    b. Complied with the lead action level for two consecutive monitoring periods and discontinued the lead service line replacement program; and
    c. Subsequently were re-triggered into lead service line replacement.
    d. All previously "tested-out" lines would then have to be tested again or added back into the sampling pool and considered for replacement.

Exceedance of the AL is not considered a violation but can trigger other requirements that include water quality parameter monitoring, corrosion control treatment, source water monitoring/treatment, public education, and lead service line replacement.

Samples must be collected at cold water taps in homes/buildings that are at high risk of lead/copper contamination as identified in 40 CFR 141.86(a). The number of sample sites is based on system size.

MONITORING REQUIREMENTS

The City completed two initial six-month home tap monitoring periods and the required follow-up testing. Lead and copper action levels were not exceeded during the initial monitoring periods. Based on their approved reduced monitoring schedule, the City must collect 30 lead/copper samples every three years. In the future, the City will assess the need for corrosion mitigation studies, pH adjustment treatment, corrosion inhibitor application, and removal of lead plumbing materials.

8.2.3 Surface Water Treatment Rules

The wholesale water purchased from CWA is from a surface water supply. As discussed above, CWA is responsible for ensuring its surface water supply meets all surface water treatment rule requirements. The main requirement affecting the City is maintenance of a disinfectant residual in 95 percent of distribution system samples. In addition, due to this supply, the City is classified as a Subpart H system under the Stage 1 and 2 DBPRs, with increased TTHM/HAA monitoring requirements.

8.2.4 Reporting Requirements

Federal regulations related to reporting requirements are discussed herein.

Consumer Confidence Report (CCR)

Each July, community water systems must provide an annual report to customers providing information as to the quality of their drinking water supply. These reports are referred to as “Consumer Confidence Reports” (CCR). These reports let customers know whether their water meets state and federal drinking water standards. The CCR includes information on the water source, the regulated and unregulated contaminants that have been detected during the year and their concentrations. The report also provides information on disinfection byproducts or microbial contaminants and the potential health effects of the contaminants at concentrations greater than the MCL. The likely source of the contaminants is identified and a summary of any violations in monitoring, reporting, or record keeping is included. The reports can assist customers with special health needs to make informed decisions regarding their drinking water. CCRs provide references and telephone numbers as to health effects data and available information about the water system in general.

The Consumer Confidence Report Rule was finalized on September 19, 1998. The City issues its annual *Water Quality Report* prior to every July, as the rule requires. The 2012 through 2016, *Drinking Water Reports* are included in Appendix J.

Public Notification Rule

The Public Notification Rule (PNR) requires that public water systems notify their customers when they violate EPA or State regulations (including monitoring requirements) or otherwise provide drinking water that may pose a risk to consumers’ health. The original public notification requirements were established in the SDWA; the revised PNR was promulgated in 2000 as required by the 1996 SDWA amendments.

The PNR establishes three notification levels:

- Immediate Notice (Tier 1): In a situation where there is the potential for human health to be immediately impacted, notification is required within 24 hours.

- Notice as Soon as Possible (Tier 2). In a situation where an MCL is exceeded or water has not been treated properly, but there is no threat to human health, notification is required as soon as possible and within 30 days.
- Annual Notice (Tier 3). In a situation where a standard is violated that does not directly impact human health, notice must be provided within one year, likely within the system's CCR.

Notification requirements are briefly summarized herein.

IOC/VOC/SOC Reporting Procedures

If routine sampling indicates a violation of primary or secondary MCL violation, then the water purveyor must collect confirmation sample(s), remove the source from service, and report the violation to DOH within 24 hours. If DOH determines the violation poses an acute health effect, then the purveyor must provide notice of the violation water customers within 24 hours of the violation. If it is determined that the violation does not pose an acute health risk, then the purveyor must mail a notice to customers within 30 days.

Bacteriological Reporting Procedures

If bacteriological presence is detected in a routine sample, the following reporting requirements will take effect:

- Each total coliform-positive routine sample must be tested for the presence of E.coli.
- If fecal coliform or *E. coli* is detected in routine sample, the City is required to notify DOH by the end of the day that the PWS is notified.
- Within 24 hours of learning a total coliform-positive sample result, at least three repeat samples must be collected and analyzed for total coliform.
- If one or more repeat sample is coliform-positive, the sample must be analyzed for the presence of E.coli. If the repeat sample is also E. coli-positive, the sample result must be reported to the state by the end of the day the PWS is notified.

Unregulated Contaminant Reporting Procedures

Reporting procedures for unregulated contaminants are similar to the reporting requirements for IOCs, VOCs, and SOCs. If the unregulated contaminant has a proposed MCL, then the reporting requirements are the same as those stated for IOCs, VOCs, and SOCs. If a detected unregulated contaminant does not have a proposed MCL, DOH must be contacted, and DOH will determine the reporting procedures.

8.2.5 Future Regulatory Requirements

Anticipated future regulatory requirements are summarized in Table 8-6. This table includes ongoing programs to introduce new regulatory requirements, under the Unregulated Contaminant Monitoring Rule and the Contaminant Candidate List, as well as specific rules and regulations currently under consideration. A brief description of anticipated requirements under each rule is provided herein.

Table 8-6. Future Regulatory Requirements

Proposed Rule	Affected Contaminants	Proposed Publication Date [a]
Perchlorate	Perchlorate	2019
Lead and Copper Rule Long-Term Revisions	Lead and Copper	2018

[a] Effective and compliance dates were obtained from the Federal Register and EPA's Drinking Water Hotline and represent the best information available as of the date of this report.

Perchlorate

The EPA is considering implementation of an MCL goal (MCLG) for perchlorate. Additional research may be required to derive an MCLG. EPA's current statutory deadline for proposing a perchlorate drinking water regulation is the end of 2019.

Lead and Copper Long-Term Revisions

Stakeholder meetings were held in November 2010 to discuss the potential long-term revisions that will replace the short-term revisions made in 2007. Items to be addressed are partial lead service line replacement, sample site selection, tap sampling, corrosion control, and public education about copper. These revisions are projected to be finalized in 2018.

8.3 Current Sources and Treatment

The City has two main sources of supply: groundwater from its own wells, and wholesale water purchased from CWA. All operating areas currently receive either CWA or City well water that is not blended. However, the City is looking into serving all operating areas with blended water in the future. Treatment and monitoring requirements specific to these supplies is discussed herein. This section only discusses monitoring requirements related to monitoring of treatment performance; general source water monitoring requirements are discussed under the applicable regulations in the above sections.

8.3.1 Groundwater Treatment

Risdon Wells 1 and 2

Risdon Well Nos. 1 and 2 are chlorinated using 12.5 percent sodium hypochlorite. There is currently no other treatment being implemented at the Risdon wells, however, long term treatment options are being considered for the centralized treatment of all four of the City's groundwater sources and are discussed in Section 8.6.

Gilman Wells 4 and 5

A temporary treatment system was installed in 2016 at the Gilman well sites. Currently, Gilman Well No. 4 is treated using granular activated carbon for polyfluoroalkyl substances (PFAS) removal. Well No. 4 is then blended with Well No. 5 to meet several water quality objectives 1) lower arsenic levels, 2) increased pH, and 3) lower manganese levels. Water is then disinfected with 12.5 percent sodium hypochlorite before being sent to the distribution system. In addition, sequestrate is injected on the combined Well No. 4 and 5 treated water line to prevent manganese deposits throughout the distribution system.

The temporary treatment system was designed to allow future treatment of both Well Nos. 4 and 5 if PFAS contamination ever reached Well No. 5. Further, long term treatment options for PFAS removal are being considered and are discussed in Section 8.6.

8.3.2 Wholesale Water Agreements

The City maintains interties with the City of Bellevue and the CWA supply transmission main. CWA water is wheeled through Bellevue to supply the Lakemont and Montreux communities. CWA water from the transmission main feeds Issaquah Highlands.

Monitoring Requirements

Monitoring requirements associated with disinfected surface water sources are documented in WAC 246-290-692(5) and WAC 246-290-694(8). These rules require that the City monitor disinfectant residual concentrations at representative points of the distribution system on a daily basis, and at the same time and location as TCR samples. A disinfectant residual must be detectable in at least 95 percent of samples collected in a calendar month.

8.4 Water Quality Compliance

The section evaluates the existing water quality conditions in relation to existing and future drinking water regulations for the City of Issaquah. Compliance has been evaluated and recommendations regarding treatment practices and/or existing monitoring plans based on existing or proposed regulations are presented. The City's water currently meets all state and federal drinking water standards. In addition, the City complies with all DOH monitoring and reporting requirements. The 2012 to 2016 Drinking Water Reports are included in Appendix J.

8.4.1 Overview of Water Quality

Source Water Quality

This section discusses source water quality compliance with existing primary and secondary MCLs, as well as anticipated future regulatory requirements.

National Primary and Secondary Drinking Water Regulations

In accordance with WAC 246-290-300 for systems supplied by groundwater, the City collects samples and tests them for inorganic chemical and physical contaminants once every nine years. IOC samples were most recently taken in 2016. The 2016 data in Table 8-7 show that concentrations of regulated inorganic chemical and physical contaminants are lower than MCL values for all well supplies, with the exception of manganese at Gilman Well No. 5. Elevated manganese concentration at Well No. 5 is mitigated by blending with Well No. 4 and injecting sequestrate at the station. Treatment to remove manganese at Well No. 5 is discussed in Section 8.6.

Table 8-7. 2016 Sampling Data – Inorganic Chemical and Physical Contaminants

Inorganic Chemical	MCL[a] (mg/L)		Well No. 1	Well No. 2	Well No. 4	Well No. 5
Antimony	0.006	P	ND [f]	ND	ND	ND
Arsenic	0.01	P	0.002	0.002	0.003	0.009
Asbestos [b]	72	P	NA	NA	NA	NA
Barium	2	P	ND	ND	ND	ND
Beryllium	0.004	P	ND	ND	ND	ND
Cadmium	0.005	P	ND	ND	ND	ND
Chromium	0.1	P	ND	ND	ND	ND
Copper	1.3	A	ND	ND	ND	ND
Cyanide	0.2	P	ND	ND	ND	ND
Fluoride	4.0 / 2.0	P/S	ND	ND	ND	ND
Lead	0.015	A	ND	ND	ND	ND
Mercury	0.002	P	ND	ND	ND	ND
Nickel	0.1	P	ND	ND	ND	ND
Nitrate-N	10	P	0.54	0.49	ND	0.49
Nitrite-N	1	P	ND	ND	ND	ND
Selenium	0.05	P	ND	ND	ND	ND
Sodium [c]	--	--	8.6	9	8.1	23.2
Thallium	0.002	P	ND	ND	ND	ND
Chloride	250	S	ND [f]	ND	ND	ND
Iron	0.3	S	ND	ND	ND	ND
Manganese	0.05	S	ND	ND	0.02	0.062
Silver	0.1	P	ND	ND	ND	ND
Sulfate	250	P	ND	ND	9.2	ND
Zinc	5	P	ND	ND	ND	ND
Alkalinity	--	P	NA	NA	NA	NA
Conductivity [d]	700	P	160	158	248	293
Color [e]	15	P	ND	ND	ND	ND
pH	--	P	NA	NA	NA	NA

[a] MCL (maximum contaminant level): P = primary MCL, S = secondary MCL, A = action level
[b] Asbestos MCL is measured as "million fibers/liter".
[c] MCL not established; however, it is included in inorganic chemical monitoring to public health concern.
[d] Conductivity is measured as "micromhos/cm".
[e] Color is measured as "color units".
[f] ND = not detected; NA = Not analyzed.

The latest VOC monitoring for Wells No. 1 and 2 was completed in 2015; the latest analysis for Wells No. 4 and No. 5 was completed in 2012. No VOCs were detected at any of the wells. The latest SOC monitoring in 2016 resulted in no detection of SOCs at any well sources. The City has a waiver on SOC sampling through 2022 for all wells.

Distribution Water Quality

The City has no current or anticipated challenges in meeting distribution system water quality requirements. The water quality data relevant to each regulation are summarized herein.

Revised Total Coliform Rule

The City installed chlorination at each of the well sources in 2003. Prior to installation of disinfection, non-repeat positive coliform samples were detected in years 2000 to 2002.

From 2012 through 2017 no positive coliform samples were observed in the system, so the City did not have anyviolations.

Stage 1 and 2 Disinfectants and Disinfection By-Products Rules

Samples from throughout the distribution system are tested for HAA5 and TTHM levels. Running annual average (RAA) results for the years 2012 to 2016 are shown in Table 8-8 below. The City has not violated any DBPR requirements.

Table 8-8. Haloacetic Acids and Total Trihalomethanes Monitoring

Regulation	MCL	Lower Issaquah Valley Aquifer	CWA-Cedar Supply	CWA –Tolt Supply
HAA5 (ppb)				
2012	60	1.08	29.55	29.55
HAA5 (ppb)				
2012	60	1.08	29.55	29.55
2013	60	NA	23.55	23.55
2014	60	NA	27.43	27.43
2015	60	NA	31.43	31.43
2016	60	NA	36.9	36.9
TTHM (ppb)				
2012	80	4.83	36.9	36.9
2013	80	NA	42.975	42.975
2014	80	NA	40.85	40.85

Table 8-8. Haloacetic Acids and Total Trihalomethanes Monitoring

Regulation	MCL	Lower Issaquah Valley Aquifer	CWA-Cedar Supply	CWA –Tolt Supply
2015	80	NA	56.1	56.1
2016	80	NA	47.4	47.4

Lead and Copper Rule

Lead and copper tap water samples were performed most recently in 2006, 2009, and 2012. The results are shown in Table 8-9 below. The City did not violate any Lead and Copper Rule requirements.

Table 8-9. Lead and Copper Monitoring

Year		Copper (ppm)	Lead (ppb)
	Action Level	1.3	15
	MCLG	1.3	0
2012	Amount detected (90th %tile)	0.342	1
	Sites Above Action Level/Total Sites	0/49	0/49
2015	Amount detected (90th %tile)	0.364	0.001
	Sites Above Action LevelTotal Sites	0/51	0/51

8.4.2 Use of Certified Laboratories

The EPA requires that all laboratories become certified to analyze drinking water samples and that they use analytical methods approved by the EPA. The City of Issaquah uses the following three certified laboratories to analyze drinking water samples:

- Edge Analytical (https://www.edgeanalytical.com/contact/)
- AMTEST Laboratories (http://amtestlab.com/contact_us.asp)
- Anatek Labs, Inc – PFAS (http://www.anateklabs.com/moscow/)

8.4.3 Water Quality Compliance Summary

Table 8-10 summarizes the City's compliance with current regulations.

Table 8-10. Summary of Existing Regulatory Compliance

Regulation	Compliance
National Primary and Secondary Drinking Water Standards	Yes – System wide sampling fell below MCLs.

Table 8-10. Summary of Existing Regulatory Compliance

Regulation	Compliance
Radionuclides Rule	Yes – No source has detected positive results for radionuclides.
Arsenic Rule	Yes – The arsenic sources (Gilman Well Nos. 1 and 2) are blended to reduce arsenic levels.
Unregulated Contaminants Monitoring Rule 3	Yes – Although not currently regulated, PFAS were detected in Gilman Well Nos. 4 and 5. Treatment has since been implemented and all levels have been under the practical quantification limit since the treatment system has been online.
Groundwater Rule	Yes – All requirements are met
Total Coliform Rule/ Revised Total Coliform Rule	Yes – The City has a sampling program in place and have had no positive coliform samples since 2009.
Lead and Copper Rule	Yes – The City is in compliance with the LCR.
Stage 1 and 2 Disinfectants/Disinfection Byproduct Rule	Yes – System wide annual averages all below the TTHM and HAA5 MCLs.
Information Collection Rule	Yes – The City is in compliance.
Interim Enhanced Surface Water Treatment Rule	Yes – The City is in compliance.
Long Term 1 Enhanced Surface Water Treatment Rule	Yes – The City is in compliance.
Long Term 2 Enhanced Surface Water Treatment Rule	Yes – The City is in compliance.
Consumer Confidence Report Rule	Yes – Consumer Confidence Reports are issued prior to every July.
Public Notification Rule	Yes

8.4.4 Procedures for Customer Inquiries and Complaints

The City of Issaquah utilizes a complaint/concern database online where customers are able to submit complaints and or concerns with regards to health and safety in the community.

8.5 Water Quality Protection Programs

8.5.1 Groundwater Management and Wellhead Protection

Protecting the Issaquah Valley aquifer from contamination is important for the City's continued use of groundwater as a supply source. In order to protect groundwater supplied, the City and SPWSD prepared, adopted, and implemented a Wellhead Protection Plan for the Lower Issaquah Valley in 1993, which is still current at the time of this writing. It is included as Appendix N.

In 2010, the EPA enacted Stage II of the National Pollutant Discharge Elimination System (NPDES). While this enactment is targeted at stormwater discharges, groundwater will benefit as well due to the City's active inspection, inventory and proactive management, and education related to on-site containment of pollutants, primarily in the industrial and retail sections of the City.

The City makes ongoing efforts to improve its management of groundwater quality. Recent efforts include:

- **Contaminant Source Inventory**: The City prepared a Contaminant Source Inventory in 2012, which is included as Appendix P.
- **Water quality impact assessments**: Extensive assessments were completed as part of the Wellhead Protection Plan, identifying potential sources of aquifer contamination.
- **Wellhead protection strategies**: The City is very conscious of the value of its aquifer and actively pursues improvements to protect this resource. An example of required improvements stemming from the Wellhead Protection Plan is the approximate two mile of I-90 freeway storm drainage retrofitting undertaken by Washington State Department of Transportation (WSDOT) to protect the aquifer.
- **Aquifer recharge impacts of planned development**: Since groundwater recharge is an important factor for the aquifer, the storm drainage impacts of the Issaquah Highlands development were addressed in an Environmental Impact Statement for the development.
- **Adoption of aquifer protection policies**: The City revised its Issaquah Municipal Code (IMC) Title 18.06 to protect the wellhead area. IMC Title 18.06 includes language permitting the City to disallow any use within the wellhead protection area that would be inconsistent with protecting wellheads. The wellhead protection area also includes the aquifer that the well field draws from.
- **Spill response procedures and personnel**: Eastside Fire and Rescue fills the role of spill response for the City in addition to the City's Standard Operating Procedure for City crews to respond to spills and similar accidents.

One sample project undertaken by the City with potential positive impacts on groundwater recharge water quality is the Water Resources Action Plan. This project supports the Issaquah Stream Team and staff to implement the Aquatic Resource Monitoring Plan. This program monitors stream channels, effectiveness of stormwater management and water quality. Given the aquifer recharge role of the local streams, this program could yield significant benefits for the City.

8.5.2 Cross Connection Control Program

The purpose of the City's Cross Connection Control Program, which is included as Appendix O, is to protect the health of water consumers by preventing backflow of contaminated water into the water distribution system. The program establishes minimum operating policies, backflow prevention assembly installation, and testing practices. The City has the authority to enforce the practices and policies outlined in the program through the IMC Chapter 13.13.

The City is responsible for prevention of contamination of the water distribution system by inspecting cross connections, providing guidance for new installations and existing connections, maintaining records on backflow prevention devices, and responding to customer inquiries. The City is responsible for cross-connection control beginning at the water supply source and ending at the point of delivery to the consumer's water system. Water customers are responsible for eliminating cross connections by controlling them through the installation, regular testing, and maintenance of approved backflow prevention assemblies.

8.5.3 Treatment Practices and Recommendations

The City of Issaquah conducts frequent water quality monitoring to meet state monitoring requirements. Monitoring is required both at the source and throughout the distribution system. Table 8-11 presents recommendations for treatment practices and existing monitoring plans to help remain in compliance with existing and proposed regulations.

Table 8-11. Treatment Practices and Monitoring Plan Recommendations

Monitoring or Treatment Practice	Recommendation
Revised Total Coliform Rule Compliance	Develop a distribution water quality strategy to establish system wide baseline data that can be used to ensure optimized corrosion control, inform O&M decisions, inform asset management decisions, and provide better baseline data with which to compare in an emergency contamination situation.
E. Coli Response Plan	Develop an E.Coli Emergency Response Plan in case the system should have an MCL violation.
PFAS Monitoring and Treatment	Continued monitoring from Gilman Wells 4 and 5 and evaluate long-term treatment options.

8.6 Long-term Treatment Options for Perfluorinated Compounds and Other Water Quality Issues

In 2013, the City of Issaquah (City) detected then-unregulated per- and polyfluoroalkyl substances (PFAS) in Gilman Well No. 4 as part of the UCMR 3 sampling event. In response to the PFAS detections, the City shut down Gilman Well No. 4 and evaluated a number of alternatives to eliminate the contamination from Well No. 4. A temporary granular activated carbon (GAC) filtration system was installed to treat water from Well No. 4 with the ability to be expanded to treat Well No. 5 if the PFAS migrated to the lower Well No. 5 aquifer. PFAS levels have been below the USEPA Method 537 detection limits in Well No. 4 finished water since the system went online in 2016.

In addition to PFAS in Well No. 4, the City has other water quality challenges, including manganese and arsenic, ammonia, and low pH, which adversely affect the City's groundwater supply. To further address these water quality issues, and to plan for the eventual introduction of regional water from the Cascade Water Alliance into the Valley Zone (which will require blending of groundwater and regional water in the Valley Zone), the City is evaluating long-term treatment options for PFAS and the other water quality issues. The following long-term treatment options were:

- Option 1: Centralized Treatment: Risdon Wells 1 and 2, Gilman Wells 4 and 5, and CWA water would be treated at a single location.
- Option 2: Wellhead Treatment – Abandon Gilman Well Nos. 4 and 5 and provide wellhead treatment at Risdon Well Nos. 1 and 2 and wellhead treatment at Well No. 6.

Due to the small site at Gilman Wells 4 and 5, additional wellhead treatment is not feasible at this location. The City has another existing undeveloped well, Well No. 6, which is not currently used as a potable water source. This well is considered as a part of the treatment evaluation as water rights from the existing potable water wells could potentially be transferred to this well in the future. The complete long-term water treatment alternatives evaluation can be found in Appendix Q.

8.6.1 Treatment Goals

The City desires the removal of anthropogenic PFAS contamination to non-detect levels as based on USEPA Method 537. Continued partial treatment and blending to below regulatory limits was not considered for PFAS in the evaluation. Blending to achieve lower concentrations of naturally occurring arsenic and manganese, however, was considered in the evaluation. The long-term treatment goals considered in the evaluation were:

1. Reduction of manganese concentrations to 0.015 mg/L.
2. Reduction of arsenic to at least half of the MCL (0.005 mg/L).
3. Removal of PFAS to levels below the USEPA Method 537 detection limits.
4. Optional fluoridation to 0.7 mg/L to match that of the regional water supply.
5. Disinfection to maintain a minimum of 0.2 mg/L chlorine residual throughout the distribution system.
6. Corrosion control to adjust the groundwater pH target to 8.1, to be consistent with the pH of the regional water supply.

These goals were used to determine the equipment sizes and footprints that would be needed for each option.

8.6.2 Options Evaluation Summary

Option 1 – Centralized Treatment

The centralized treatment plant was evaluated to treat water from both the Risdon and Gilman wells at a centralized location. This option would require the City to select a treatment plant location for the new treatment plant. The centralized treatment plant location would be at a location between the Risdon and Gilman well sites and south of the Interstate-90 corridor.

This option would require the installation of new transmission mains from the Risdon and Gilman wells to convey water to the centralized location and the installation of equipment to meet the long-term treatment goals. Overall, this option would be feasible for this City and would allow them to address the water quality issues from both the Risdon and Gilman wells.

Option 2 – Wellhead Treatment

Wellhead treatment was evaluated for the Risdon Well site as well as a new site at the City's undeveloped Well No. 6. It was determined that it was not feasible to install wellhead treatment at the Risdon well site due the limited space on the site. Wellhead treatment at the undeveloped Well No. 6 could be possible if the City was able to transfer water rights their existing water rights from the Gilman Wells to their Well No. 6. Overall, to meet the overall water quality goals and water demands, wellhead treatment at each site was not feasible without consideration of purchasing more land and transferring water rights. Well No. 6 is located on future Confluence Park property.

8.6.3 Long-Term Treatment Option Selection

Based on the long-term treatment evaluation, the City's preferred long-term option to meet the established treatment goals is through a centralized treatment plant that would receive and treat water from both Risdon and Gilman wells. A centralized treatment plant at a new location would give the City the ability to expand treatment based on future regulations and emerging contaminant issues. Future efforts in development of this long-term option include a treatability study, land acquisition, environmental site assessment, zoning and permitting, and a geotechnical investigation.

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Chapter 9. Facility Evaluation

This chapter provides a hydraulic evaluation of the City's water system. This include an evaluation of the system's storage facilities, pressures, and fire flows to meet Department of Health requirements and City design policies. An evaluation of pump station capacities is included in Chapter 7 – Supply Evaluation.

9.1 Storage Capacity Analysis

The following storage analysis reviews the policies and criteria established by the City that dictate storage requirements, reviews the available storage, establishes the storage requirements, and evaluates the possible storage deficit in each service level. The analysis considers demand and supply projections for the year 2017, 2021, and 2031 scenarios.

For the Lakemont and Montreux Operating Areas, storage is provided in the City of Bellevue's system per agreement and therefore are not analyzed in this chapter[1].

9.1.1 Storage Components

The storage capacity analysis compares the volume of existing water storage provided by reservoirs and standpipes in the water system, to the volume of storage required to serve current and projected water demands.

The storage capacity analysis only looks at supply/demand flow rates, existing reservoir volumes, and system elevations for determining the capacity of the storage facilities. Additional analysis that takes into consideration the movement of water through the distribution system and associated impacts on pressure (such as head loss) are completed as part of the distribution system analysis (Section 9.2).

There are five types of storage volumes that must be accounted for per Washington Administrative Code (WAC) 246-290-235. These are described below and shown in Figure 9-1.

- **Operational Storage** - the volume of storage associated with source or booster pump normal cycling times under normal operating conditions. This is calculated as the volume of water that is delivered to the system from the storage facility between the storage facility's sources switching from off to on. Operating storage must be provided at a pressure of at least 30 psi per DOH requirements. The City has established a policy that all new facilities be designed to provide this storage at 40 psi at the second floor. The analyses presented in this chapter are based on the assumption of an operating band with a 2 ft height will a maximum fill height to 6 inches below a storage tank's overflow elevation. Actual operating bands use for the reservoirs depend on time of year and observed water quality.
- **Equalizing Storage** - the volume of storage needed to supplement supply to consumers when the peak hourly demand exceeds the total source pumping capacity. The City has established a policy that all new facilities be designed to provide a minimum pressure within the distribution

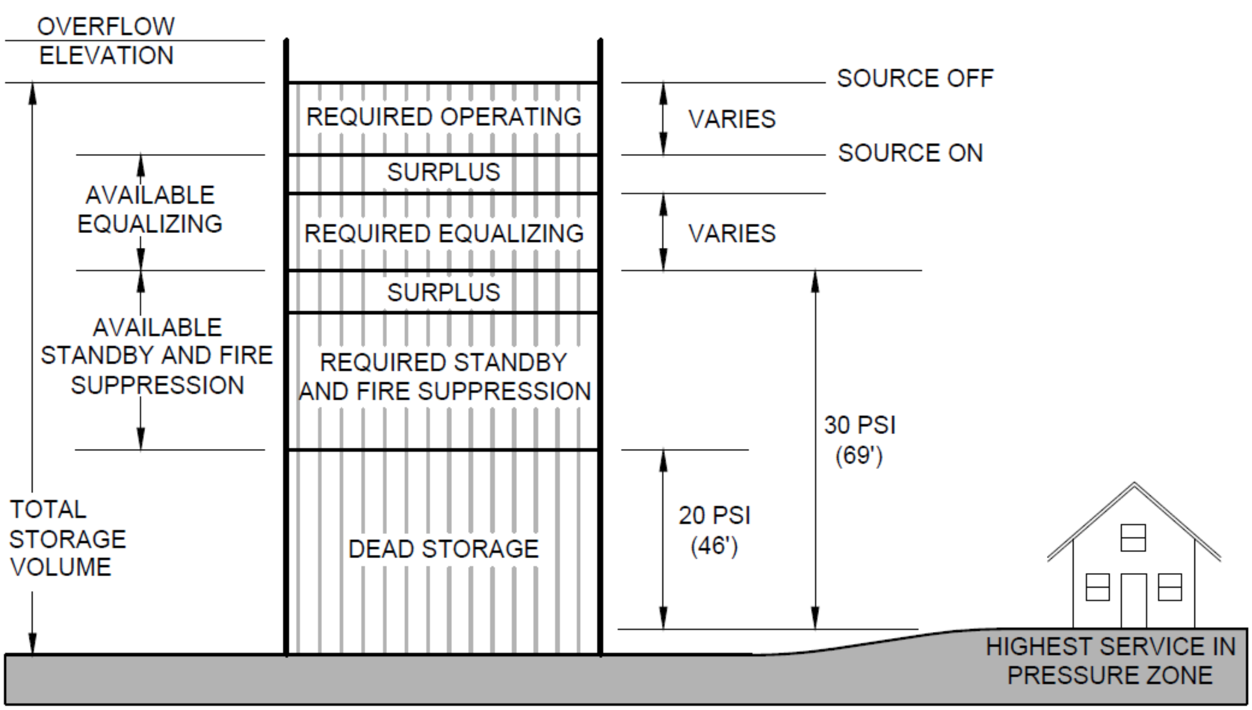
[1] Additional information on storage for the Lakemont and Montreux Operating Areas can be found in the City of Bellevue's 2016 Water System Plan, Volume 1, pages 4-28; and in Volume 2, Appendix K, Tables 12 and 14.

system of 40 psi at the second floor elevation where all equalizing storage has been depleted. However, the storage analysis of existing facilities performed for this Plan were based on the DOH regulatory requirement of 30 psi at the meter.

- **Standby Storage** - the volume of stored water available for use during a loss of source capacity or power, or similar short-term emergency. This storage component is equal to the greater of (1) the amount of storage required to meet average day demands for two days if the largest source supplying the storage facility is out of service, or (2) 200 gallons per the number of ERUs served by the facility. Standby storage must be provided at a pressure of at least 20 psi during maximum day demand (MDD).
- **Fire Suppression Storage** - the volume of stored water available during fire suppression activities. This is calculated to be the volume associated with the highest fire demand (flow × duration) served by the storage facilities. The standby storage and fire suppression storage can be "nested" meaning the larger of the two becomes the required storage volume. However, for future development, the City currently plans on having fire suppression storage and standby storage be additive. Fire suppression storage must be provided at a pressure of at least 20 psi.
- **Dead Storage** - the volume of stored water not available to all consumers at the minimum required design pressures.

The total storage volume required is equal to the greater of standby and fire suppression storage added to the sum of operational and equalizing storage; the volumes of which must be provided at the pressures shown in Figure 9-1.

Figure 9-1. Schematic of Storage Components



9.1.2 Methodology

The storage capacity analysis is based on an evaluation of the existing storage reservoirs and their ability to meet the demands and minimum pressure requirements in the areas they serve. The evaluation is based upon two primary calculations:

1. An evaluation of the ability of existing storage facilities to provide required operational and equalizing storage volumes under current and future conditions at a minimum of 30 psi to the highest customer in the service area.
2. An evaluation of the ability of existing storage facilities to provide required operational, equalizing, standby, and fire suppression storage volumes under current and future conditions at a minimum of 20 psi to the highest customer in the service area.

Required storage volumes for each of the storage components follows the methodologies provided in the Washington State Department of Health (DOH) Water System Design Manual.

The analysis is divided by operating area. For each operating area, the required volumes for operational, equalizing, standby, and fire suppression storage are calculated. These storage volumes are based upon the demands of the individual pressure zones each reservoir directly serves in the operating area. In the analysis, where possible, if there is a surplus of storage that is available at 20 psi or more for a pressure zone, that storage is made available to the next lower pressure zone for use in meeting standby or fire suppression storage needs. PRVs in the distribution system allow for movement of water from upper to lower zones under certain pressure conditions.

Assumed Operating Levels

The storage capacity analysis assumes that reservoirs are operated to their full capacity by assuming an operating band that fills to 6 inches below the overflow with an operating band height of 2 ft. Actual operating bands use for the reservoirs depend on time of year, water quality, and design criteria.

9.1.3 Storage Requirements Compared to Available Storage

This section provides a comparison of the calculated required storage volume compared to the existing storage volume available at elevations that satisfy DOH requirements and City policies regarding system pressures. This comparison is made within each operating area. Table 9-1 provides a brief summary of compliance while the tables on pages 9-5 through 9-16 provide details on the storage analysis for each operating area.

Table 9-1. Summary of Storage Ability to Meet DOH Requirements and City Policies

Operating Area	Compliance with DOH Requirements (20 psi and 30psi Pressures)	Compliance with City Policy (40 psi at 2nd Story)
Forest Rim	**Adequate**	**Adequate**
Highwood	**Adequate**	**Adequate**
Wildwood	**Adequate**	**Deficiency** to supply pressure at all service connections per City policy. However, DOH requirements are met.
Mount Hood	**Adequate** if 12th Avenue BPS and Mt. Park BPS used to provide a portion of fire flows.	**Deficiency** to supply pressure at all service connections per City policy. However, DOH requirements are met.

Table 9-1. Summary of Storage Ability to Meet DOH Requirements and City Policies

Operating Area	Compliance with DOH Requirements (20 psi and 30psi Pressures)	Compliance with City Policy (40 psi at 2nd Story)
Grand Ridge	**Adequate**	**Adequate**
Issaquah Highlands Summit	**Adequate**	**Adequate**
Issaquah Highlands Central Park	**Adequate**	**Deficiency** to supply pressure at all service connections per City policy. However, DOH requirements are met.
Talus Foothills	**Adequate**	**Adequate**
Talus Shangri-La	**Adequate** if Talus I/II BPS used to provide a portion of fire flows.	**Deficiency** to supply pressure at all service connections per City policy. However, DOH requirements are met.
Cougar Ridge	**Adequate**	**Adequate**
Valley	**Future Deficiency** resolved through construction of the SPAR Reservoir.	**Deficiency** to supply pressure at all service connections per City policy. However, DOH requirements are met.
South Cove	**Future Deficiency** resolved if nesting allowed for operating area.	**Adequate**

Forest Rim Operating Area

Table 9-2 shows that storage within the Forest Rim Operating Area is sufficient for the 20-year planning horizon.

Table 9-2. Forest Rim Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 1,080.00 ft			
Largest Fire Demand	1,000 gpm	for	2 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
Forest Rim 1178 Zone	117	129	137	161
Projected Demand (gpm) (2)				
Average Day	12.2	13.4	14.3	16.7
Maximum Day	25.7	28.2	30.1	35.3
Peak Hour Demand	85.9	91.0	94.7	105.0
Sources (gpm)				
Forest Rim BPS				
Pump 1	300	300	300	300
Pump 2	300	300	300	300
Total Available Source, All Sources Online	600	600	600	600
Total Available Source, Largest Source Offline	300	300	300	300
Required Storage Calculations				
Operational Storage (gal) (3)	5,288	5,288	5,288	5,288
Equalizing Storage (gal) (4)	0	0	0	0
Standby Storage (gal) (5)	23,370	25,706	27,391	32,103
Fire Suppression Storage (gal)	120,000	120,000	120,000	120,000
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	5,288	5,288	5,288	5,288
Greater than 20 psi at highest meter (gal) (7)	148,658	150,993	152,678	157,390
Existing Storage Greater than 30 psi				
Forest Rim Tank A (gal)	67,649	67,649	67,649	67,649
Forest Rim Tank B (gal)	67,649	67,649	67,649	67,649
Total Existing Storage at 30 psi (gal)	135,298	135,298	135,298	135,298
Storage Surplus/(Deficiency) at 30 psi (gal)	130,010	130,010	130,010	130,010
Existing Storage Greater than 20 psi				
Forest Rim Tank A (gal)	98,196	98,196	98,196	98,196
Forest Rim Tank B (gal)	98,196	98,196	98,196	98,196
Total Existing Storage at 20 psi (gal)	196,393	196,393	196,393	196,393
Storage Surplus/(Deficiency) at 20 psi (gal)	47,734	45,399	43,714	39,002
Storage Surplus/(Deficiency) at 20 psi (gal) (excluding standby storage)	71,105	71,105	71,105	71,105
Existing Storage Greater than 40 psi @ 2nd Story				
Forest Rim Tank A (gal)	21,239	21,239	21,239	21,239
Forest Rim Tank B (gal)	21,239	21,239	21,239	21,239
Total Existing Storage at 40 psi @ 2nd Story (gal)	42,478	42,478	42,478	42,478
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	37,190	37,190	37,190	37,190

Notes (apply to all storage capacity analysis tables):

1 ERUs calculated as average day demand / ERU water use factor (150 gpd/ERU)

2 Projected demands taken from Chapter 5.

3 Required operational storage assumes a 2 ft high operating band for each reservoir with a high fill elevation at 0.5 ft below the reservoir overflow.

4 Required equalizing storage = (PHD – total available source) × 150 minutes, but no less than zero.

5 Required standby storage = greater of 2 × (ADD – total source with largest source out of service) or 200 gallons per ERU.

6 Equal to the combined volume of operational and equalizing storage.

7 Equal to the combined volume of operational, equalizing, standby, and fire suppression storage.

Highwood Operating Area

Table 9-3 shows that storage within the Highwood Operating Area is sufficient for the 20-year planning horizon.

Table 9-3. Highwood Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 743.00 ft			
Largest Fire Demand	1,000 gpm	for	2 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
Highwood 920, 782, 715, 677 Zones	439	483	514	603
Projected Demand (gpm) (2)				
Average Day	45.7	50.3	53.6	62.8
Maximum Day	96.5	106.1	113.0	132.5
Peak Hour Demand	219.1	236.4	248.3	279.4
Sources (gpm)				
Wildwood BPS				
Pump 1	450	450	450	450
Pump 2	450	450	450	450
Total Available Source, All Sources Online	900	900	900	900
Total Available Source, Largest Source Offline	450	450	450	450
Required Storage Calculations				
Operational Storage (gal) (3)	33,935	33,935	33,935	33,935
Equalizing Storage (gal) (4)	0	0	0	0
Standby Storage (gal) (5)	87,767	96,537	102,865	120,561
Fire Suppression Storage (gal)	120,000	120,000	120,000	120,000
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	33,935	33,935	33,935	33,935
Greater than 20 psi at highest meter (gal) (7)	241,702	250,472	256,800	274,496
Existing Storage Greater than 30 psi				
Highwood Tank A (gal)	241,787	241,787	241,787	241,787
Highwood Tank B (gal)	241,787	241,787	241,787	241,787
Total Existing Storage at 30 psi (gal)	483,574	483,574	483,574	483,574
Storage Surplus/(Deficiency) at 30 psi (gal)	449,639	449,639	449,639	449,639
Existing Storage Greater than 20 psi				
Highwood Tank A (gal)	241,787	241,787	241,787	241,787
Highwood Tank B (gal)	241,787	241,787	241,787	241,787
Surplus Storage from Forest Rim Zone at 20 psi (gal)	47,734	45,399	43,714	39,002
Total Existing Storage at 20 psi (gal)	531,309	528,974	527,288	522,577
Storage Surplus/(Deficiency) at 20 psi (gal)	289,607	278,501	270,488	248,081
Existing Storage Greater than 40 psi @ 2nd Story				
Highwood Tank A (gal)	241,787	241,787	241,787	241,787
Highwood Tank B (gal)	241,787	241,787	241,787	241,787
Total Existing Storage at 40 psi @ 2nd Story (gal)	483,574	483,574	483,574	483,574
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	449,639	449,639	449,639	449,639

Wildwood Operating Area

Table 9-4 shows that storage within the Wildwood Operating Area is sufficient for the 20-year planning horizon for DOH requirements. However, a deficiency exists for delivering operational and equalizing storage to all services at 40 psi at the 2nd story. The locations that have a pressure below 40 psi at the 2nd story is shown in Figure 9-3.

Table 9-4. Wildwood Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 539.00 ft			
Largest Fire Demand	1,000 gpm	for	2 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
Wildwood 625, 588 Zones	116	128	136	160
Projected Demand (gpm) (2)				
Average Day	12.1	13.3	14.2	16.6
Maximum Day	25.5	28.1	29.9	35.1
Peak Hour Demand	85.6	90.7	94.4	104.7
Sources (gpm)				
Mount Hood BPS				
Pump 1	500	500	500	500
Pump 2	500	500	500	500
Total Available Source, All Sources Online	1,000	1,000	1,000	1,000
Total Available Source, Largest Source Offline	500	500	500	500
Required Storage Calculations				
Operational Storage (gal) (3)	38,177	38,177	38,177	38,177
Equalizing Storage (gal) (4)	0	0	0	0
Standby Storage (gal) (5)	23,245	25,568	27,244	31,930
Fire Suppression Storage (gal)	120,000	120,000	120,000	120,000
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	38,177	38,177	38,177	38,177
Greater than 20 psi at highest meter (gal) (7)	181,422	183,745	185,421	190,107
Existing Storage Greater than 30 psi				
Wildwood Reservoir (gal)	248,150	248,150	248,150	248,150
Total Existing Storage at 30 psi (gal)	248,150	248,150	248,150	248,150
Storage Surplus/(Deficiency) at 30 psi (gal)	209,973	209,973	209,973	209,973
Existing Storage Greater than 20 psi				
Wildwood Reservoir (gal)	248,150	248,150	248,150	248,150
Surplus Storage from Highwood Zone at 20 psi (gal)	289,607	278,501	270,488	248,081
Total Existing Storage at 20 psi (gal)	537,757	526,651	518,638	496,231
Storage Surplus/(Deficiency) at 20 psi (gal)	356,335	342,907	333,217	306,123
Existing Storage Greater than 40 psi @ 2nd Story				
Wildwood Reservoir (gal)	0	0	0	0
Total Existing Storage at 40 psi @ 2nd Story (gal)	0	0	0	0
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	(120,000)	(120,000)	(120,000)	(120,000)

Mount Hood Operating Area

Table 9-5 shows that storage within the Mount Hood Operating Area is sufficient for the 20-year planning horizon. However, this is due to the pump stations (12th Avenue BPS and Mountain Park BPS) supplying a significant portion of fire suppression storage. It is assumed that the pumps stations supply a fire flow equal to the difference in the pumping firm capacity (largest pump out of service) and maximum day demand. This means that any pumping capacity with the largest pump out of service greater than the maximum day demand is allocated toward fire flows. The remaining required fire flow is provided from fire suppression storage in the reservoir.

However, a deficiency exists for delivering operational and equalizing storage to all services at 40 psi at the 2nd story. The locations that have a pressure below 40 psi at the 2nd story is shown in Figure 9-3.

Table 9-5. Mount Hood Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 403.00 ft			
Largest Fire Demand	3,500 gpm	for	4 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
Mount Hood 480 Zone	1,045	1,150	1,225	1,436
Projected Demand (gpm) (2)				
Average Day	109	120	128	150
Maximum Day	230	253	269	316
Peak Hour Demand	435	472	498	572
Sources (gpm)				
12th Avenue BPS				
Pump 1	760	760	760	760
Pump 2	760	760	760	760
Mountain Park BPS				
Pump 1	1,000	1,000	1,000	1,000
Pump 2	1,000	1,000	1,000	1,000
Total Available Source, All Sources Online	3,520	3,520	3,520	3,520
Total Available Source, Largest Source Offline	2,520	2,520	2,520	2,520
Required Storage Calculations				
Operational Storage (gal) (3)	42,301	42,301	42,301	42,301
Equalizing Storage (gal) (4)	0	0	0	0
Standby Storage (gal) (5)	209,091	229,984	245,060	287,216
Fire Suppression Storage (gal)	85,793	94,843	101,376	119,640
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	42,301	42,301	42,301	42,301
Greater than 20 psi at highest meter (gal) (7)	337,185	367,128	388,737	449,157
Existing Storage Greater than 30 psi				
Mt. Hood Reservoir (gal)	225,783	225,783	225,783	225,783
Total Existing Storage at 30 psi (gal)	225,783	225,783	225,783	225,783
Storage Surplus/(Deficiency) at 30 psi (gal)	183,482	183,482	183,482	183,482

Table 9-5 (continued). Mount Hood Operating Area Storage Capacity Analysis

Existing Storage Greater than 20 psi				
Mt. Hood Reservoir (gal)	391,287	391,287	391,287	391,287
Surplus Storage from Wildwood Zone at 20 psi (gal)	356,335	342,907	333,217	306,123
Total Existing Storage at 20 psi (gal)	747,622	734,194	724,504	697,410
Storage Surplus/(Deficiency) at 20 psi (gal)	410,437	367,066	335,767	248,253
Storage Surplus/(Deficiency) at 20 psi (gal) (excluding standby storage)	619,527	597,049	580,827	535,469
Existing Storage Greater than 40 psi @ 2nd Story				
Mt. Hood Reservoir (gal)	0	0	0	0
Total Existing Storage at 40 psi @ 2nd Story (gal)	0	0	0	0
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	(42,301)	(42,301)	(42,301)	(42,301)

Grand Ridge Operating Area

Table 9-6 shows that storage within the Grand Ridge Operating Area is sufficient for the 20-year planning horizon.

Table 9-6. Grand Ridge Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 1,194.00 ft			
Largest Fire Demand	1,000 gpm	for	2 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) [1]				
Grand Ridge 1337 Zone	26	46	60	60
Projected Demand (gpm) [2]				
Average Day	3	5	6	6
Maximum Day	6	10	13	13
Peak Hour Demand	35	49	56	56
Sources (gpm)				
Grand Ridge BPS				
Pump 1	293	293	293	293
Pump 2	293	293	293	293
Total Available Source, All Sources Online	586	586	586	586
Total Available Source, Largest Source Offline	293	293	293	293
Required Storage Calculations				
Operational Storage (gal) [3]	9,028	9,028	9,028	9,028
Equalizing Storage (gal) [4]	0	0	0	0
Standby Storage (gal) [5]	5,198	9,279	12,000	12,000
Fire Suppression Storage (gal)	120,000	120,000	120,000	120,000
DOH Required Storage				
Greater than 30 psi at highest meter (gal) [6]	9,028	9,028	9,028	9,028
Greater than 20 psi at highest meter (gal) [7]	134,226	138,307	141,028	141,028
Existing Storage Greater than 30 psi				
Grand Ridge Standpipes (gal)	189,589	189,589	189,589	189,589
Storage Surplus/(Deficiency) at 30 psi (gal)	180,561	180,561	180,561	180,561

Table 9-6 (continued). Grand Ridge Operating Area Storage Capacity Analysis

Existing Storage Greater than 20 psi				
Grand Ridge Reservoir (gal)	189,589	189,589	189,589	189,589
Storage Surplus/(Deficiency) at 20 psi (gal)	55,363	51,281	48,561	48,561
Storage Surplus/(Deficiency) at 20 psi (gal) (excluding standby storage)	60,561	60,561	60,561	60,561
Existing Storage Greater than 40 psi @ 2nd Story				
Grand Ridge Reservoir (gal)	171,834	171,834	171,834	171,834
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	162,806	162,806	162,806	162,806

Issaquah Highlands Summit Operating Area

Table 9-7 shows that storage within the Issaquah Highlands Central Park Operating Area is sufficient for the 20-year planning horizon.

Table 9-7. Issaquah Highlands Summit Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 1,095.00 ft			
Largest Fire Demand	3,500 gpm	for	4 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
Issaquah Highlands Summit 1234, 1000, 615 Zones	1,932	4,318	4,318	4,318
Projected Demand (gpm) (2)				
Average Day	201	450	450	450
Maximum Day	425	949	949	949
Peak Hour Demand	747	1,586	1,586	1,586
Sources (gpm)				
Central Park BPS				
Pump 1	1,528	1,528	1,528	1,528
Pump 2	1,528	1,528	1,528	1,528
Total Available Source, All Sources Online	3,056	3,056	3,056	3,056
Total Available Source, Largest Source Offline	1,528	1,528	1,528	1,528
Required Storage Calculations				
Operational Storage (gal) (3)	99,291	99,291	99,291	99,291
Equalizing Storage (gal) (4)	0	0	0	0
Standby Storage (gal) (5)	386,452	863,574	863,574	863,574
Fire Suppression Storage (gal)	840,000	840,000	840,000	840,000
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	99,291	99,291	99,291	99,291
Greater than 20 psi at highest meter (gal) (7)	1,325,743	1,802,865	1,802,865	1,802,865
Existing Storage Greater than 30 psi				
Summit Standpipes (gal)	2,099,995	2,099,995	2,099,995	2,099,995
Storage Surplus/(Deficiency) at 30 psi (gal)	2,000,704	2,000,704	2,000,704	2,000,704
Existing Storage Greater than 20 psi				
Summit Reservoir (gal)	2,099,995	2,099,995	2,099,995	2,099,995
Surplus Storage from Grand Ridge Zone at 20 psi (gal)	55,363	51,281	48,561	48,561
Total Existing Storage at 20 psi (gal)	2,155,357	2,151,276	2,148,556	2,148,556
Storage Surplus/(Deficiency) at 20 psi (gal)	829,615	348,411	345,691	345,691
Storage Surplus/(Deficiency) at 20 psi (gal) (excluding standby storage)	1,216,067	1,211,986	1,209,265	1,209,265
Existing Storage Greater than 40 psi @ 2nd Story				
Summit Reservoir (gal)	1,716,072	1,716,072	1,716,072	1,716,072
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	1,616,782	1,716,072	1,716,072	1,716,072

Issaquah Highlands Central Park Operating Area

Table 9-8 shows that storage within the Issaquah Highlands Central Park Operating Area is sufficient for the 20-year planning horizon. However, a deficiency exists for delivering operational and equalizing storage to all services at 40 psi at the 2nd story. The locations that have a pressure below 40 psi at the 2nd story is shown in Figure 9-3.

Table 9-8. Issaquah Highlands Central Park Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 658.00 ft			
Largest Fire Demand	3,500 gpm	for	4 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
Issaquah Highlands Central Park and Lakeside Zones	2,790	4,676	4,834	5,313
Projected Demand (gpm) (2)				
Average Day	291	487	504	553
Maximum Day	613	1028	1063	1168
Peak Hour Demand	1048	1712	1768	1936
Sources (gpm)				
Holly I BPS				
Pump 1	500	500	500	500
Pump 2	500	500	500	500
Holly II BPS				
Pump 1	1,300	1,300	1,300	1,300
Pump 2	1,300	1,300	1,300	1,300
Total Available Source, All Sources Online	3,600	3,600	3,600	3,600
Total Available Source, Largest Source Offline	2,300	2,300	2,300	2,300
Required Storage Calculations				
Operational Storage (gal) (3)	249,319	249,319	249,319	249,319
Equalizing Storage (gal) (4)	0	0	0	0
Standby Storage (gal) (5)	557,918	935,198	966,865	1,062,698
Fire Suppression Storage (gal)	840,000	840,000	840,000	840,000
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	249,319	249,319	249,319	249,319
Greater than 20 psi at highest meter (gal) (7)	1,647,237	2,024,517	2,056,184	2,152,017
Existing Storage Greater than 30 psi				
Central Park Reservoirs (gal)	1,779,517	1,779,517	1,779,517	1,779,517
Storage Surplus/(Deficiency) at 30 psi (gal)	1,530,198	1,530,198	1,530,198	1,530,198
Existing Storage Greater than 20 psi				
Central Park Reservoir (gal)	3,091,557	3,091,557	3,091,557	3,091,557
Surplus Storage from IH Summit Zone at 20 psi (gal)	829,615	348,411	345,691	345,691
Total Existing Storage at 20 psi (gal)	3,921,172	3,439,969	3,437,248	3,437,248
Storage Surplus/(Deficiency) at 20 psi (gal)	2,273,934	1,415,451	1,381,064	1,285,230
Existing Storage Greater than 40 psi @ 2nd Story				
Central Park Reservoir (gal)	0	0	0	0
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	(249,319)	(249,319)	(249,319)	(249,319)

Talus Foothills Operating Area

Table 9-9 shows that storage within the Talus Foothills Operating Area is sufficient for the 20-year planning horizon.

Table 9-9. Talus Foothills Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 804.60 ft			
Largest Fire Demand	1,500 gpm	for	2 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
Talus Foothils 912, 752 Zones	509	649	672	672
Projected Demand (gpm) (2)				
Average Day	53	68	70	70
Maximum Day	112	143	148	148
Peak Hour Demand	247	296	304	304
Sources (gpm)				
Cascade BPS				
Pump 1	195	195	195	195
Pump 2	195	195	195	195
Pump 3	195	195	195	195
Pump 4	195	195	195	195
Shangri-La BPS				
Pump P1, P3	250	250	250	250
Pump P2, P4	250	250	250	250
Total Available Source, All Sources Online	1,280	1,280	1,280	1,280
Total Available Source, Largest Source Offline	1,030	1,030	1,030	1,030
Required Storage Calculations				
Operational Storage (gal) (3)	14,888	14,888	14,888	14,888
Equalizing Storage (gal) (4)	0	0	0	0
Standby Storage (gal) (5)	101,849	129,792	134,449	134,449
Fire Suppression Storage (gal)	180,000	180,000	180,000	180,000
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	14,888	14,888	14,888	14,888
Greater than 20 psi at highest meter (gal) (7)	296,737	324,680	329,337	329,337
Existing Storage Greater than 30 psi				
Foothills Reservoir (gal)	287,160	287,160	287,160	287,160
Storage Surplus/(Deficiency) at 30 psi (gal)	272,271	272,271	272,271	272,271
Existing Storage Greater than 20 psi				
Foothills Reservoir (gal)	357,321	357,321	357,321	357,321
Storage Surplus/(Deficiency) at 20 psi (gal)	60,584	32,641	27,984	27,984
Existing Storage Greater than 40 psi @ 2nd Story				
Foothills Reservoir (gal)	25,807	25,807	25,807	25,807
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	10,918	10,918	10,918	10,918

Talus Shangri-La Operating Area

Table 9-10 shows that storage within the Talus Shangri-La Operating Area is sufficient for the 20-year planning horizon. However, a deficiency exists for delivering operational and equalizing storage to all services at 40 psi at the 2nd story. The locations that have a pressure below 40 psi at the 2nd story is shown in Figure 9-3.

Table 9-10. Talus Shangri-La Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 513.00 ft			
Highest Hydrant Elevation	EL 544.00 ft			
Operating area serves fire flows for MFR areas in Talus 912 zone. Highest EL of these hydrants used for determining available 20 psi storage.				
Largest Fire Demand	3,500 gpm	for	4 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
Talus Shangri-La 616 Zone	986	1,260	1,305	1,305
Projected Demand (gpm) (2)				
Average Day	103	131	136	136
Maximum Day	217	277	287	287
Peak Hour Demand	414	510	527	527
Sources (gpm)				
Talus I & II BPS				
Pump 1, 2	500	500	500	500
Pump 3, 4	500	500	500	500
Total Available Source, All Sources Online	1,000	1,000	1,000	1,000
Total Available Source, Largest Source Offline	500	500	500	500
Required Storage Calculations				
Operational Storage (gal) (3)	146,668	146,668	146,668	146,668
Equalizing Storage (gal) (4)	0	0	0	0
Standby Storage (gal) (5)	197,184	251,962	261,092	261,092
Fire Suppression Storage (gal)	584,324	584,324	584,324	584,324
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	146,668	146,668	146,668	146,668
Greater than 20 psi at highest meter (gal) (7)	928,176	982,954	992,084	992,084
Existing Storage Greater than 30 psi				
Shangri-La Reservoirs (gal)	2,163,353	2,163,353	2,163,353	2,163,353
Storage Surplus/(Deficiency) at 30 psi (gal)	2,016,685	2,016,685	2,016,685	2,016,685
Existing Storage Greater than 20 psi				
Shangri-La Reservoirs (gal)	1,854,128	1,854,128	1,854,128	1,854,128
Surplus Storage from Talus Mt. View at 20 psi (gal)	60,584	32,641	27,984	27,984
Total Existing Storage at 20 psi (gal)	1,914,712	1,886,769	1,882,112	1,882,112
Storage Surplus/(Deficiency) at 20 psi (gal)	986,536	903,815	890,028	890,028
Existing Storage Greater than 40 psi @ 2nd Story				
Shangri-La Reservoirs (gal)	0	0	0	0
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	(146,668)	(146,668)	(146,668)	(146,668)

In addition to serving the demands within the Talus Shangri-La 616 Zone, the Shangri-La Reservoir also feeds pipes which serve fire flows for multifamily residential units within the Talus Foothills 752 zone (domestic water service and hydrants are in separate mains and separate pressure zones for multifamily residential units). Because of this, storage required at 30 psi is based on the highest service connection elevation while storage required at 20 psi is based on the highest hydrant elevation.

Table 9-10 shows surplus/deficient storage based on static conditions. Hydraulic modeling of the area found that due to head losses in the system when flowing 3,500 gpm to the MFR areas in the Talus 752 zone with fire suppression storage depleted, pressures dropped below 20 psi.

Assuming a portion of the fire flow is provided by the Talus I & II BPS provides enough head for pressures to remain above 20 psi while delivering the non-residential fire flow goal of 3,500.

Cougar Ridge Operating Area

Table 9-11 shows that storage within the Cougar Ridge Operating Area is sufficient for the 20-year planning horizon.

Table 9-11. Cougar Ridge Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 323.00 ft			
Largest Fire Demand	1,500 gpm	for	2 hours	
Nesting of Fire Flow Storage?	Yes			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) [1]				
Cougar Ridge 430 Zone	75	81	86	99
Projected Demand (gpm) [2]				
Average Day	8	8	9	10
Maximum Day	17	18	19	22
Peak Hour Demand	65	68	71	78
Sources (gpm)				
Terra II BPS				
Pump 1	525	525	525	525
Pump 2	525	525	525	525
Total Available Source, All Sources Online	1,050	1,050	1,050	1,050
Total Available Source, Largest Source Offline	525	525	525	525
Required Storage Calculations				
Operational Storage (gal) [3]	6,792	6,792	6,792	6,792
Equalizing Storage (gal) [4]	0	0	0	0
Standby Storage (gal) [5]	15,019	16,296	17,217	19,794
Fire Suppression Storage (gal)	180,000	180,000	180,000	180,000
DOH Required Storage				
Greater than 30 psi at highest meter (gal) [6]	6,792	6,792	6,792	6,792
Greater than 20 psi at highest meter (gal) [7]	186,792	186,792	186,792	186,792
Existing Storage Greater than 30 psi				
Cougar Ridge Reservoir (gal)	129,637	129,637	129,637	129,637
Storage Surplus/(Deficiency) at 30 psi (gal)	122,845	122,845	122,845	122,845

Table 9-11 (continued). Cougar Ridge Operating Area Storage Capacity Analysis

Existing Storage Greater than 20 psi				
Cougar Ridge Reservoir (gal)	208,109	208,109	208,109	208,109
Storage Surplus/(Deficiency) at 20 psi (gal)	21,318	21,318	21,318	21,318
Storage Surplus/(Deficiency) at 20 psi (gal) (excluding standby storage)	36,337	37,614	38,535	41,111
Existing Storage Greater than 40 psi @ 2nd Story				
Cougar Ridge Reservoir (gal)	10,414	10,414	10,414	10,414
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	3,622	3,622	3,622	3,622

Valley Operating Area

Table 9-12 shows that storage within the Valley Operating Area is currently sufficient to the 10-year planning horizon. However, forecasted growth in the Valley Operating Area increases both standby and equalizing storage volumes. Additional storage (South SPAR Reservoir) will be required to provide the additional storage volume for the 20-year planning horizon.

Additionally, a deficiency exists for delivering operational and equalizing storage to all services at 40 psi at the 2nd story. The locations that have a pressure below 40 psi at the 2nd story is shown in Figure 9-3.

The analysis calculates available storage based on a highest service connection elevation of 200 ft within the Valley 297 Zone. Four services are higher than 200 ft, all of which are located at the western end of NW Goode Place. A project has been identified to move these services to the Talus 616 Zone from the Valley 297 Zone.

Table 9-12. Valley Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 200.00 ft			
Largest Fire Demand	3,500 gpm	for	4 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
Valley 297, Bergsma Zones	7,462	9,891	11,524	15,675
Projected Demand (gpm) (2)				
Average Day	777	1030	1200	1633
Maximum Day	1640	2174	2533	3445
Peak Hour Demand	2691	3546	4120	5580
Sources (gpm)				
Risdon Well No. 1	550	550	550	550
Risdon Well No. 2	990	990	990	990
Gilman Well No. 4	200	200	200	200
Gilman Well No. 5	1,020	1,020	1,020	1,020
Total Available Source, All Sources Online	2,760	2,760	2,760	2,760
Total Available Source, Largest Source Offline	1,740	1,740	1,740	1,740
Required Storage Calculations				
Operational Storage (gal) (3)	262,127	262,127	262,127	262,127
Equalizing Storage (gal) (4)	0	117,861	204,029	422,958
Standby Storage (gal) (5)	1,492,343	1,978,174	2,304,874	3,134,939
Fire Suppression Storage (gal)	840,000	840,000	840,000	840,000
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	262,127	379,988	466,156	685,085
Greater than 20 psi at highest meter (gal) (7)	2,594,470	3,198,163	3,611,030	4,660,024

Table 9-12 (continued). Valley Operating Area Storage Capacity Analysis

Existing Storage Greater than 30 psi				
Westside Reservoir (gal)	1,757,442	1,757,442	1,757,442	1,757,442
Cemetary Hills Standpipes (gal)	917,445	917,445	917,445	917,445
Proposed SPAR Reservoir (gal)	0	1,896,516	1,896,516	1,896,516
Total Existing Storage at 30 psi (gal)	2,674,887	4,571,403	4,571,403	4,571,403
Storage Surplus/(Deficiency) at 30 psi (gal)	2,412,760	4,191,415	4,105,248	3,886,318
Existing Storage Greater than 20 psi				
Westside Reservoir (gal)	1,757,442	1,757,442	1,757,442	1,757,442
Cemetary Hills Reservoir (gal)	975,430	975,430	975,430	975,430
Proposed SPAR Reservoir (gal)	0	2,535,539	2,535,539	2,535,539
Surplus Storage from Talus Shangri-La at 20 psi (gal)	986,536	903,815	890,028	890,028
Surplus Storage from Cougar Ridge at 20 psi (gal)	21,318	21,318	21,318	21,318
Surplus Storage from Mount Hood at 20 psi (gal)	410,437	367,066	335,767	248,253
Total Existing Storage at 20 psi (gal)	4,151,163	6,560,610	6,515,525	6,428,011
Storage Surplus/(Deficiency) at 20 psi (gal)	1,556,693	3,362,447	2,904,496	1,767,987
Westside Reservoir (gal)	0	0	0	0
Cemetary Hills Standpipes (gal)	0	0	0	0
Proposed SPAR Reservoir (gal)	0	0	0	0
Total Existing Storage at 40 psi @ 2nd Story (gal)	0	0	0	0
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	(262,127)	(379,988)	(466,156)	(685,085)

South Cove Operating Area

Table 9-13 shows that storage within the South Cove Operating Area has a deficiency for the 10-year planning horizon. The analysis assumes that 1,000 gpm of the 3,500 gpm is provided by the Bellevue intertie (the largest allowable fire flow per agreement).

However, the deficiency could be resolved by allowing nesting in the area. No storage projects are planned at this time for South Cove.

The analysis assumes zero operational storage for the South Cove Reservoir because it is not fed through a booster pump station.

Table 9-13. South Cove Operating Area Storage Capacity Analysis

Highest Service Connection Elevation	EL 175.00 ft			
Largest Fire Demand	3,500 gpm	for	4 hours	
Nesting of Fire Flow Storage?	No			
	Year			
	2017	**2023**	**2027**	**2037**
Projected Equivalen Residential Units (ERUs) (1)				
South Cove 260 Zone	1,216	1,338	1,425	1,671
Projected Demand (gpm) (2)				
Average Day	127	139	148	174
Maximum Day	267	294	313	367
Peak Hour Demand	495	538	569	655
Sources (gpm)				
Bellevue Intertie	1,000	1,000	1,000	1,000
Required Storage Calculations				
Operational Storage (gal) (3)	0	0	0	0
Equalizing Storage (gal) (4)	0	0	0	0
Standby Storage (gal) (5)	364,875	401,335	427,643	501,209
Fire Suppression Storage (gal)	600,000	600,000	600,000	600,000

Table 9-13 (continued). South Cove Operating Area Storage Capacity Analysis

Fire Suppression Storage (gal)	[illegible]	[illegible]	[illegible]	[illegible]
DOH Required Storage				
Greater than 30 psi at highest meter (gal) (6)	0	0	0	0
Greater than 20 psi at highest meter (gal) (7)	964,875	1,001,335	1,027,643	1,101,209
Existing Storage Greater than 30 psi				
South Cove Reservoir (gal)	430,596	430,596	430,596	430,596
Storage Surplus/(Deficiency) at 30 psi (gal)	430,596	430,596	430,596	430,596
Existing Storage Greater than 20 psi				
South Cove Reservoir (gal)	1,012,303	1,012,303	1,012,303	1,012,303
Storage Surplus/(Deficiency) at 20 psi (gal)	47,428	10,968	(15,340)	(88,906)
Existing Storage Greater than 40 psi @ 2nd Story				
South Cove Reservoir (gal)	0	0	0	0
Storage Surplus/(Deficiency) at 40 psi @ 2nd Story (gal)	0	0	0	0

9.2 Distribution System Analysis

9.2.1 Hydraulic Model

Background

A hydraulic model of the water system was utilized to analyze water system performance capabilities and define improvements necessary to meet system pressure and velocity criteria. The modeling software used is Infowater by Innovyze. The model was used to perform the following:

- Evaluate existing system-wide hydraulic performance and identify deficiencies.
- Evaluate future system-wide performance and identify deficiencies.
- Identify system improvements required to resolve deficiencies.

The physical parameters of the model were checked and updated as needed. This work included updating the model with changes to pipe sizes and materials, PRV settings, pump operational rules, water system facilities (pump stations and storage reservoirs), and updating model node elevations based on the most recent contour data available. After the physical parameters of the model were updated, demands were then allocated into the model.

Demand Allocation

Demands are allocated to junction nodes in the model. Junctions are located at the intersections of pipe mains and, in some locations, between intersections. Junction nodes are not included for every service connection.

A GIS database of water meters in the system includes current water demands by customer class. The demands in this database also included non-revenue demands distributed based on the size of the revenue demand of a water meter. The meter demands were then spatially linked to the nearest pipe in the model. The “meter-pipe” allocation method in the Demand Allocation module in InfoWater was used to allocate demands in the model. The method takes a point (meter) demand and allocates it between the junctions on each end of the particular model pipe segment that demand was spatially linked to. The split between junctions is weighted by distance.

For future forecast years, increases in demand for pressure zones was typically distributed by multiplying each demand junction in a pressure zone by the same factor. However, for the Valley 297 Zone, areas inside and outside of the Central Issaquah area were allocated separately, while in the Talus Foothills 912 Zone demands were allocated only to specific areas where planned development will occur.

Calibration

A steady-state calibration of the model was completed using data collected from 15 fire hydrant flow tests performed throughout the distribution system (see Figure 9-2). The static and residual pressures measured from the flow tests were then compared to the predicted values in the model. Each test had multiple locations in which static and residual pressures were read including the residual hydrant near the flow test along with locations in the applicable pressure zone in which pressures are recorded by the City's SCADA system (PRVs and pump stations). Between the 15 tests, there were 92 points of data for both static and residual conditions in which model and field data were compared to inform the calibration.

Calibration of the model was performed primarily by adjusting roughness factors for pipes and by adjusting PRV station settings where applicable.

There are no standard industry adopted criteria for calibrating a water system model. Since the model is being used for general water system planning, calibration goals were to have:

- Predicted (model) pressure results to within 4.3 psi (10 ft of water column) or 5%, whichever is greater, of measured values for 90 percent of data points
- Predicted pressure results to within 8.6 psi (20 ft of water column) or 15%, whichever is greater, of measured values for 100 percent of data points
- Drop in pressure (from static to residual conditions) within 5 psi of measured values for 90 percent of data points.

Table 9-14 provides a summary of the calibration of the model compared to the calibration goals. All goals were met except for one measurement point within Test No. 15 in which one location measured during the test had measured static and residual pressures whose difference from model values exceeded the 8.6 psi / 15 percent limit. However, the measured and predicted drop in pressures for the location were within 5 psi. The assumed elevations of measurement locations involved in the test and the pressures measured during the test at those locations was used to calculate HGL elevations for the points. A large difference in HGL elevation was seen between these measurement points during flow conditions which can be expected, but also for static conditions where HGL elevations should remain relatively flat across a pressure zone if there is no major

Table 9-14. Calibration Accuracy

	5 psi Pressure Drop Difference	4.3 psi (10 ft) / 5% Difference		8.6 psi (20 ft) / 15% Difference	
		Static	Residual	Static	Residual
Data Points Within Calibration Goal	59	56	58	61	61
Tests Outside of Calibration Goal	3	6	4	1	1
% Acceptable	95.2%	90.3%	93.5%	98.4%	98.4%
% Acceptable Goal	90%	90%	90%	100%	100%

demand draws. Because of this, it is suspected that an erroneous elevation or pressure reading caused the difference.

After review of the data collected from the field and model, it was determined that any discrepancies between the field and model were within a reasonable margin of error and that the model was sufficiently calibrated to performed the required analysis.

9.2.2 Pressure Analysis

In accordance with WAC 246-290-230, a minimum pressure of 30 psi must be maintained at all customer connections under peak hour demand (PHD) conditions with operational and equalizing storage volumes depleted in the reservoirs. Additionally, the City has a design policy for new developments of keeping pressures above 40 psi at the second story (analysis assumes this is measured as 12 ft above grade).

A steady-state run of the model was completed using PHD and operational and equalizing storage depleted. The model run showed that distribution system piping (outside of PRV and pump stations) all remain below 8 ft/s during PHD conditions. Pressures in the system were also determined using the model.

Figure 9-3 illustrates areas which currently (2017 demands) have low pressures during PHD conditions. Currently, no areas are below 30 psi during peak hour demand conditions. However, as shown in Figure 9-3, some areas do have pressures below 40 psi at the 2nd story. Figure 9-4 illustrates areas which have low pressures when assuming 2027 PHD and 10-year capital improvement program (CIP) projects have been completed.

A model run was also completed to determine the maximum static pressures throughout the system. It is the City's goal to keep pressures bellow 100 psi when possible and to restrict pressures to stay below 150 psi. Figure 9-5 shows the pressures throughout the distribution system during static (no demand) conditions with reservoirs at their overflow elevations (representing a maximum pressure condition). As seen in Figure 9-5, a few areas have pressures which exceed 150 psi given this condition.

9.2.3 Fire Flow Analysis

A fire flow run of the hydraulic model was used to determine the maximum fire flow available during maximum day demand (MDD) conditions. The maximum fire flow available is defined as the maximum flow that can be delivered to a fire flow node while keeping system pressures above 20 psi with operational, equalizing, and fire flow storage depleted as well as keeping pipe velocities under a maximum allowable velocity. This is then compared to the required fire flow for the node to determine if there is a deficiency.

Table 9-15. Fire Flow Goal

Land Use	Fire Flow Goal
Single Family (8 ft setback)	1,000 gpm
Single Family (no setback)	1,500 gpm
Non-Residential	3,500 gpm

Typically, the required fire flows in the model are based on the fire flow goals in Table 9-15. The values in the table are planning level fire flow goals that are used to size water mains and facilities. However, actual regulatory fire flow requirements for individual buildings may differ from these goals which are based on the International Fire Code and building construction. A few locations in the model have lower fire flow goals based on known specific requirements.

The available fire flow calculated in the hydraulic model is equivalent to what the distribution system can deliver to a location, not necessarily what a single hydrant on a lateral off the distribution main would be able to convey. Hydrant laterals were not included in the model.

It is the City's policy to keep pipe velocities below 7 ft/s during fire flow conditions (see Section 3.4.2). Very few existing locations in the City are able to meet the 7 ft/s policy and upgrading the existing system to meet the 7 ft/s criteria would be exceedingly costly. Therefore this criteria is not used for determining new CIP projects.

However, the hydraulic analysis (and the resulting distribution main upsize projects included in this plan) use a criterion of 10 ft/s to identify and size potential velocity-based improvements to the existing system. The 10 ft/s criterion was selected because it resulted in an array of projects that is financially more feasible than what would be required using the 7 ft/s criterion. It was also selected because velocities above 10 ft/s are increasingly more vulnerable to pressure surges. WAC 246-290-230 requires that transmission mains designed to convey velocities greater than 10 ft/s include a water hammer (pressure transient) analysis in the design. Available fire flows were also determined using a 20 ft/s criterion as well as having no velocity constraint to determine different levels of priority for identified deficiencies.

Given current (2017) demands, operating rules, and infrastructure, fire flow deficiencies given no velocity constraint (20 psi pressure constraint only), 10 ft/s velocity constraint, and a 20 ft/s velocity constraint are given in Figure 9-6, Figure 9-7, and Figure 9-8.

As shown on Figure 9-8, there are some areas in the system that are not able to meet the fire flow goal while keeping pressures at service connections above 20 psi. Some of these are located at dead-end mains that have higher, non-residential fire flow goals.

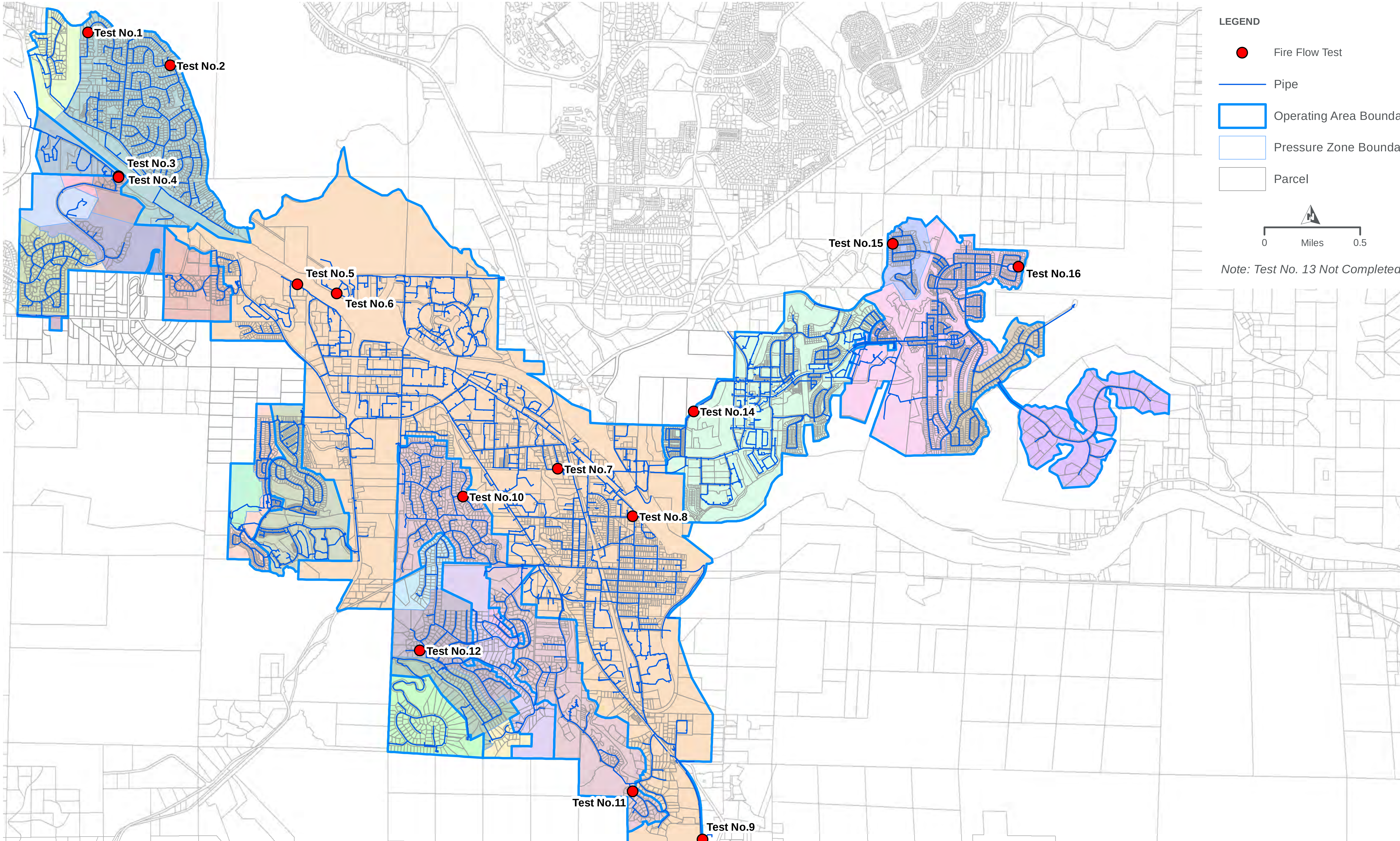
Others are located at far ends of a pressure zone away from sources. There are three instances of this in the Valley 297 Zone. In the northwest part of the zone, deficiencies exist along Newport Way east of the Cougar Ridge 430 Pressure Zone. These deficiencies will be resolved given new mains that will be installed in the area as part of the Gateway Apartments development as well as the new planned pipe crossing of I-90.

Another location is on the southwest end of the Valley 297 Zone near the Talus I & II BPS. The deficiencies in this area can be resolved by installing a PRV station between the Valley Zone and the Talus Shangri-La 616 Zone near the Talus I & II BPS.

The third area of deficiencies in the Valley 297 Zone is in the southeast end of the zone and is caused by the high, non-residential fire flow goal needing to be conveyed by a long distance of piping. This can be improved by increasing pipe sizes in this part of the system.

The other deficiencies in Figure 9-8 due to flows limited by pressure constraints, as well as deficiencies shown in Figure 9-6 and Figure 9-7 due to flows limited by velocity, can be resolved through additional pipe looping, pipe upsizing, and changes in pump operating rules. A summary of the projects to resolve these deficiencies is given in Chapter 11.

When incorporating all the projects identified in Chapter 11, the deficiencies in the system given 2027 and 2037 projected demands are shown in Figure 9-9 and Figure 9-10, respectively. Only two deficiencies still exist for both planning horizons which are for hydrants located near storage facilities. These hydrants are marked as low pressure hydrants and will not have projects to address the deficiencies.



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FIRE FLOW TEST LOCATIONS FOR MODEL CALIBRATION

FIGURE 9-2

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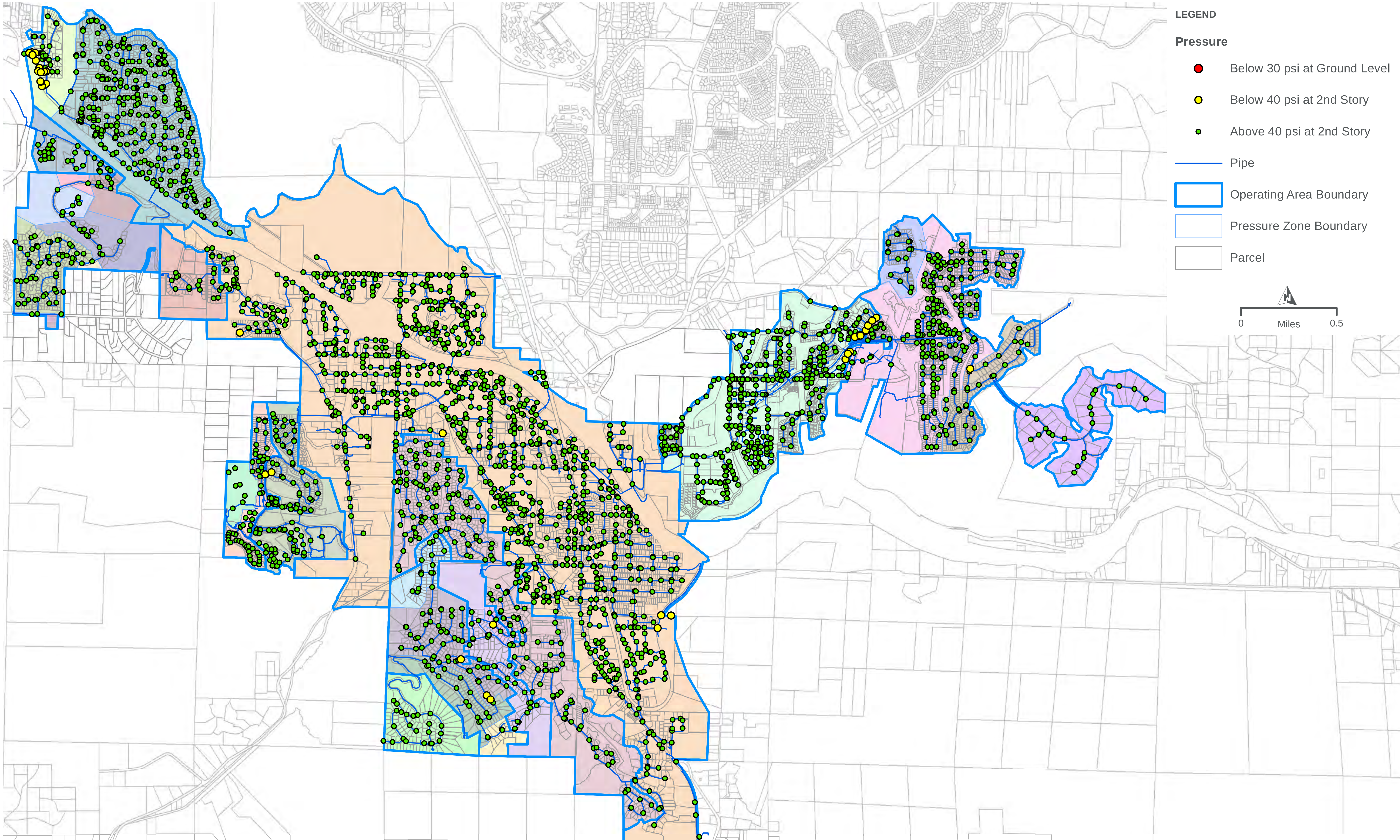

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2017 PEAK HOUR DEMAND MINIMUM SERVICE CONNECTION PRESSURES (OPERATIONAL AND EQUALIZING STORAGE DEPLETED)

FIGURE 9-3

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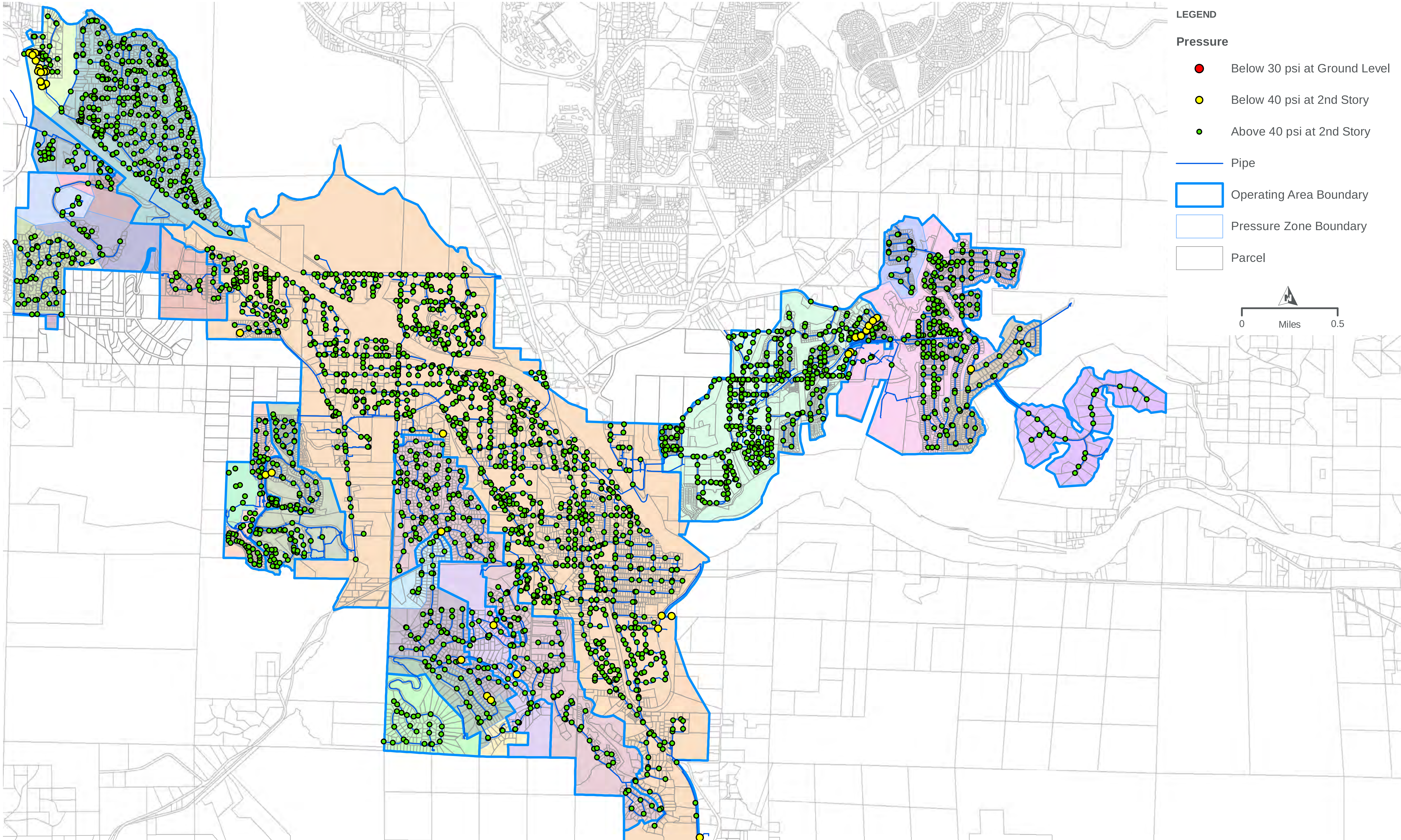

CITY OF ISSAQUAH WASHINGTON

2027 PEAK HOUR DEMAND MINIMUM SERVICE CONNECTION PRESSURES (OPERATIONAL AND EQUALIZING STORAGE DEPLETED)

FIGURE 9-4

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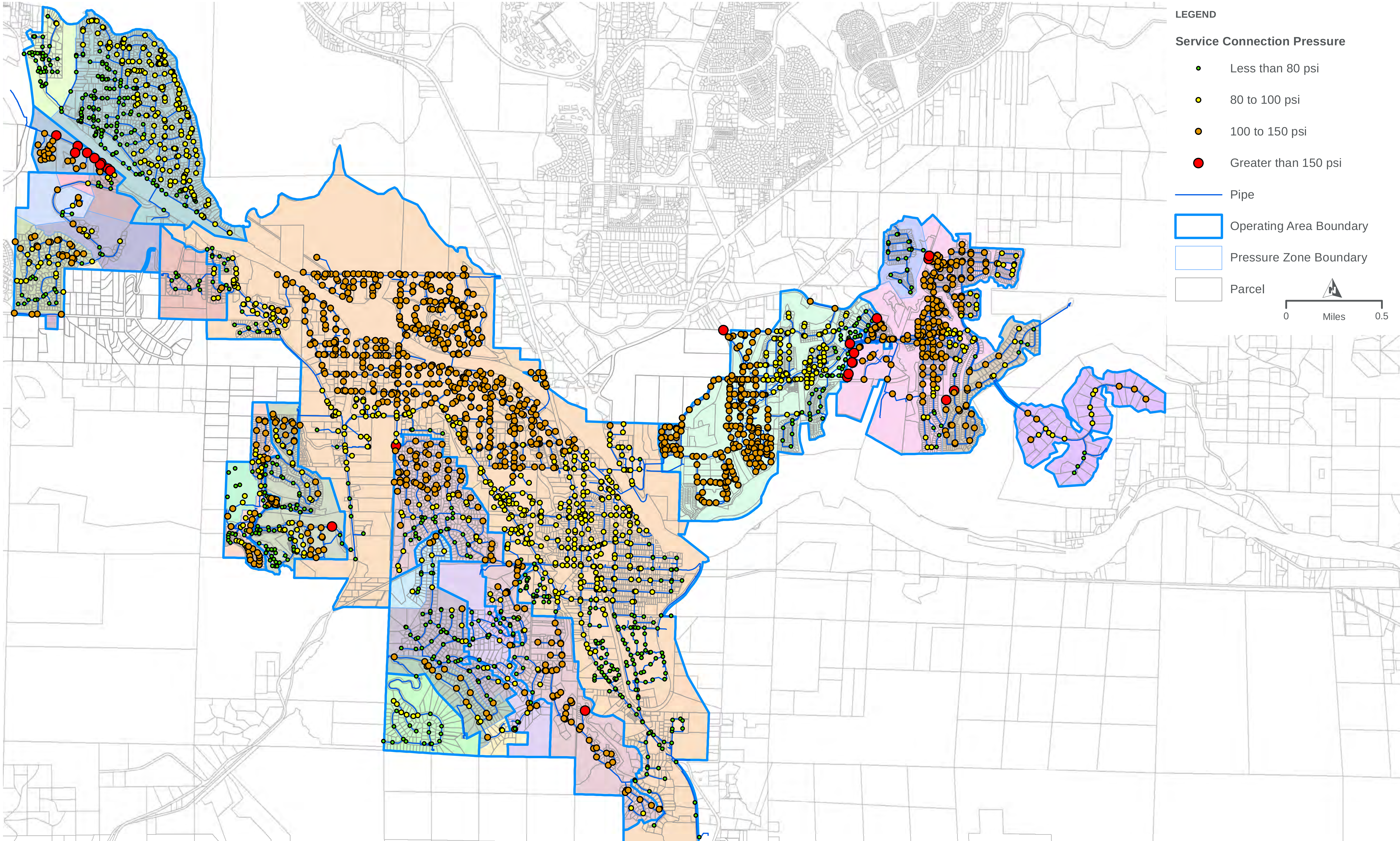

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2017 SERVICE CONNECTION MAXIUMUM PRESSURE (STATIC CONDITIONS WITH STORAGE AT OVERFLOW)

FIGURE 9-5

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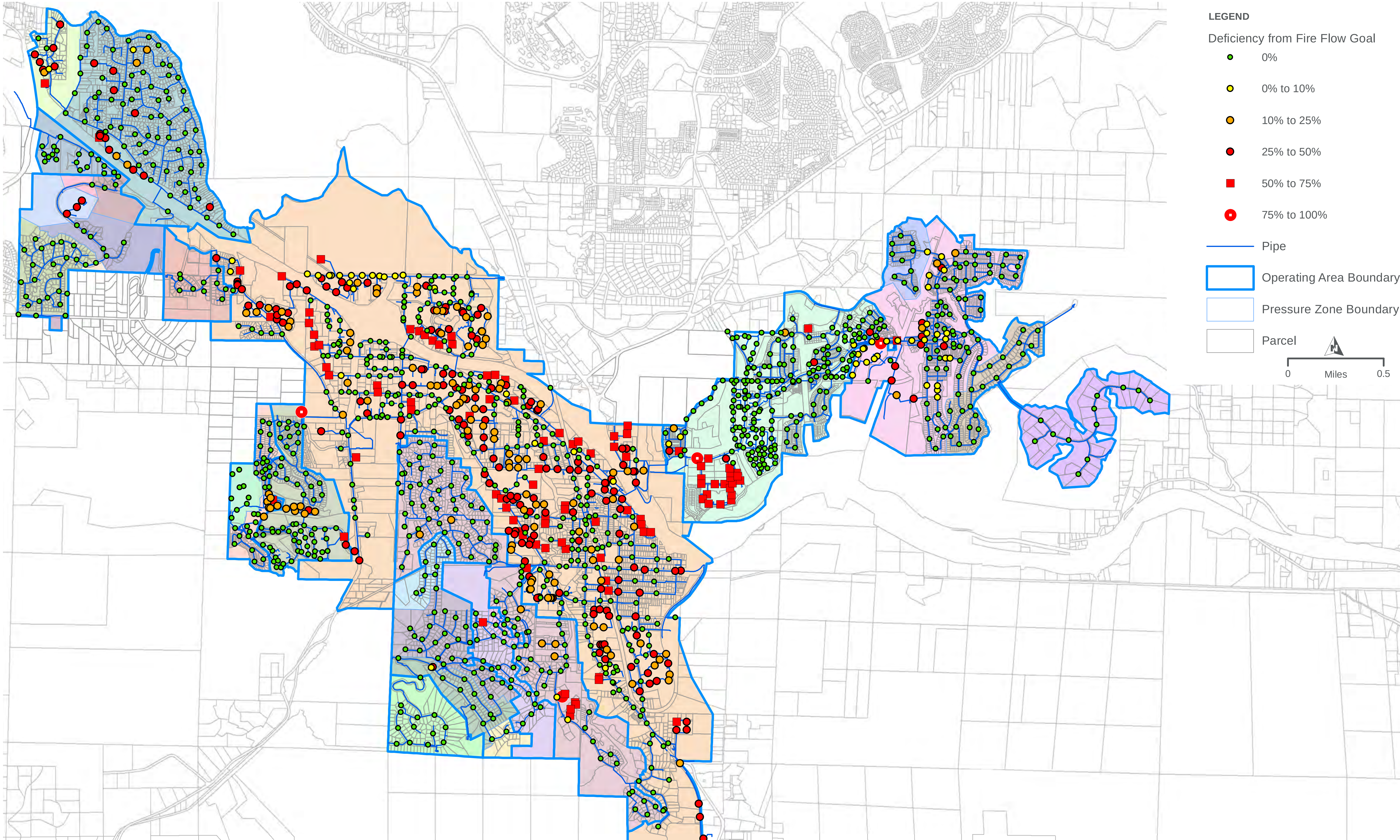

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2017 FIRE FLOW DEFICIENCIES: 10 FPS VELOCITY LIMIT

FIGURE 9-6

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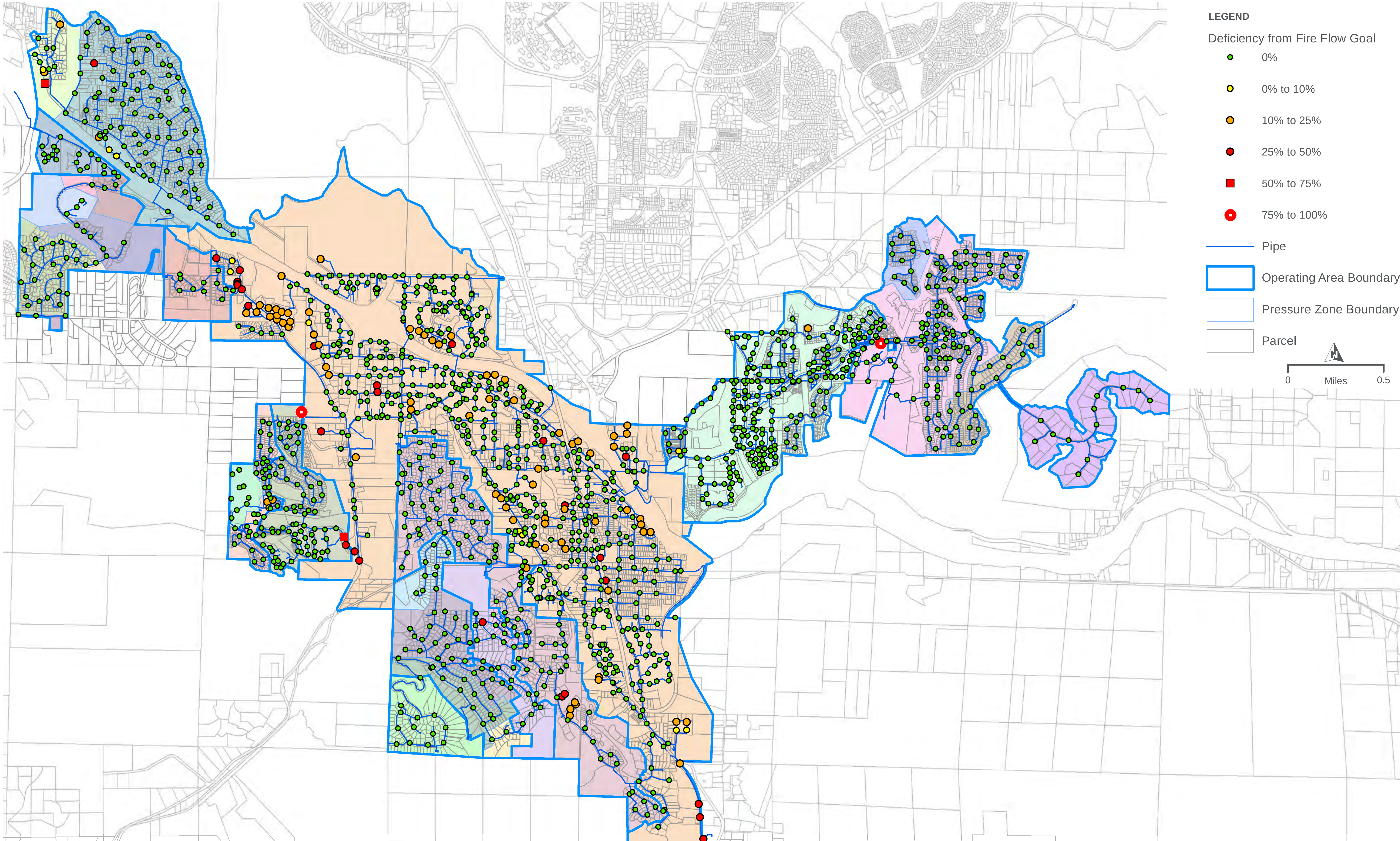

2017 FIRE FLOW DEFICIENCIES: 20 FPS VELOCITY LIMIT

FIGURE 9-7

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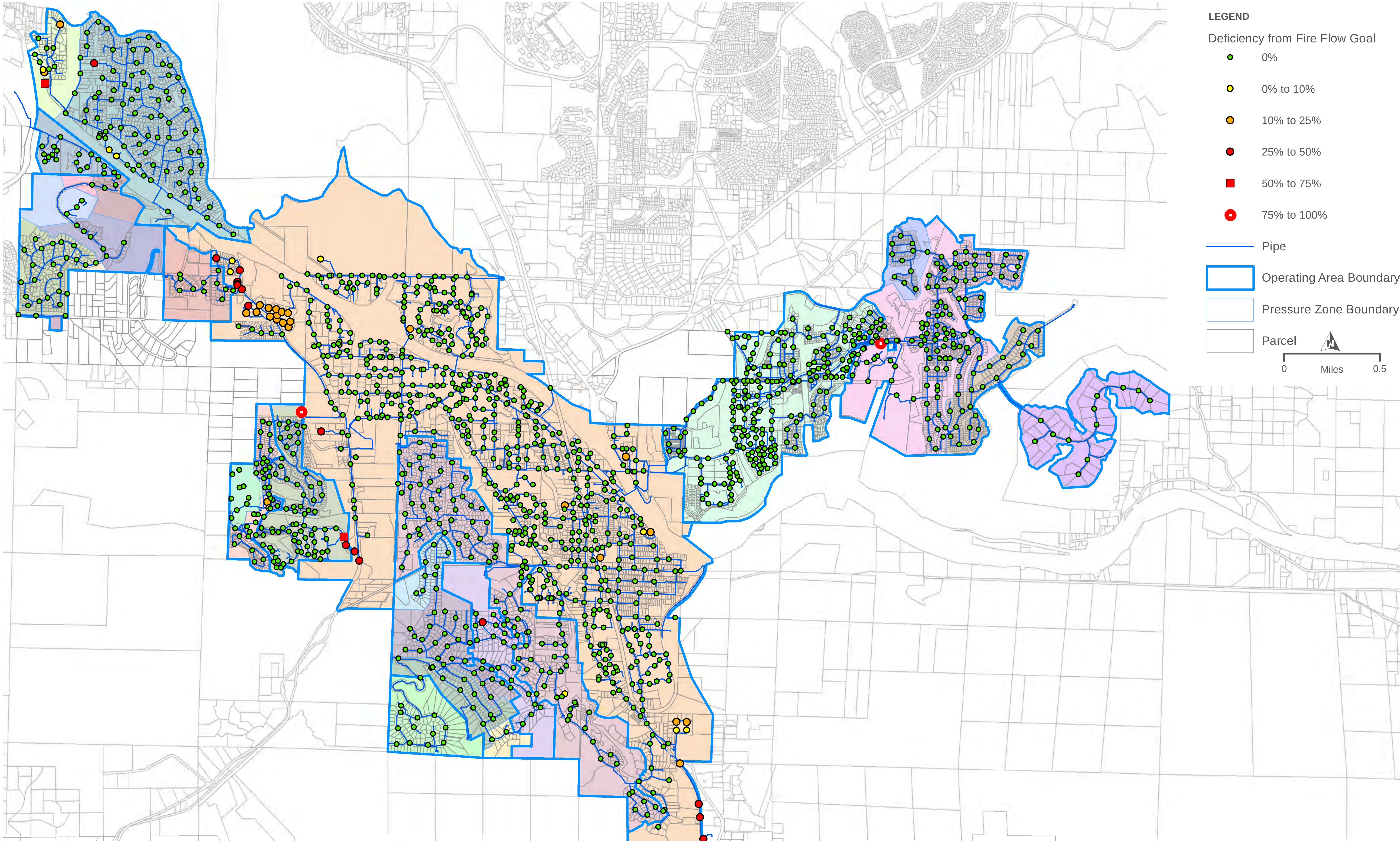

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2017 FIRE FLOW DEFICIENCIES: NO VELOCITY LIMIT

FIGURE 9-8

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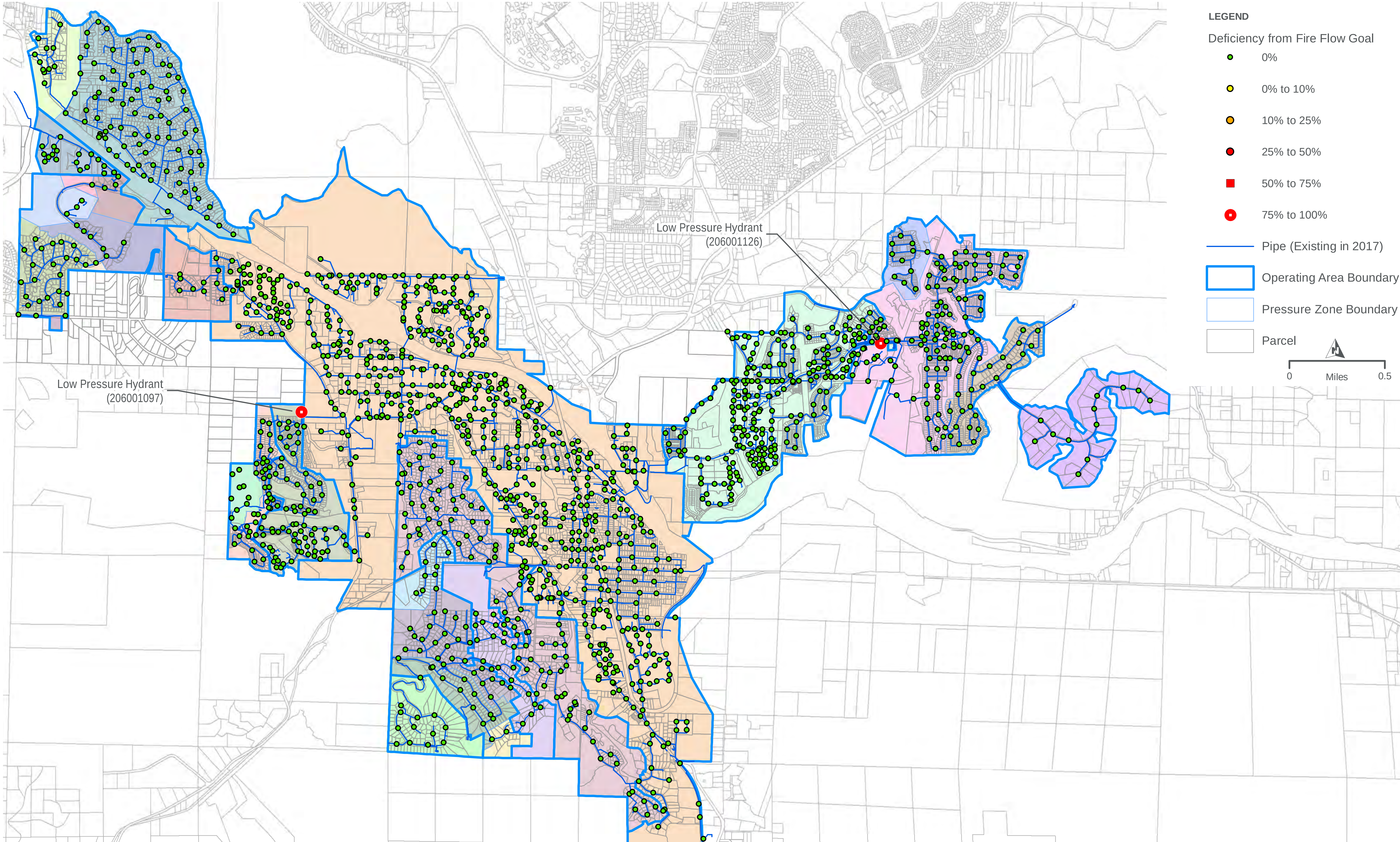

HDR CITY OF ISSAQUAH WASHINGTON

2027 FIRE FLOW DEFICIENCIES: CIP PROJECTS WITH 10 FT/S VELOCITY LIMIT

FIGURE 9-9

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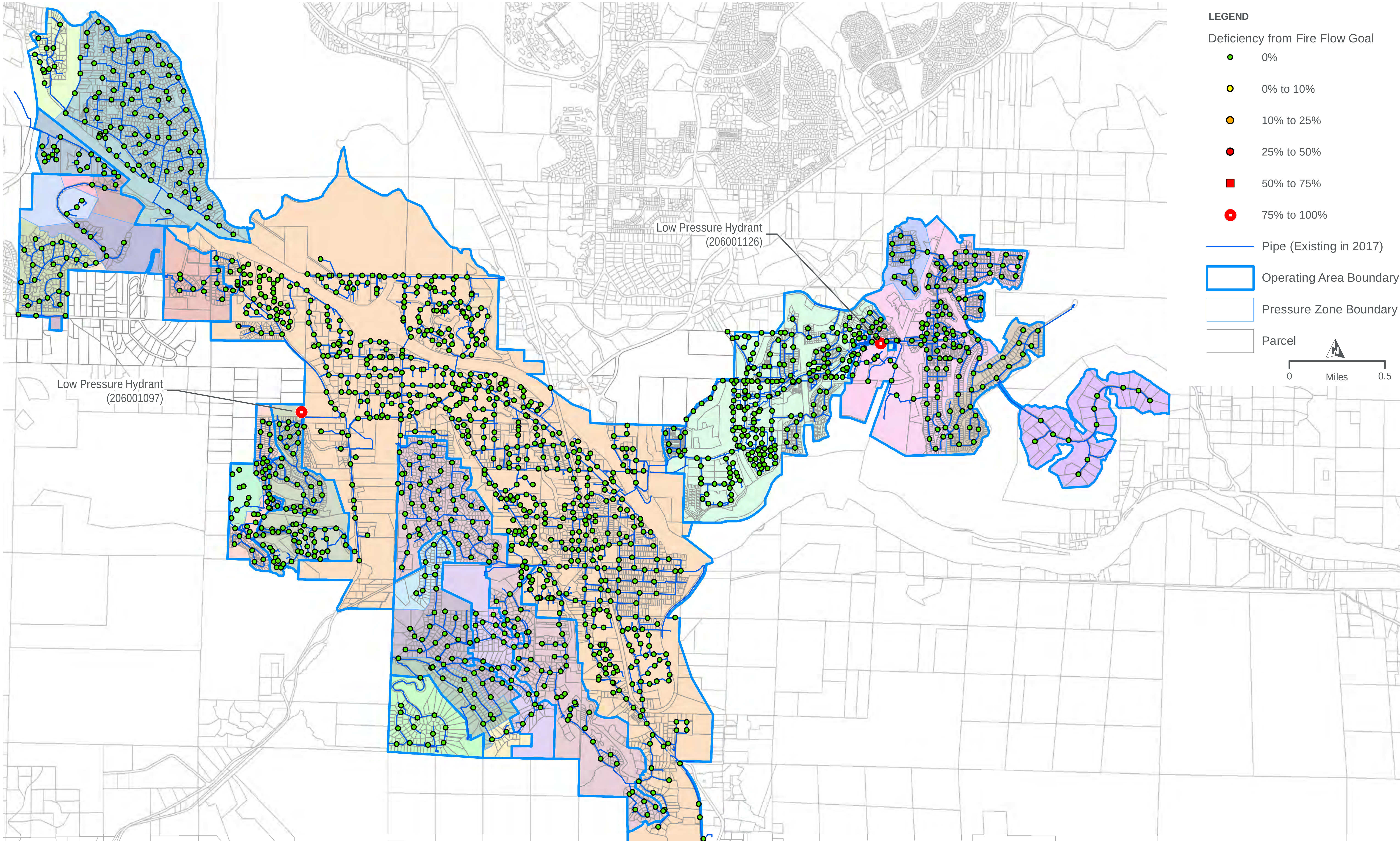

HDR CITY OF ISSAQUAH WASHINGTON

2037 FIRE FLOW DEFICIENCIES: CIP PROJECTS WITH 10 FT/S VELOCITY LIMIT

FIGURE 9-10

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Chapter 10. Operations and Maintenance

This chapter provides an overview of the operations and maintenance functions of the City's water utility.

10.1 Water System Management and Personnel

The City's administration and management is structured to optimize use of personnel, office, and maintenance facilities. Figure 10-1 details organization of the Public Works staff.

The City has a mayor-council form of government; subsequently, the Public Works Engineering and Public Works Operations Directors report to the Mayor. The City Council Utilities, Technologies, and Environment Committee is comprised of three City Council members and provides oversight of the water utility regarding policy, planning, and management of the water system.

The City is operated as a utility enterprise under the direction of the Public Works Engineering and Public Works Operations Directors. The Public Works Departments of Engineering and Operations have the responsibility for planning, design, construction, operation, maintenance, quality control and management of the water system. The Engineering Department provides design, construction, and inspection of projects related to the water system under its Director. The Operations Department, under the direction of the Operations Director, performs daily activities including infrastructure maintenance, inspections, utility locating, water quality monitoring, and manages the Cross Connection Control Program.

The Finance Department provides all financial functions for the water utility: utility billing services and customer water sales records. Meter reading, although intricately tied to the Finance Department, is a function performed by the Operations Department.

Employees responsible for operation, maintenance and administration duties are listed in Table 10-1.

Figure 10-1. Public Works Organization Chart

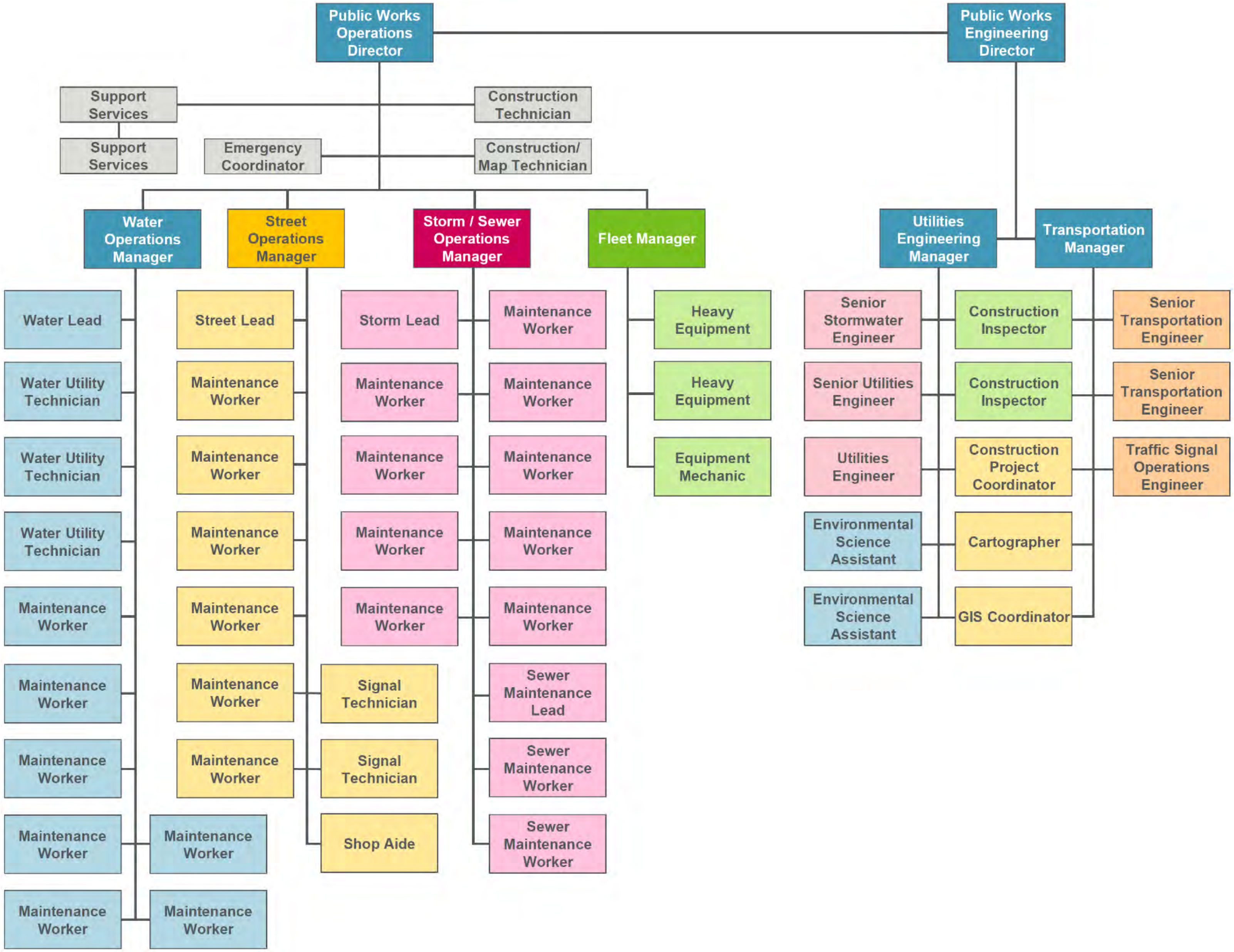

Table 10-1. Current Water Staffing Positions

Position	Number of Employees	Percent Dedicated To Department	Number of Full Time Employees (FTEs)
Public Works Operations			
Public Works Operations Director	1	25	0.25
Office Manager	1	25	0.25
Manager of Water Operations	1	100	1
Water Lead	1	100	1
Water Utility Technician	3	100	3
Water Maintenance Worker	7	100	7
Part Time Worker	1	62	0.62
Mapping Technician	1	30	0.3
Shop Aide	1	30	0.3
Administrative Staff	2	25	0.5
Fleet Supervisor(1)	1	6	0.06
Fleet Mechanic(1)	3	6	0.06
Public Works Engineering			
Public Works Engineering Director	1	25	0.25
Utilities Engineering Manager	1	33	0.33
Senior Utilities Engineer	1	50	0.50
Utilities Engineer	1	33	0.33
Construction Inspector	2	25	0.50
Construction Project Coordinator	1	25	0.25
Cartographer	1	25	0.25
GIS Coordinator	1	25	0.25
Finance Department			
Utility Services Program Coordinator	1	25	0.25
Development Services Department			
Development Services Director	1	10	0.10
Land Development Manager	1	10	0.10
Senior Engineer	2	10	0.20
Senior Planner	1	10	0.10
Assistant Planner	3	10	0.30
		TOTAL FTEs for Water Utility	**18.05**

[1] Fleet Services charge a flat rate based on the prior year's service costs to each utility and department. Fleet charges in were $33,408 in 2017 and $35,068 in 2018.

10.2 Future Staffing

During the planning period to 2037, it is predicted that the water demand will increase by approximately 72 percent. It is believed that the personnel requirements for operations, maintenance and clerical duties will also increase during this time to meet the demands of operating and maintaining the system; Public Works Operations staffing may increase from 14 FTEs to approximately 24 FTEs by 2037 and Public Works Engineering staffing may increase from 3 FTEs to 5 FTEs by 2037.

10.3 Operator Certification

The City recognizes the value of having a knowledgeable and well-trained staff to operate the water utility, and encourages employees to obtain the highest level of certification available. To promote this aptitude, the City pays for annual certification fees, provides time and tuition for certification training courses and allows time during work hours for certification examinations. In addition, the City provides its staff opportunities for obtaining the continuing education required to maintain certification. Professional growth requirements for certification are met through continuing education units (CEUs).

Certification requirements for water systems are outlined in WAC 246-292. The system classifications and minimum operator certification levels for the Issaquah system are given in Table 10-2. The system must maintain a person in responsible charge at the minimum certification level or higher. Outside of regular work hours, the person in responsible charge may be one level below the minimum operator certification level.

The number of operating staff with certifications is shown in Table 10-3.

Table 10-2. Required Certification Levels

System Classifications	Classification	Minimum Operator Certification Level
Water Treatment Plant	Class 1	Water Treatment Plant Operator (WTPO) 1
Distribution System	Class 3	Water Distribution Manager (WDM) 3

Table 10-3. Public Work Operations Water Division Staff Certification

	Certification	No. of Staff with Certification
WDM-4	Water Distribution Manager 4	1
WDM-3	Water Distribution Manager 3	1
WDM-2	Water Distribution Manager 2	4
WDM-1	Water Distribution Manager 1	5
CCS	Cross Connection Control Specialist	5
BAT	Backflow Assembly Tester	3
WTPO-1	Water Treatment Plant Operator 1	5

10.4 System Operation

System operation is the control of various facilities to ensure that water is available in quantities and at locations throughout the service area, so that customer demands are met.

Public Works Operations, Water Division is located at 670 1st Ave NE, Issaquah and comprises five buildings constructed in 2003: Administration, Shops, Parking, Fleet and Decant. This facility is shared with Public Work Operations divisions of Street, Sewer, Storm Water and Fleet Maintenance.

Operation and maintenance tasks include infrastructure preventative maintenance, meter reading, maintaining water quality, repairing infrastructure, cross connection control and regulatory compliance. Private contractors are also engaged to perform tasks that require specific tools, equipment or knowledge.

Preventative maintenance programs are necessary to maintain consistency of the water system. Manufacturer's information for each piece of equipment regarding preventative maintenance is readily available and referenced by the operators. Some of these programs are:

- Source meters are inspected monthly and are calibrated every two years. Water personnel read the service meters and note any malfunction for subsequent repair. Readings are collected and compared to electronic readings gathered automatically by the City's SCADA system.
- Wells, booster pump stations, and reservoirs are checked on a weekly schedule. Personnel verify power voltage and amperage, pump and motor use, and condition; and check for excessive heat, noise, vibration, and odor. Also inspected are overall station conditions including mechanical, structural, and site anomalies. All items needing attention are forwarded to the Water Division manager or designee.
- Water mains are routinely replaced under Public Works Engineering's Water Main Replacement Program. Targeted water mains for replacement are asbestos cement, cast iron, undersized mains, and looping to address water quality and volume issues. Complementing the Main Replacement Program is Public Works Operations' Leak Detection Program. This is a continual effort, using a contracted leak detection service to sound approximately 50 miles of water main per year. The goal of these programs is to maximize water efficiency by reducing leakage, reducing repair costs, and allowing better fire flow volumes. Collectively, these goals supplement the larger goal of saving water and extending the point to where new water sources must be secured.
- Two types of water main flushing are routinely completed: high-volume, unidirectional flushing (HVF) and dead-end water main flushing. HVF is completed biennially for the entire northwest section of the Valley Operating Area, the primary distribution area for Gilman Wells 4 and 5, because of elevated manganese levels. HVF throughout the remaining city sections is performed on a rotating five-year schedule. Dead-end water main flushing points are distributed on one of three cycles determined by historical water quality data; the three flushing schedules are 6-week, 12-week, and 26-week flushes.
- Water reservoirs are cleaned and inspected on a five-year cycle to remove accumulated silt and verify coating conditions. Recoating the interior would be scheduled after inspection, if needed. The reservoirs are also subjected to a detailed inspection once per year, noting any appurtenance deficiencies for later correction.

- An aggressive and comprehensive Cross Connection Control program works toward eliminating possible water contamination through cross-connected piping arrangements.
- Easements are inspected, kept clear and clean of brush and debris.
- Other ongoing maintenance programs include: fire hydrant operation and maintenance program, valve exercising program, monthly steel reservoir cathodic protection check, monthly PRV inspections, yearly PRV adjusting and calibration, five-year PRV rebuilding program, domestic water meter upgrades to Radio Read technology and galvanized water service renewals.

10.4.1 Telemetry

Monitoring and adjusting primary operations of the water system are carried out using the Supervisory Control and Data Acquisition (SCADA) computerized control system located at the Public Works Operations facility. The SCADA system allows the operator to adjust operational parameters to meet specialized needs and requirements that vary with time of day and season. The SCADA system is fully automated and accessible remotely, plus allowing for manual control and collecting operational data for records and analysis. The system includes Programmable Logic Controllers (PLCs), two dedicated computer servers, computer interface screens, a manually-operated panel interface, and remote access to the system.

10.4.2 Standard Operating Procedures

Standard Operating Procedures for virtually all water functions are written and regularly updated to ensure accuracy and consistency in system operations.

10.4.3 Supplies

As part of maintaining the water system, supplies, equipment and services are purchased from distributors and vendors. Many of these purchases require specific handling procedures, installation requirements, or hazards. Employees are trained for these specifics and most technical information or health hazards have been incorporated into Standard Operating Procedures.

10.4.4 Comprehensive Monitoring (Regulatory Compliance) Plan

The City maintains an active and ongoing program of water quality monitoring and compliance reporting to ensure a safe, high-quality water supply. Public Works Operations employees are responsible for water quality monitoring and compliance reporting. Employees are responsible for collecting and coordinating all water quality sampling, coordination with laboratory testing companies, chlorination and fluoridation control, and water quality record maintenance and reporting. The City Water Quality Program is discussed in Chapter 8.

10.4.5 Emergency Response Program

The most likely disasters to impact the water utility include power outages, floods, fire, storms, sustained freezing temperatures, chemical spills, or earthquakes. These and other issues are discussed at length in the City's Comprehensive Emergency Management Plan and Water System Emergency Response Plan. Both emergency response plans have been included as appendices into this document. The City has also been completing tasks to lessen seismic damage, detailed in the 2002 Water/Wastewater Seismic Disaster and Recovery Plan.

10.4.6 Customer Response to Requests or Service

Customers often call with general water system questions, or questions specific to their home or workspace. Some typical topics include: whether there is fluoride in the drinking water, if there is a water leak, or for a water quality issue. A phone number and online reporting form are provided on the City's website.

Requests, questions, or statements regarding the water system are typically answered within that working day. Questions regarding water quality are typically responded to immediately—including a physical response. All work performed is recorded on work orders and entered into the Public Works Operations database.

10.4.7 Record Keeping

Water quality and operational records are maintained according to WAC 246-290-480 and 485. These records are available for inspection by DOH and will be sent to DOH if requested. Records are kept digitally, on paper, or both depending on the data.

Reports are submitted as required by WAC 246-290-480(1)(a). Most records are kept in hard copy, although water quality results are kept in both hard copy and electronic format.

10.5 Water Quality Protection Programs

10.5.1 No Lead Piping in System

In May 2016, the Washington State Governor issued Directive 16-06 which calls for DOH to further prioritize and assist communities in responding to lead in water systems.

However, there is no evidence that the City's water system contains any lead service connections or appurtenances. Record drawings of the system do not detail or describe any lead service connections being used, and there is no record of work being performed where lead service lines have been found in the system. Because of this, the City is not currently implementing and programs for finding lead appurtenances beyond the sampling discussed in Chapter 8.

10.5.2 Cross-connection Control Program

The City has a cross-connection control program which is designed to protect the health of water consumers of the public water system. The cross-connection control program establishes minimum operating policies and backflow prevention assembly installation and testing practices. This program is structured such that it may be supplemented with published documents and materials developed by the City for its specific use. The authority to enforce these practices and policies is established in City of Issaquah Municipal Code Chapter 13.13 or its future revisions.

A copy of the City's cross-connection control program is included in Appendix O.

10.5.3 Sanitary Survey

All Group A public drinking water systems are required to complete routine sanitary surveys of the system every three to five years. The survey evaluates the critical elements of the water system and its operation including:

- Planning and management documents.

- Distribution system and status of cross-connection control program.
- Source and sanitary control area.
- Source pumps and pumping facilities.
- Source treatment procedures and equipment.
- Monitoring, reporting, and data verification.
- Finished water storage.
- Operator certification status.

In the State of Washington, sanitary surveys are administered by DOH. The last sanitary survey for the City was conducted in October 215 with the letter of finding received from DOH in December, 2015. The survey did not find any “significant deficiencies” in the system requiring corrective actions. The next sanitary survey of the system will take place in 2020.

10.6 Design Review Procedures

The City implements a comprehensive design review of both developer-led water system projects and projects initiated by the Public Works department.

Developer-led water system designs are reviewed at multiple stages during the permitting process by a broad group of City stakeholders, including professional engineering staff and system operators. These reviews are intended to make sure that all City and DOH policies and requirements are met by the design. Specific standards as shown in Appendix E must be met before the design is approved for construction. In addition, when necessary, submittals to the DOH (engineering reports, plans and specifications, and documentation of construction completion) are submitted. Approval from DOH must be received before construction begins.

Construction of developer initiated water projects is performed under the watch of City inspectors and, when needed, Public Works staff.

Projects implemented by the City follow a similar approach. The City uses both in-house design staff and consulting engineering firms to design projects. Typically, a preliminary design report is prepared, followed by submission of plans, specifications, and estimates at the 30, 60, 90, and 100 (bid ready) percent design points. Reviews include both engineering and operations staff. These reviews are intended to make sure that all City and DOH policies and requirements are met by the design. All work is performed under the supervision of Washington State registered engineers. When necessary, submittals to the DOH (engineering reports, plans and specifications, and documentation of construction completion) are submitted. Approval from DOH must be received before construction begins.

Chapter 11. Capital Improvement Program

This chapter describes the improvements necessary for meeting Issaquah's future water system needs through the year 2037. The improvements are based upon evaluation of the existing system facilities, reports from the operations staff, and the analyses performed while preparing this Plan and form the capital improvement program (CIP).

Specific needs of the water utility must be evaluated on an ongoing basis. As growth and land-use patterns are likely to vary from neighborhood to neighborhood over the planning period, the size and timing of necessary projects may differ from the recommendations in this Plan.

Additionally, this Plan has not attempted to identify all the capital improvements required to serve potential new developments within the City's Future Retail Water Service Area. Specific on-site or off-site improvements may be required that are outside of the scope of this Plan. Additional facility requirements should be identified as part of ongoing facility planning efforts.

11.1 Capital Improvement Program Projects

The improvements addressed in this chapter constitute the recommended CIP for the City water utility, shown in Table 11-3. The CIP includes components that focus on improving the existing system to meet the City's water system policies and criteria, components that respond to projected growth, and desired improvements to upgrade the current system to meet current requirements.

The recommended improvements are summarized in four categories: Water Supply and Treatment, Storage Reservoirs, Booster Pump Stations, and Distribution System. A summary of the projects included in each of these categories is provided below. A detailed list of these projects with CIP costs are provided in Table 11-3 and a map showing project locations is provided in Figure 11-1. Figure 11-2 shows the hydraulic profile of the system with the CIP projects that impact system hydraulics.

11.1.1 Water Supply and Treatment

Water supply projects relate to well, intertie, and treatment facility upgrades. The following projects are planned:

- **Refurbish Gilman Wells** – The Gilman Wells are over 30 years old. This project would refurbish and the building and selected mechanical, electrical, and control infrastructure, including pumps and valves, to enhance the ability to withstand a seismic event and enhance security. The condition of the casings in each of the wells will be evaluated and a determination will be made of the need for rehabilitation or replacement. Rehabilitation of the wells will enhance the routine operation, as well as increase reliability of the system during non-routine catastrophic events.
- **Refurbish Risdon Wells** – The Risdon Wells are approximately 50 years old. This project would refurbish and the building and selected mechanical, electrical, and control infrastructure, including pumps and valves, to enhance the ability to withstand a seismic event and enhance security. The condition of the casings in each of the wells will be evaluated and a determination will be made of the need for rehabilitation or replacement. Rehabilitation of the wells will enhance the routine operation, as well as increase reliability of the system during non-routine catastrophic events.

- **Water Treatment Plant** – This project addresses a permanent solution to perfluorochemicals (PFCs), Manganese (Mn), Iron (Fe), Arsenic (As), pH, and chlorination regarding the City's groundwater supplies. In addition, this project will address fluoridation of the groundwater supplies, to support blending with regional CWA water to meet future needs in the 297 zone.

  The 297 operating zone provides water from the City's wells to areas of the valley floor and up Squak Mountain. As growth occurs in the 297 zone the well capacities will be out-stripped requiring the blending of regional water with the groundwater to provide adequate water supply. This will require addressing the chemistry of both supplies as they blend. To address ongoing water quality challenges at the wells and the issues surrounding blending, the City needs to plan, study, engineer, and build a treatment facility to continue providing reliable and safe drinking water.

  The project would result in an increase in operating costs due to additional treatment being given to the City's well water; however, maintenance of water quality compliance and the ability to blend well and regional water would optimize the use of groundwater and minimize the need to purchase additional regional water.

- **Gilman Wells PFOS Discharge to Sewer** – This project will create a permanent flushing system connected to the sanitary sewer to reduce operations costs for discharging the monthly backwash necessary for the carbon treatment system at Well 4.

- **Emergency Water Fill Station** – Install an emergency water tank that can be remotely filled and dispense water to the public in the event of an emergency.

- **Emergency Water Filtration Plant** – This project creates an emergency supply from Lake Sammamish, including treatment and transmission to distribution systems, which could be utilized by the Issaquah and Sammamish Plateau Water (SPW) systems. SPW would be involved in the development of an emergency supply to determine whether the supply would be an acceptable alternative for both the City and SPW.

- **Bulk-Purchase Water Filling Stations** – Access to Issaquah-produced bulk water is mostly unregulated. The only bulk water source currently available to the public is through any citywide fire hydrant which poses a significant water quality risk. Project will modify five hydrants to be metered and available for use 24-hours a day as bulk water filling stations for public and private use after obtaining a permit.

- **Well Capacity Optimization** – Optimize Gilman and Risdon Wells to maximize use of instantaneous water rights for wells to fullest extent feasible. This would reduce the amount of CWA water that needs to be purchased and would help delay the need for a central Water Treatment Plan.

11.1.2 Storage Reservoirs

As determined in Chapter 9, the City is able to meet all DOH minimum storage requirements through the 20-year planning horizon except for the Valley Operating Area.

Deficiencies in storage for this operating area is addressed by the following project:

- **South SPAR 297 Reservoir** – This project becomes necessary in the future to provide additional standby storage as growth occurs in the Valley Operating Area. Project will be constructed after SPAR booster pump station and associated water main projects are completed. Reservoir is planned to have a 2.5 MG storage volume, constructed of concrete, and will be located north of I-90 near the Sunset Interchange (I-90 Exit 18). Predesign has been completed for the project.

- **South Cove Reservoir Rehabilitation** – Rehabilitate (or replace) a 1 million gallon reservoir which was originally constructed in 1981. This project will correct deficiencies within the reservoir and potentially increase pressures within the South Cove pressure zones.
- **Reservoir Chlorine Boosting** – Some reservoirs currently have an issue of having low residual chlorine levels due to slow reservoir turnover if utilized to the full operating capacity. This project would add booster chlorination equipment at reservoirs having chlorine residual issues.

11.1.3 Booster Pump Stations

As determined in Chapter 9, all pump stations have sufficient capacity to meet current and future maximum day demands. However, two pump station projects are planned:

- **SPAR Booster Pump Station and Main** – provides redundant pumping to the Holly I and II BPSs which are located in a geologically sensitive hazard area and pump from the Valley 297 Pressure Zone to the Issaquah Highlands Central Park 742 Zone. The SPAR Booster Pump Station will be located on the north of I-90 near the Sunset Interchange (I-90 Exit 18) and is planned to have three, 1,000 gpm pumps with approximately 5,800 ft of piping to connect the pump station site to the Valley 297 and Issaquah Highlands Central Park 742 Zones. Predesign has been completed for the project.
- **Replace Forest Rim Booster Pump Station** – replaces the existing Forest Rim Booster Pump Station which is nearing the end of its design lifespan. The current pump station is also susceptible to seismic damage. The new pump station will consist of a new earthquake resistant concrete building with new more efficient pumps, motors, electronics, and security systems. Predesign has been completed for the project.

11.1.4 Distribution System

Distribution system projects relate to transmission and distribution main replacement, looping and extension, PRV replacement, and tie-ins.

A total of seven projects are included in this category:

- **Upgrade water meters to radio read** – Continued program to upgrade service water meters from Touch Read to radio readings.
- **I-90 Watermain Underboring** - Crossing of I-90 between NW Sammamish Road and NW Poplar Way with approximately 930 ft of 12-inch pipe. Project improves available fire flow to the northwest portions of the Valley 297 Pressure Zone. Looping the system with the crossing will also increase water quality due to the added circulation.
- **Lakemont Triangle Regional Main Tie-in and Meter** – Allows the Lakemont Operating Area to be served from the Bellevue-Issaquah Pipeline instead of through interties with the Bellevue Water System and will include a master meter to track flows.
- **Talus PRV Station** – Adds a PRV Station near the Talus I/II BPS allowing water to drop from the Talus 616 Zone to the Valley 297 Zone to allow fire flows goals to be met along Renton-Issaquah Rd SE without having pressures drop below 20 psi.

- **Redundant Water Feed to Squak Mountain** – Constructs approximately 5,000 ft of 12-inch main providing a redundant connection between the north part of the Mt. Hood Operating Area to the Mt. Hood Reservoir.
- **Redundant Water Feed for South Cove Reservoir** – Constructs a connection between the South Cove Operating Area to the CWA regional supply to provide a redundant water supply for the South Cove Reservoir.
- **Water Main Replacement Program** – See description below.

Water Main Replacement Program

The Water Main Replacement Program is a list of pipe replacement projects developed based on the City's rehabilitation objectives and on the results of the hydraulic modeling analysis. The City has allocated an annual budget toward implementing these projects. However, not all of these projects will be completed during the CIP planning horizon in Table 11-3; thus the total main replacement budget shown in this table is less than the sum of all estimated project costs.

Each of these projects has been prioritized using "High", "Medium", or "Low" categories based on how critical the project is to meeting minimum regulatory requirements and the City's level of service and reliability goals. An overall map of these projects and their locations is shown in Figure 11-1.

Prioritization criteria for the water main replacement program include:

- High Priority
  - Replacement of asbestos cement mains.
  - Improvements to provide required fire flow during maximum day demand while keeping pressures above 20 psi.
- Medium Priority
  - Improvements to provide required fire flow during maximum day demand while keeping velocities below 20 ft/s.
  - Construction of new mains to establish looping to improve system performance and water quality.
  - Removal and replacement of 2-inch service pipes with 4-inch or larger pipes, where needed.
- Low Priority
  - Improvements to provide required fire flow during maximum day demand while keeping velocities below 10 ft/s.

Table 11-1. Basis of Unit Costs

Cost	Row	Calculated As
Materials	A	Cost for materials from construction cost database (pipe, excavation, paving, etc.)
Division 01 Costs	B	8% of A
Contingency	C	30% of (A + B)
Sales Tax	D	10% of (A + B + C)
Engineering and Admin	E	15% of (A + B+ C + D)
Permitting	F	5% of (A + B+ C + D)
Project Cost	G	A + B + C + D + E + F

Note: Construction cost database costs escalated to Seattle area costs and 2017 dollars.

The water main replacement projects have been identified by operating area with a letter followed by a number. Letters correspond to: Valley Operating Area (V), Mt. Hood Operating Area (MH), South Cove Operating Area (SC), Wildwood Operating Area (WW), Cougar Ridge Operating Area (CR), Highwood Operating Area (HW), Montreux Operating Area (M), Issaquah Highlands Operating Areas (IH) and Talus Operating Areas

(T). The numbers identify and separate the projects within each operating area. Projects with a number below 100 are projects previously identified in the 2012 WSP while projects with a number of 100 or higher were identified as part of this WSP's modeling effort.

The list of all identified Water Main Replacement Program projects is found in Table 11-4, Table 11-5, and Table 11-6. The tables also include a planning level cost estimate for each project. The project cost estimates are presented in 2017 dollars and are based on applying a linear foot cost for each pipe size against the planned length of pipe. This includes trenching the roadway to install the water main, installing necessary valves and fittings, connecting service connections and water meters, flushing the lines, backfilling the trench, and asphalt repair work. Costs also include Division 1 costs (contractor mobilization, traffic control, site control and restoration), design, engineering, administration, taxes, and a planning level contingency (a summary of these are in Table 11-1). The costs do not take into account individual variables related to the particular projects, such as the potential need for full roadway restoration or impacts to other utilities. The assumed unit costs used for water main replacement program projects are given in Table 11-2. Costs associated with the various projects should be adjusted to account for inflation rates applicable to the proposed design and construction schedules. As a result, final project costs will vary from the estimates presented herein. Because of these factors, funding needs must be carefully reviewed prior to establishing final budgets.

Table 11-2. Assumed Project Unit Cost

Pipe Size (inch)	Assumed Project Unit Cost ($/LF)	
	Pipe Upsizing / Replacement	New Water Main
4	$331.70	$296.73
8	$406.65	$366.71
10	$458.48	$418.54
12	$494.84	$454.90
14	$626.01	$586.07
16	$655.79	$615.85
18	$735.10	$695.16

11.2 CIP Cost Estimate and Schedule

Table 11-3 provides a summary of planned CIP projects, planning-level cost estimates, and project schedules. The project cost estimates are presented in 2017 dollars.

Table 11-3. Capital Improvement Program Schedule and Budget

Project	No.	Project Costs in 2017 Dollars ($1,000s)											
		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028-2037	Total CIP (2018-2037)
Distribution Projects													
Water Main Replacement Program	D-1	787	787	787	787	787	787	787	787	787	787	7,870	15,740
Upgrade Water Meters to Radio Read	D-2	45	45	45	45	45	45	45	45	45	45	450	900
I-90 Watermain Underboring	D-3	34	472										506
Lakemont Triangle Regional Main Tie-in and Meter	D-4			400									400
Talus PRV Station	D-5								275				275
Redundant Water Feed to Squak Mountain	D-6		168	1,101									1,269
Redundant Water Feed for South Cove Reservoir	D-7					600							600
	Total	866	1,472	2,333	832	1,432	832	832	1,107	832	832	8,320	19,690
Pump Station Projects													
SPAR Booster Pump Station and Main	PS-1	392	3,465	1,148									5,005
Replace Forest Rim Booster Pump Station	PS-2	1,170											1,170
	Total	1,562	3,465	1,148	0	0	0	0	0	0	0	0	6,175
Storage Projects													
South SPAR 297 Reservoir	S-1				168	168	5,400						5,736
South Cove Reservoir Rehabilitation	S-2								900				900
Reservoir Chlorine Boosting	S-3		400										400
	Total	0	400	0	168	168	5,400	0	900	0	0	0	7,036
Water Supply And Treatment Projects													
Refurbish Gilman Wells	WS-1							821					821
Refurbish Risdon Wells	WS-2							821					821
Water Treatment Plant	WS-3	1,066	1,492	10,660	10,660								23,878

Table 11-3. Capital Improvement Program Schedule and Budget

Project	No.	Project Costs in 2017 Dollars ($1,000s)											
		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028-2037	Total CIP (2018-2037)
Gilman Wells PFOS Discharge to Sewer	WS-4	200											200
Emergency Water Fill Station	WS-5								210				210
Emergency Water Filtration Plant	WS-6								2,100				2,100
Bulk-Purchase Water Fill Station	WS-7								100				100
Well Capacity Optimization	WS-8		200										200
	Total	1,266	1,692	10,660	10,660	0	0	1,642	2,410	0	0	0	28,330
TOTAL BUDGET													
	TOTAL	3,694	7,029	14,141	11,660	1,600	6,232	2,474	4,417	832	832	8,320	61,231

Table 11-4. High Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
MH-1	12	260	118		✓		Upsizing pipes in Cabin Creek Ln SW off of Sunrise Pl SW.
SC-100	8	330	121		✓	✓	Upsizing pipes on SE 51st St from West Lake Sammamish Pkwy SE to hydrant 206001617 to meet velocity constraint and remove AC pipe.
SC-101	12 14	2,350 3,240	2,968		✓		Upsizing pipes: 14-inch in West Lake Sammamish Pkwy SE from 184th Ave SE to 192nd Ave SE. 12-inch pipe within Timberlake Apartments and Sammamish Bluffs Condominiums.
SC-103	8	1,100	403		✓	✓	Upsizing pipes in SE 43rd Pl to resolve fire flows limited by pressure and to remove AC pipe.
SC-104	8	160	59		✓	✓	Upsizing pipes on 189th Pl SE from SE 42nd Pl to hydrant 206001594. Upsizing pipes on SE 43rd St from 189th Ave SE to hydrant 206001592. Project removes AC pipe and allows fire flow to meet velocity constraint.
SC-105	8	50	18		✓	✓	Upsizing pipes on 190th Ave SE from 191st Ave SE to hydrant 206001593 to meet velocity constraint and remove AC pipe.
SC-106	8	1,090	400		✓		Upsizing pipes in 182nd Ave SE.
SC-107	12 14 16	500 930 240	920		✓		Upsizing piping near Sammamish Crown Apartments: 16-inch at intertie, 14-inch between intertie bifurcation and hydrant 206001643 and in 182nd Ave SE, and 12-inch between hydrant 206001643 and 182nd Ave and between hydrant 206001634 and 182nd Ave.
SC-108	8	380	139		✓	✓	Upsizing pipe in 187th Pl SE and SE 44th Pl to meet velocity constraint and remove AC pipe.
SC-109	8 12 14	22,950 110 850	9,333			✓	Removal and replacement of AC pipes within South Cove service area that have not be identified for replacement by other projects resolving hydraulic deficiencies.
T-105	12	30	17		✓		Upsizing of segment of 8-inch pipe on loop between Shangri-La Way NW and hydrant 206001036.
V-1	8	490	199	✓			New pipe from Talus 616 zone to change services in Goode Pl from Valley 297 to Talus 616 zone.
V-2	12	2,560	1,165		✓	✓	Upsizing 6-inch pipes on 19th Ave NW between NW Poplar Way and NW Mall St, and upsizing 6-inch pipes along NW Mall St between 19th Ave NW and hydrant 206000743 to meet velocity constraint and to remove AC pipe.
V-3	12	320	146		✓		Upsizing pipe containing hydrant 206000735 between 19th Ave NW and Hyla Ave NW.
V-5	12	290	132		✓		Upsizing pipe feeding hydrant 206000182.
V-6	12	470	214		✓		Upsizing pipes feeding hydrants 206000187, 206000188, and 206000189.
V-7	12	400	182		✓		Upsizing pipes feeding hydrant 206000142.
V-9	12	390	177		✓	✓	Upsizing pipes feeding hydrant 206000033 to meet velocity constraint and remove AC pipe.

Table 11-4. High Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
V-12	12	280	139	✓			New pipe between hydrant 206001284 and intersection of NE Creek Way and 3rd Ave NE.
V-15	8	110	45	✓			New pipe creating a loop between hydrants 206000387 and 206000389.
V-38	14 16 18	1,250 2,940 1,090	3,301		✓		Upsizing pipes to increase fire flow and eliminate low pressures at southern end of Valley 297 Zone on Issaquah-Hobart Rd SE. Large diameter pipes required to minimize headloss. Upsize pipes to 14-inch on 2nd Ave SE from southern end of pipe loop serving hydrant 206000038 to Front St S. Upsize to 18-inch on Front St S from tee with 2nd Ave SE pipe to 6th Ave SE. Upsize to 16-inch between intersection of SE Lewis St and 6th Ave SE to hydrant 206001292 at south end of system. Upsize to 14-inch between hydrants 206001292 and 206001473.
V-101	12	650	296		✓		Upsizing of pipes along 6th Ave SE from SE Lewis St to hydrant 206000002.
V-134	12	680	309		✓		Upsizing pipes between hydrant 206000112 and hydrant 206000999.
V-161	12	220	100		✓	✓	Upsizing pipes between hydrant 206000592 and NW Maple St to remove existing AC pipe and to meet velocity constraints.
V-186	12	1,360	619		✓		Upsizing pipes along loop containing hydrants 206000669, 206000668, 206000665, 206000663, and 206000662.
WW-1	8	530	194		✓		Upsizing pipes on Mt Fury Cir SW between hydrant 206000291 and Mountain Park Blvd SW.
Total High Priority Water Main Replacement Cost = $21,710,000							

Table 11-5. Medium Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
CR-1	12	1,300	591		✓		Upsizing of pipes on Pine View Dr NW, NW Pine Cone Pl, and Newport Way NW between transition to 12-inch pipe south of hydrant 206001343 and PRV Station No. 24.
IH-101	12	250	114		✓		Upsizing pipes feeding hydrant 206000866 on 14th Ct NE.
IH-103	12	40	18		✓		Upsize pipe on NE Denny Way between hydrant 206001212 and 4th Ave NE.
IH-109	12	10	5		✓		Upsizing pipe (pipe 203005380) between hydrant 206000937 and 16-inch main.
MH-3	4	100	30		✓		Remove 2-inch pipe and replace with 4-inch pipe in Sunrise Pl SW.
MH-6	12 14	80 560	365		✓		Upsizing pipes on Cabin Creek Ln SW between Sunrise Pl SW and hydrant 206001208.
MH-103	12	130	59		✓		Upsizing pipes feeding hydrant 206000279.

Table 11-5. Medium Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
T-104	12	50	23		✓		Upsizing pipe on NW Pebble Ln between Shangri-La Way NW and hydrant 206001067.
V-11	10 12	3,660 250	1,646		✓		Upsizing pipe loops around Issaquah High School.
V-112	12	470	214		✓		Upsizing pipes on NW Alder Pl and 2nd Pl NW between 1st Ave NW and hydrant 206000395.
V-115	12	330	150		✓		Upsizing pipes between hydrant 206001353 and Newport Way NW.
V-116	12	420	191		✓		Upsizing pipes between hydrant 206000414 and Newport Way NW.
V-117	12	100	45		✓		Upsizing pipes between hydrant 206000429 and Newport Way NW.
V-121	12	330	150		✓		Upsizing pipes between hydrant 206000437 and Newport Way NW.
V-122	12	360	164		✓		Upsizing pipes between hydrants 206001401 and 206001402.
V-125	12	160	73		✓		Upsizing pipes between hydrant 206000146 and Rainier Blvd N.
V-127	12	190	86		✓		Upsizing pipes between hydrant 206000132 and NE Dogwood St.
V-129	12	200	91		✓		Upsizing pipes between hydrant 206001284 and 206001285.
V-133	12	330	150		✓		Upsizing pipes on 1st Ave NE between hydrant 206000109 and NE Juniper St. Upsizing pipes on NE Juniper St between 1st Ave NE and pipe leading to hydrants 206000998 and 206000999.
V-138	12	190	86		✓		Upsizing pipes between hydrant 206000108 and NE Gilman Blvd.
V-139	12	360	164		✓		Upsizing pipes between hydrant 206000538 and 10-inch pipe loop.
V-14	12	1,430	651		✓		Upsizing pipes on 7th Ave NW between NW Locust St and NW Holly St and upsizing pipes on NW Holly St between 7th Ave NW and hydrant 206000454.
V-16	12	610	277		✓		Upsizing pipes on 5th Ave NW between NW Juniper St and NW Holly St.
V-17	12	530	241		✓		Upsizing pipes on NW Holly St between hydrant 206000454 and 5th Ave NW.
V-18	12	660	300		✓		Upsizing pipes on 3rd Ave NW between NW Juniper St and NW Holly St.
V-19	12	1,180	537		✓		Upsizing pipes on NW Holly St between 3rd Ave NW and Front St N.
V-20	12	350	159		✓		Upsizing pipes on 1st Ave NW between hydrant 206000381 and NW Holly St.
V-21	12	130	59		✓		Upsizing pipe 203008539 near hydrant 206000134.
V-25	12	1,600	728		✓		Upsizing pipes on E Sunset Way between 2nd Ave SE and 6th Ave SE.
V-26	12	690	314		✓		Upsizing pipes on SW Clark St between Wildwood Blvd SW and pipe serving hydrant 206001268.

Table 11-5. Medium Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
V-28	10 12	290 60	149		✓		Upsizing pipes on Rainier Blvd S between SE Andrews St and SE Bush St.
V-29	12	370	168		✓		Upsizing pipes between hydrant 206000404 and Newport Way NW.
V-30	4	850	252		✓		Remove 2-inch pipe and replace with 4-inch pipe in 1st Ave SE from Trailer Park to south end of 1st Ave.
V-31	12	2,180	992		✓		Upsizing pipe loop around Clark Elementary School / Gibson Ek High School.
V-49	12	70	32		✓		Upsizing pipe from Newport Way NW feeding hydrants 206000430, 206000431, and 206000432.
V-147	12	110	50		✓		Upsizing pipes between hydrant 206000490 and 8-inch pipe loop to the south.
V-149	12	140	64		✓		Upsizing pipes between hydrant 206000501 and 7th Ave NW.
V-151	12	220	100		✓		Upsizing pipes between hydrant 206000526 and pipe loop to the west.
V-152	12	370	168		✓		Upsizing pipes between hydrant 206000536 and pipe loop to the northwest.
V-155	12	190	86		✓		Upsizing pipes between hydrant 206000525 and pipe loop to the south.
V-156	12	350	159		✓		Upsizing pipes between hydrant 206000517 and pipe loop to the southwest.
V-157	12	500	227		✓		Upsizing pipes between hydrant 206000562 and 12th Ave NW.
V-158	12	20	9		✓		Upsizing pipes between hydrant 206000558 and 12th Ave NW.
V-164	12	260	118		✓		Upsizing 8-inch pipes between hydrant 206000586 and 17th Ave NW.
V-175	12	680	309		✓		Upsizing pipes between hydrant 206000704 and NW Sammamish Rd.
V-178	12	480	218		✓		Upsizing pipes on 15th Pl NW between hydrant 206000693 and NW Sammamish Rd.
V-184	10	1,290	540		✓		Upsizing pipes along loop containing hydrants 206000664, 206000655, 206000657, 206000658, and 206000660.
V-188	12	180	82		✓		Upsizing pipes on 3rd Pl NW between hydrant 206001428 and NW Dogwood St.
Total Medium Priority Water Main Replacement Cost = $11,405,000							

Table 11-6. Low Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
HW-100	10	460	193		✓		Upsizing pipes between Wildwood BPS and hydrant 206000232.
IH-100	10 12	210 10	93		✓		Upsizing pipes between hydrant 206000868 and NE Katsura St to 10-inch. Upsize remaining 8-inch pipe west of hydrant 206000868 to 12-inch.
IH-102	12	20	9		✓		Upsizing segment of 8-inch pipe (pipe 203008513) between 12-inch runs of pipe near the intersection of 5th Pl NE and NE Discovery Dr.
IH-104	12	270	123		✓		Upsizing pipes on NE Denny Way between hydrants 206001212 and 206001211.
IH-105	12	190	86		✓		Upsizing pipes on NE Eagle Way between NE High St and hydrant 206001209.
IH-106	14	30	18		✓		Upsizing pipes on NE Discovery Dr between SPAR Pump Station discharge line and 9th Ave NE.
IH-107	12	40	18		✓		Upsizing pipes on 14th Ave NE between hydrant 206000852 and Huckleberry Cir.
IH-110	10 12	2,030 100	899		✓		Upsizing pipes to 10-inch on Central Park Ln NE from 24th Ave NE to hydrant 206000900. Upsizing pipes to 12-inch on Central Park Ln NE for remainder of existing 8-inch pipe north of hydrant 206000900.
IH-111	12	160	73		✓		Upsizing pipes on NE Jay Ln from24th Ave NE to hydrant 206001129.
IH-112	10 12	630 20	274		✓		Upsizing pipes to 10-inch on 23rd Pl NE from 24th Ave NE to hydrant 206001130. Upsizing pipes to 12-inch on 23rd Pl NE from hydrant 206001130 to Alley Park. Upsizing pipes to 10-inch on Alley Park from 23rd Pl NE until existing pipe transitions to 12-inch.
IH-113	12	190	86		✓		Upsize pipe on NE Jared Ct from 25th Ave NE to 25th Walk NE.
IH-114	14	900	527		✓		Upsizing pipes on 30th Ave NE from 28th Ave NE to NE Harrison St.
IH-115	10	350	146		✓		Upsizing pipes on 29th Ave NE from NE Magnolia St to hydrant 206001152.
IH-116	10 14	230 80	146		✓		Upsizing pipes to 14-inch on NE Natalie Way from NE Magnolia St to 24th Ct NE. Upsizing pipes to 10-inch on 24th Ct NE from NE Natalie Way to NE Marion Ln. Upsizing pipes to 10-inch on NE Marion Ln from 24th Ct NE to hydrant 206001420.
IH-117	10 14	250 390	349		✓		Upsizing pipes to 14-inch on NE Natalie Way from hydrant 206001115 to 23rd Ct NE. Upsizing pipes to 10-inch on 23rd Ct NE from NE Natalie Way to NE Marion Ln. Upsizing pipes to 10-inch on NE Marion Ln from 23rd Ct NE to hydrant 206001114.
M-101	10 12	350 3,120	1,690		✓		Upsizing pipes to 10-inch on NW Village Park Dr from NW Lac Leman Dr to NW Montreux Dr. Upsizing pipes to 12-inch on NW Village Park Dr from NW Lac Leman Dr to Champery Pl NW. Upsizing pipes to 12-inch on Champery Pl NW.
MH-10	8	640	235		✓		Upsizing pipes on SW Gibson Ln.

Table 11-6. Low Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
MH-104	14	1,490	873		✓		Upsizing pipes on Sunrise Pl SW from Wildwood Blvd SW to Cabin Creek Ln SW.
MH-14	8	340	125		✓		Upsizing pipes on Almak Ct NW from W Sunset Way to hydrant 206000375.
MH-15	8	320	117		✓		Upsizing pipes on SW Hepler Ln.
MH-7	8	150	55		✓		Upsizing pipes on Mt Sl Pl NW from Mt Quay Dr NW to hydrant 206000328.
MH-9	8	540	198		✓		Upsizing pipes on SW Mt Baker Dr from Mountain Park Blvd SW to hydrant 206000280.
SC-102	10	130	54		✓		Upsizing pipes on 189th Pl SE from 190th Ave SE to transition from 6-inch to 8-inch pipe southwest of hydrant 206001578.
T-106	12	10	5		✓		Upsize small segment of 8-inch pipe on NW Boulderway Dr near the intersection with Timber Creek Dr NW.
V-40	12	130	59		✓		Upsizing pipes between hydrant 206000470 and NW Juniper St.
V-41	12	220	100		✓		Upsizing pipes on Rainier Blvd N from hydrant 206000378 south to tee with 12-inch pipe.
V-42	12	1,130	514		✓		Upsizing pipes on NW Poplar Way from proposed I-90 crossing east past hydrant 206000724 to transition from existing 8-inch pipe to 12-inch. Upsizing pipes between hydrant 206000727 and NW Poplar Way.
V-43	8	180	66		✓		Upsizing pipes on 2nd Ave NE between hydrant 206000071 and NE Creek Way.
V-44	8	700	257		✓		Upsizing pipes on SE Andrews St between 4th Pl SE and 2nd Ave SE.
V-45	8	650	238		✓		Upsizing pipes on SE Bush St between 2nd Ave SE and hydrant 206000088.
V-46	10 12	1,420 180	683		✓		Upsizing of pipes on loop with hydrants 206000118, 206000134, and 206000135 with 10-inch except for pipes between hydrant 206000118 and Front St N, and pipes near hydrant 206000134 which are upsized to 12-inch.
V-47	10 12	590 40	267		✓		Upsizing pipes to 10-inch on NE Crescent Dr between Front St N and tee with 8-inch pipe near hydrant 206000124. Upsizing pipes between tee and hydrant 206000124 with 12-inch.
V-48	10	450	188		✓		Upsizing of pipes on loop with hydrant 206000133.
V-50	10	130	54		✓		Upsizing of pipe between southern portion of Gilman Square pipe loop and NW Dogwood St.
V-51	10	620	259		✓		Upsizing of pipe between eastern portion of Gilman Square pipe loop and NW Dogwood St.
V-52	10	770	322		✓		Upsizing of pipes on 1st Pl NW between NW Dogwood St and transition to 12-inch near NW Alder Pl.
V-53	10	1,170	490		✓		Upsizing of pipes on pipe loop through Vista Ridge Apartments.

Table 11-6. Low Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
V-54	10 12	330 340	306		✓		Upsizing of pipes between hydrant 206000445 and NW Juniper St.
V-55	10 12	740 340	478		✓		Upsizing of pipes to 10-inch on 4th Ave NW between NW Juniper St and NW Holly St. Upsizing of pipes to 12-inch on NW Holly St between 4th Ave NW and hydrant 206001266.
V-56	10 12	1,230 190	609		✓		Upsizing of pipes to 10-inch on pipe loop with hydrants 206000399, 206000402, and 206000365 except for segments between hydrant 206000399 and Newport Way NW, and between hydrant 206000365 and W Sunset Way with 12-inch.
V-102	12	620	282		✓		Upsizing piping leading to hydrants 206000003 and 206000001.
V-103	10 12	1,110 60	494		✓		Upsizing pipe to 12-inch between hydrant 206000038 and 2nd Ave SE. Upsize remaining pipe on loop (also serving hydrant 206000037 and 206000024).
V-104	10	830	347		✓		Upsizing pipes on 4th Pl SE from SE Evans St to 12-inch pipe loop to the south.
V-105	12	90	41		✓		Upsizing pipes between Front St S and hydrant 206000166.
V-106	10 12	1,530 160	720		✓		Upsizing pipes in loop serving Windsong Apartments to 10-inch except for pipe segment between hydrant 206000169 and Front St S which is upsized to 12-inch.
V-107	10	60	25		✓		Upsizing pipes on SE Darst St between hydrant 206001427 and 4th Pl SE.
V-108	10	450	188		✓		Upsizing pipes on SE Andrews St from Rainier Blvd S to 1st Ave SE. Upsizing pipes on 1st Ave SE from SE Andrews St to SE Bush St.
V-109	12	60	27		✓		Upsizing pipes on 3rd Ave NE from E Sunset Way to hydrant 206001281.
V-110	10	340	142		✓		Upsizing pipes on 2nd Ave NE from NE Alder St to E Sunset Way.
V-111	10 12	640 320	426		✓		Upsizing pipes to 10-inch on 1st Ave NE from E Sunset Way to NW Alder Pl. Upsizing pipes to 12-inch on NW Alder Pl from Front St N to Rainier Blvd N.
V-113	10 12	890 90	417		✓		Upsizing pipes to 10-inch on Newport Way NW from W Sunset Way to hydrant 206000179. Upsizing pipes to 12-inch on Newport Way NW from hydrant 206000179 to tee with pipe leading to hydrant 206001454.
V-114	10 12	730 90	350		✓		Upsizing pipes to 10-inch on loop serving hydrants 206000409 and 206000411 except for pipes between hydrant 206000407 and Newport Way NW, and hydrant 206000411 and Newport Way NW which are upsized to 12-inch.
V-119	10 12	1,830 60	796		✓		Upsizing pipes to 10-inch in Gilman Square pipe loop except for pipe 203005633 which gets upsized to 12-inch.
V-120	10	590	247		✓		Upsizing pipes for pipe loop with hydrants 206000433, 206000434, and 206000435.
V-123	10	570	239		✓		Upsizing pipes for pipe loop with hydrants 206000438 and 206000451.

Table 11-6. Low Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
V-124	10	1,260	527		✓		Upsizing pipes on 1st Ave NW between NW Dogwood St and Rainier Blvd N. Upsizing pipes between hydrants 206000387 and 206001414, and between hydrant 206000389 and 1st Ave NW.
V-126	12	210	96		✓		Upsizing pipes between hydrant 206000149 and NE Dogwood St.
V-128	10	180	75		✓		Upsizing pipes on 3rd Ave NE between hydrant 206000127 and NE Creek Way.
V-130	10	650	272		✓		Upsizing pipes on NE Gilman Blvd between 3rd Ave NE and hydrant 206001284.
V-131	12	100	45		✓		Upsizing pipes between hydrant 206000099 and tee with 12-inch pipe loop to the south.
V-132	10 12	820 520	601		✓		Upsizing pipes to 12-inch on 1st Ave NE between NE Juniper St and hydrant 206000095. Upsizing pipes on 1st Ave NE between hydrant 206000095 and NE Holly St. Upsizing pipes to 10-inch on NE Holly St from 1st Ave NE to Holly Pump Station Mixing Vault.
V-135	10	50	21		✓		Upsizing pipes between hydrant 206000115 and tee with 8-inch pipe loop to the north.
V-136	10 12	410 20	181		✓		Upsizing pipes to 10-inch between Risdon Wells and tee to 8-inch in pipe going to hydrant 206000114. Upsize to 12-inch between upsized 10-inch and hydrant 206000114.
V-137	10 12	170 40	91		✓		Upsizing pipes to 12-inch on NE Gilman Blvd from hydrant 206000131 to tee with 8-inch pipe northwest from hydrant. Continue pipe upsizing with 10-inch pipe until tee with pipe leading to hydrant 206000133.
V-140	12	40	18		✓		Upsizing pipe between hydrant 206000383 and tee with 10-inch pipe to the southwest.
V-141	10	260	109		✓		Upsizing pipe between hydrant 206000440 to 5th Ave NW.
V-142	10	250	105		✓		Upsizing pipe between hydrant 206000439 to 5th Ave NW.
V-143	12	80	36		✓		Upsizing pipes between hydrant 206000469 and NW Juniper St.
V-144	14	500	293		✓		Upsizing pipes on 12th Ave NW between Newport Way NW and hydrant 206000336.
V-145	10	750	314		✓		Upsizing pipes on loop serving hydrants 206001260, 206001261, and 206001262.
V-146	10	1,140	477		✓		Upsizing pipes on loop serving hydrant 206000488, 206000489, and 206000491.
V-148	10 12	3,220 280	1,486		✓		Upsizing of pipes primarily to 10-inch around the Issaquah Commons commercial development with some upsizing of pipes to 12-inch near hydrants.
V-150	12	70	32		✓		Upsizing of pipes between hydrants 206000487 and 206000484.

Table 11-6. Low Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
V-153	10 12	590 210	351		✓		Upsizing to 10-inch of pipe loop off of NW Gilman Blvd of serving US Post Office except for pipes between hydrant 206000531 and NW Gilman Blvd, and hydrant 206000533 and NW Gilman Blvd which are upsized to 12-inch.
V-154	10 12	670 100	330		✓		Upsizing of pipe loop with hydrants 206000518, 206001259, 206000524, and 206000523 to 12-inch except for portion of loop west of hydrant 206000518 which is upsized to 12-inch.
V-159	10 12	1,480 140	689		✓		Upsizing of pipes with hydrants 206000559, 206000548, 206000547, 206000546, and 206000545 with 10-inch pipe except for segment of loop north of hydrant 206000545 which is upsized to 12-inch.
V-160	10	800	335		✓		Upsizing of pipes between 12th Ave NW and hydrant 206000552. Upsizing continues east of hydrant 206000552 until tee with 12-inch pipe.
V-162	10 12	810 130	403		✓		Upsizing of pipes to 10-inch on loop with hydrants 206001510 and 206001234 except for segment of loop south of hydrant 206001234 which is upsized to 12-inch.
V-163	14	110	64		✓		Upsizing of pipes on Newport Way NW from 206000745 northwest until tee with 16-inch pipe.
V-165	10	460	193		✓		Upsizing of pipes on 17th Ave NW between NW Mall St and NW Maple St.
V-166	10	210	88		✓		Upsizing of pipes between hydrant 206001220 and 18th Ave NW.
V-167	10	310	130		✓		Upsizing of pipes between hydrant 206000721 and 18th Ave NW.
V-168	10	310	130		✓		Upsizing of pipes between hydrant 206000720 and 18th Ave NW.
V-169	10 12	1,410 20	600		✓		Upsizing of pipes on NW Pacific Elm Dr to 10-inch except for segment of pipe between hydrant 206000767 and Newport Way NW which is upsized to 12-inch. Upsizing pipes to 10-inch on NW Pacific Yew Pl between hydrant 206000765 and NW Pacific Elm Dr.
V-170	10 12	2,130 50	916		✓		Upsizing of pipe loops serving Sammamish Pointe development off of Newport Way NW.
V-171	10	260	109		✓		Upsizing of pipe loop serving Bentley House Luxury Apartments off of Newport Way NW.
V-173	12	400	182		✓		Upsizing of pipes between hydrant 206000708 and NW Sammamish Rd.
V-174	10	210	88		✓		New pipe creating a loop between hydrants 206000706 and 206000698.
V-176	10	210	88		✓		Upsizing pipes from hydrant 206000696 to NW Sammamish Rd.
V-177	12	210	96		✓		Upsizing pipes from hydrant 206000695 to NW Sammamish Rd.
V-179	10 12	790 110	385		✓		Upsizing pipes to 10-inch on pipe loop with hydrants 206000679, 206000683, and 206000681 except for segment of loop east of hydrant 206000681 which is upsized to 12-inch.

Table 11-6. Low Priority Water Main Replacement Program Projects

Project No.	Proposed Pipe Size (in) and Length (ft)		Cost In 2017 Dollars ($1,000s)	New Pipe	Upsizing	AC Removal	Project Description
V-180	10	130	54		✓		Upsizing pipes between hydrant 206000652 and 11th Ave NW.
V-181	10 12	1,600 90	714		✓		Upsizing pipes to 10-inch on loop with hydrants 206000642, 206000639, 206000635, and 206000634 except for the segment connecting the loop to Lake Dr and a small segment east of hydrant 206000639 which are upsized to 12-inch.
V-182	10 12	1,840 310	924		✓		Upsizing pipes to 10-inch on loop with hydrants 206001476, 206001474, 206000628, and 206000627 except for segments between hydrants 206001476 and 206000627 and Lake Dr which are upsized to 12-inch.
V-183	10	720	301		✓		Upsizing pipes on loop with hydrants 206001108 and 206001109.
V-185	10	110	46		✓		Upsizing of pipes on loop with hydrant 206000655.
V-187	12	10	5		✓		Upsizing of short segment of pipe on E Sunset Way between hydrant 206001492 and 6th Ave NE.
V-189	12	20	9		✓		Upsizing of short segment of pipe on 17th Ave NE between hydrant 206000884 and NE Killian Ln.
V-190	10	210	88		✓		Upsizing of segment of dead-end pipe within the Gateway Apartments development.
Total Low Priority Water Main Replacement Cost = $28,123,000							

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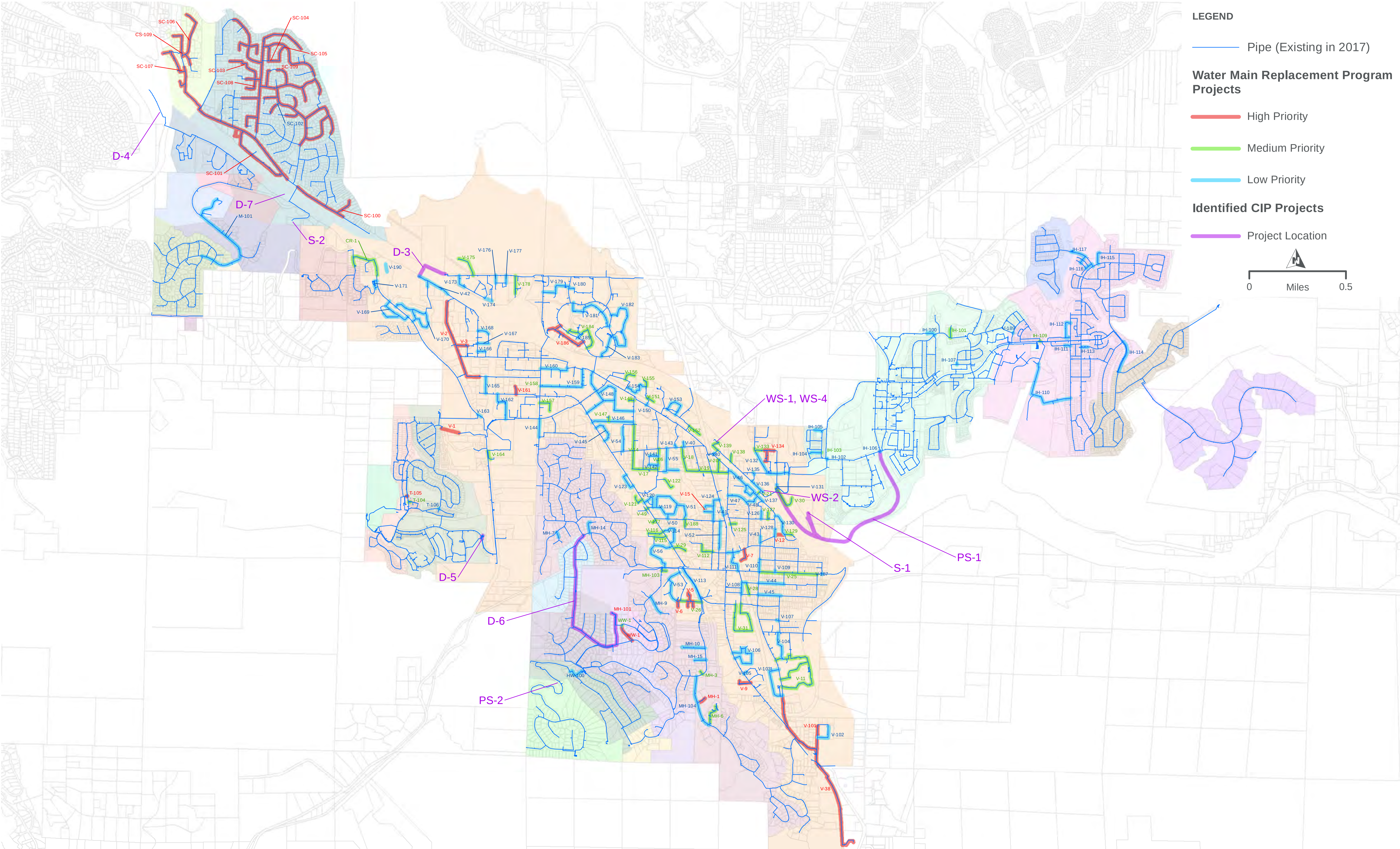

CITY OF ISSAQUAH WASHINGTON

CAPITAL IMPROVEMENT PROGRAM PROJECTS

FIGURE 11-1

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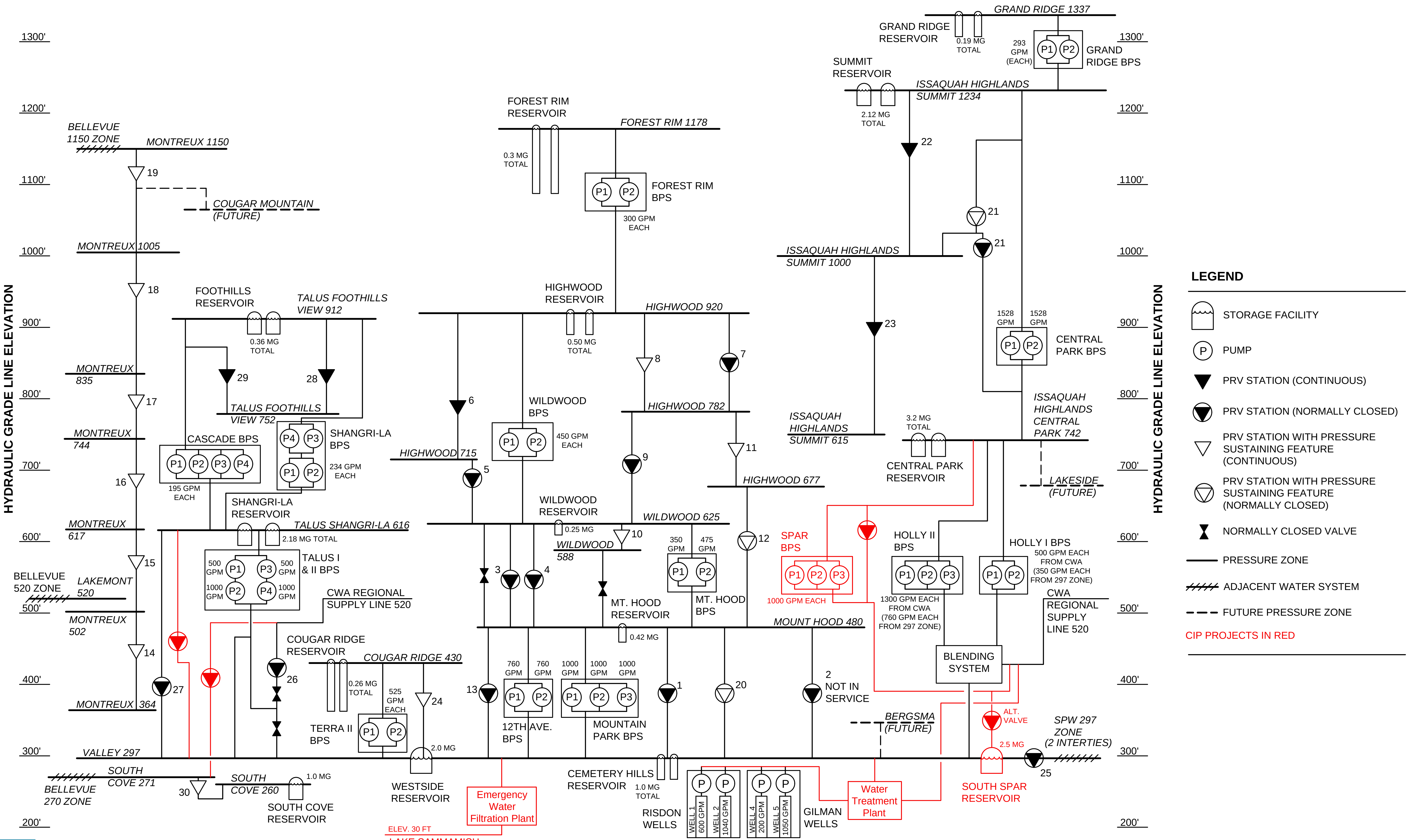

HDR
CITY OF ISSAQUAH WASHINGTON

HYDRAULIC PROFILE WITH CAPITAL IMPROVEMENT PLAN PROJECTS

FIGURE 11-2

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Chapter 12. Financial Program

This chapter presents the financial plan, which is the development of the projected revenues and operating and capital expenses for the City of Issaquah's (City's) water system. The capital costs contained within the financial plan are based on the Capital Improvement Plan (CIP) projects presented in Chapter 11 of this plan.

12.1 Introduction

The effective implementation of a Water System Plan (WSP) is dependent on developing a plan that can be financially supported by the water utility's revenue, by meeting State and local regulatory requirements, and by providing the flexibility to deal with unforeseen changes. The financial plan uses the annual operating expense and identified capital needs of the water system to determine if the current water utility revenues are sufficient to fund operating and capital expenses, and develop, as necessary, a rate transition plan to fully fund the utility.

12.2 Key Assumptions

The City's adopted 2017 and 2018 budgets were utilized as the basis for the operation and maintenance (O&M) cost projection. Escalation factors were then applied to the budgeted O&M to project future expenses. Escalation factors were developed based on historical inflationary factors for the City and local area. The financial plan has also assumed that the recommended rate adjustments from the 2015 rate study will be implemented. The revenues collected are anticipated to reflect the rate increases of 6.0% in 2016 and 5.5% from 2017 – 2018. The results of this analysis are based on those assumptions as a starting point. The financial plan is predicated on the following: projected rate adjustments are implemented, the timing and magnitude of the capital improvements is maintained, assumed debt issuance is executed, and that customer characteristics remain similar for rate revenue generating purposes.

12.3 Historical Review

The first step in reviewing the financial health of the City of Issaquah's water utility is to gain background from prior financial performance. To do this, the analysis starts with the previous five year period of 2011 to 2015, as well as the budget from 2016. Based on this information, one can assess the water utility's financial health as well as gauge any trends that may be occurring. The information from the historical review helped in the development of the assumptions for the financial plan as well as in gaining an understanding of the water utilities' operations. A summary of the historical operating revenues and expenses is show in the Table 12-1.

Table 12-1 Historical Revenue Requirement ($000s)

	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Actual 2015	Actual 2016
Revenues						
Rate Revenue	$5,305	$6,222	$6,489	$6,808	$7,608	$7,238
Misc. Revenue	634	677	713	561	1,036	1,165
Total Revenue	**$5,939**	**$6,899**	**$7,202**	**$7,368**	**$8,644**	**$8,403**
Expenses						
Personnel	$1,421	$1,526	$1,796	$1,833	$1,819	$2,200
Supplies & Equipment	1,332	1,110	1,099	1,295	1,420	1,490
Charges & Service	1,533	1,855	1,603	1,215	1,752	1,938
Interfund Charges	132	150	N/A	N/A	N/A	N/A
Intergov Charges	201	257	206	156	148	137
Capital Outlay / Reserves	N/A	N/A	N/A	150	150	150
Debt Service	N/A	N/A	N/A	639	639	640
Operating Transfers - Out	1,135	1,366	1,553	1,573	1,950	1,706
Total Expenses	**$5,754**	**$6,263**	**$6,257**	**$6,859**	**$7,879**	**$8,262**
Bal. / (Def.) of Funds	***$185***	***$635***	***$945***	***$509***	***$765***	***$142***

As can be seen from the historical data, the City has maintained adequate funding for annual operating and maintenance as well as funding capital improvements during this historical time period. It is important to note that there may be additional expenses and revenues not shown in the available source data. However, this table attempts to make a fair comparison from year to year using all available figures in a similar manner.

12.4 Development of the Financial Plan

A financial projection was developed to determine the City's ability to fund its water system capital improvements, as developed in this WSP, as well as the O&M needs over the review period. The analysis also took into consideration prudent financial management criteria such as adequate funding of capital through rates, debt service coverage ratios, and operating and capital fund balances (or reserve levels). The financial plan developed the projected water utility revenues and expenses for 2019 to 2027. The development of the projection was based on the current 2018 budget provided by the City. The 2018 budget was then escalated through 2027, by applying factors for inflation ranging from 3.0 to 6.5 percent - depending on the expense category - and future customer growth projections. The range in inflationary factors is based on historical trends in various costs such as the difference in increasing general operating supplies at 3.0 percent annually to overall benefits increasing at a higher rate, 6.0 percent for this analysis.

12.4.1 Revenues

The first component in developing the financial analysis is a review of the sources of revenue for the water system. The revised budget for 2017 was the starting point for both rate and other revenues. The revenues received from water system customers and operations are:

- **Rate revenues** – retail to customers
- **Other revenues** – backflow charges, hydrant charges, interest income, rental income, and other miscellaneous sources

Water rate revenues are projected to be approximately $7.5 million in 2018. By 2027, with assumed customer growth of 1.0 percent per year, the rate revenues are projected to total $8.2 million. It is important to note that the rate revenues shown are prior to any additional rate adjustments other than the previously mention adjustments from the 2015 rate study which were effective in 2016 and 2017. Other, or miscellaneous, revenues total approximately $900,000 in 2018. These revenues are projected to increase slightly over the review period to roughly $1.0 million by 2027. In total, the City is projected to receive revenues of $8.5 million in 2018, and that figure is projected to increase by 2027 to approximately $9.3 million. The total revenues are summarized in Table 12-2 below.

Table 12-2 Total Revenues ($000s)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Revenues										
Rate Revenue	$7,542	$7,618	$7,694	$7,771	$7,849	$7,927	$8,007	$8,087	$8,167	$8,249
Other Revenue	911	931	951	932	942	960	981	986	998	1,013
Total Revenue	**$8,454**	**$8,549**	**$8,645**	**$8,703**	**$8,791**	**$8,887**	**$8,987**	**$9,072**	**$9,165**	**$9,262**

12.4.2 Operations & Maintenance

The next component of the financial plan was to project the O&M expenses incurred to provide water service. The projection of future O&M expenses is based upon the 2018 budget. The budgeted figures were then escalated annually through 2027 using the assumed inflationary factors described previously. The O&M expenses in 2018 are projected to be $7.6 million. O&M expense levels are expected to increase to $10.7 million by the year 2027 based on inflationary factors. This of course assumes that there are no significant additions or changes made to the O&M practices during that period.

An important line item to highlight is the purchased water from Cascade Water Alliance (CWA), of which the City is a member agency. There have been recent increases in the use of CWA water that have led to increased costs as CWA is a more expensive source. In November 2015, there was a landslide in the Talus neighborhood, an area of the City's water system, which compromised the ability to use groundwater as a source in that particular area. As a result, the City switched to CWA as the source for this area and that led to increased purchased water costs. The escalation of purchased water was reviewed and revised to incorporate the following. CWA has signaled that the rate adjustment in 2019 will be approximately 4 percent followed by a 3 percent adjustment in 2020. Then, from 2020 to 2027, it is assumed that there will be an average annual increase of approximately 3.5 percent for CWA costs. In addition to the increase in CWA costs due to rate adjustments, the demand forecast is increasing for the City. The demand growth is projected to range from 6.6 percent to 4.5 percent for the next four years and then average approximately 2.0 percent per year, thereafter. Although this is strong growth in demand, the majority of this additional demand will have to be supplied via CWA purchased water. When taking into account this source of supply, the CWA water demand is expected to grow at around 20 percent for the next few years and then fall off to around 7.0 to 3.5 percent demand growth per year. When evaluating the effects of this demand increase, it is important to note that the CWA purchased water is more expensive as a source. Given this, the City costs to purchase CWA water are dramatically increasing over the next ten-year period as a result of the majority of the demand growth is projected to be supplied via CWA.

The O&M expenses are shown in summary in Table 12-4 below.

12.4.3 Rate Funded Capital

For the City to maintain the existing system and level of service to its customers, it is important to reinvest in the system at a level at least equal to depreciation. It is prudent, therefore, to have a level of annual capital projects funded by rates greater than this target level. This is because the replacement cost of the system will continue to increase due to inflation and the annual depreciation, therefore, may actually be the lower threshold of targeted funding. Depreciation expense for 2015 was estimated at $1.8 million for the water utility. Following prudent financial practices, this would mean that the City should invest at a minimum $1.8 million annually to sustain its capital facilities. The financial plan projects that the rate funded capital will increase over the review period from $600,000 in 2018 to $1.9 million in 2027.

The major factor for the City and a focal point of this financial review is the funding of the City's water system CIP. For purposes of financial planning the CIP, as presented in detail in Chapter 11 which is shown in 2018 dollars, is increased annually by 2.7% to reflect the future escalation of costs due to inflationary pressures. The inflated CIP includes projects totaling $3.7 million for 2018, increasing to a maximum level in 2020 of $14.9 million. The large total for capital projects in 2020 is primarily related to the Water Treatment Plant project which equals $25.4 million over four years (2018 – 2021) and the majority of this project, approximately $22.8 million, is planned for 2020 - 2021. By 2027, the CIP totals $59.3 million and the average capital spending from 2018 – 2027 is $5.9 million annually. Funding for the capital projects comes from several sources:

- The first source is rate-funded capital which starts out at $600,000 in 2018 and increases annually to $1.9 million by 2027. This funding source is very important in showing that the rates have the capacity to fund renewal and replacement of the system which should be targeted as greater than annual depreciation. As mentioned previously, the annual depreciation for 2015 – which is the target minimum funding - was approximately $1.8 million. During the projected time period the level of rate funded capital approaches the target minimum but falls short of the target. The City should continue to increase rate funded capital to reflect annual renewal and replacement needs
- The second source of funding is from reserves; and for purposes of capital funding, the City has two reserves: operating and capital funds. In total, approximately 17.8 percent or $8.0 million comes from reserves over the review period to smooth out rate adjustments as well as limit and reduce debt issuances.
- The final source of funding for capital projects is from long-term debt. This comes in the form of low interest loans and / or revenue bonds. This source allows the City to not only secure funding for large projects but it also serves as a tool to equitably spread the costs of projects to the future beneficiaries, even though they are not connected to the system yet. For this review, it is assumed that the City will issue approximately $37.0 million in long-term debt in order to fund the capital projects. The analysis does not assume or prescribe specific debt service terms. The debt service payments were calculated based on historical City long-term debt terms for planning purposes. Table 12-3 shows a summary of the capital projects and their funding sources.

Table 12-3 Capital Improvement Plan ($000s) [1]

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Total Distribution Projects	$866	$1,512	$2,461	$901	$1,593	$951	$976	$1,334	$1,030	$1,057
Total Pump Station Projects	1,562	3,559	1,211	0	0	0	0	0	0	$0
Total Storage Projects	0	411	0	182	187	6,169	0	1,085	0	0
Total Water Supply & Treatment Projects	1,266	1,738	11,243	11,547	0	0	1,927	2,904	0	0
Future Unidentified Capital Projects	0	0	0	0	0	0	0	0	795	868
Transfer to Cash Reserve	0	0	0	0	0	0	0	0	0	0
Total Capital Improvement Projects	**$3,694**	**$7,219**	**$14,915**	**$12,630**	**$1,780**	**$7,120**	**$2,903**	**$5,323**	**$1,825**	**$1,925**
Less: Outside Funding Sources										
Operating Fund Reserves	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Fund Reserves	3,094	1,094	1,690	305	355	95	1,278	98	0	0
Developer Contributions	0	0	0	0	0	0	0	0	0	0
Additional Low Interest Loan	0	0	0	0	0	0	0	0	0	0
Additional Revenue Bonds	0	5,000	12,000	11,000	0	5,500	0	3,500	0	0
Total Funding Sources	**$3,094**	**$6,094**	**$13,690**	**$11,305**	**$355**	**$5,595**	**$1,278**	**$3,598**	**$0**	**$0**
Rate Funded Capital	**$600**	**$1,125**	**$1,225**	**$1,325**	**$1,425**	**$1,525**	**$1,625**	**$1,725**	**$1,825**	**$1,925**

[1] – Costs shown in Table 12-3 are escalated annually by 2.7% to reflect the inflation of future costs.

12.4.4 Taxes

The water utility also has to pay utility and B&O taxes on the revenues that are collected. The first is calculated as 5.029 percent of sales (rate revenues) and the second is calculated as 1.5 percent of total revenues. For 2018, the utility tax is calculated at $379,000 and the B&O tax is estimated at $145,000. By 2027, the utility tax is projected to be approximately $415,000 and $159,000 for the B&O tax. Additionally, with the assumed rate adjustments, there will be proportional increases in taxes from the proposed rate revenues. In 2018, if the projected deficiency was covered entirely by a rate adjustment, there would be an estimated $20,000 in additional taxes on the projected revenues. Over the review period, if the projected deficits were covered by rate adjustments, by 2027, there would be an additional $426,000 in annual taxes.

12.4.5 Debt

The water utility currently has one (1) outstanding debt issuance – the 2011 Water Refunding Bond – with an annual debt service payment of approximately $640,000 for 2018. This issuance is retired in 2021. The City has planned and assumed that it will issue approximately $37.0 million in long-term debt over the next 20 years in order to fund capital projects. This analysis assumes that the City will issue the long-term debt and has incorporated the assumed payment associated with the issuances borrowed at the terms of 4.5 percent for 20 years, as a general assumption. No recommendations are provided on the final timing, total, and terms of each issuance. The borrowing assumptions are simply the identification of funding needs for a given capital plan and only highlights that need not necessarily projecting what the debt service will be. In total, the annual debt service is $635,000 in 2018 and increases over time with additional debt issuances to approximately $2.8 million by 2027.

An important metric used in the analysis of debt is the debt service coverage (DSC) ratio. The DSC is essentially a ratio of revenues available to fund annual debt service payments after deducting O&M expenses from the total available revenues. Generally, a DSC of 1.5 is considered prudent and adequate for a utility. This number is often looked at by rating agencies and can affect the terms of financing for future long-term debt issuances. For the City's water utility, the DSC is calculated at 1.85 for 2018 if the deficiency was funded by rate adjustments. The number increases slightly over the review period and by 2027 it reaches 1.84. As noted previously, the City has done well in the past of funding annual capital projects through rates and limited the use of long-term debt.

12.4.6 Reserve Funds

The City has three separate - operations, capital, and bond reserve- reserve funds. Reserve funds serve a variety of purposes but the two main ones are, first, to provide funds for a catastrophic event resulting in a large capital funds need or loss of revenue. Second, is to act as the name implies as a reserve that can store money from a surplus year and disburse in a deficit year thereby avoiding needed rate increase and decreases and smoothing the rates over time. It is important to note as well, that for the operating reserve, the minimum balance is important as this fund is used to bridge the timing gap between when the water utility bills its customers and when it receives the revenues. This period of time can be up to 90 days and therefore the minimum is set at 90 days of O&M expenses. The beginning balances were taken from the 2017 Budget Verses Actual Report and total $11.9 million. Of this total, $2.5 million was allocated to the operating fund, the capital fund was allocated $8.6 million, and the bond reserve fund was allocated $834,000. Over the review period, reserves are used for various reasons, such as to offset capital costs and lower debt issuances therefore minimizing rate adjustments. In 2027, it is projected that the ending reserve balance will be approximately $10.9 million for the three reserves in total. At this level – after the City has met the 90 days of O&M in the operating reserve and 125% of the annual debt service - the City would have approximately $3.9 million to fund capital and provide a debt reserve.

12.5 Summary of the Financial Plan

The individual components discussed above are used to develop the financial plan. The summation of the annual O&M expenses, taxes and transfers, rate funded capital, and debt service payments is called the revenue requirement. This figure is used in comparison to the City's water rate revenues to assess the sufficiency of the current rates. If there is a deficiency – and depending on the magnitude, timing, etc. – a rate adjustment may be recommended in order to maintain adequate funding for the operational and capital needs of the utility. Shown below in Table 12-4 is a summary of the revenue requirement that was prepared for the City's water utility as part of this WSP.

As noted in Table 12-4 Revenue Requirement Summary ($000s), the City's water utility would be deficient absent any rate adjustments, which are necessary to fully fund the operating and capital needs of the water utility. Key drivers in the financial plan results are the projection of CWA costs and the funding of the proposed CIP. Given this, when comparing the prior rate study to the current financial plan, a number of assumptions have changed. The daily demands on the system have increased substantially with the annexation of the South Cove area as well as additional customer growth. This has resulted in both the additional purchased water and expanding the CIP due to the additional demands on the system. A major component of the CIP that was not in the prior rate study is the water treatment plant which totals $25.4 million. Due to this expense as well as other large capital projects, there are increased needs to issue long-term debt for the City. Any future rate transition plan should aim to provide steady and predictable rate adjustments over time. Those assumed rate adjustments should be designed to fund the deficiency that this financial plan projects and in doing this will help maintain a strong financial position for the City to fully fund the operational and capital needs of the water utility.

The financial plan presented in this section is based upon a number of assumptions: the level of growth in the system, inflation amounts, and the level of debt financing at certain terms. Should these assumptions change (e.g. growth increases, slows down, or does not occur) the level of balance or deficiency and, therefore, rate adjustments required will be affected. Likewise, if costs escalate faster or slower than indicated in this plan, the projected balance or deficiency would also be affected.

Table 12-4 Revenue Requirement Summary ($000s)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Revenues										
Rate Revenue	$7,542	$7,618	$7,694	$7,771	$7,849	$7,927	$8,007	$8,087	$8,167	$8,249
Other Revenue	911	931	951	932	942	960	981	986	998	1,013
Total Revenue	**$8,454**	**$8,549**	**$8,645**	**$8,703**	**$8,791**	**$8,887**	**$8,987**	**$9,072**	**$9,165**	**$9,262**
Expenses										
Total O&M	$7,625	$8,213	$8,925	$8,985	$10,684	$10,859	$11,224	$11,706	$12,190	$13,213
Taxes & Transfers	753	761	770	778	787	796	805	814	824	833
Rate Funded Capital	600	1,125	1,225	1,325	1,425	1,525	1,625	1,725	1,825	1,925
Net Debt Service	40	422	1,342	2,184	1,550	1,972	1,972	2,242	2,242	2,242
Reserve Funding	(169)	(312)	(453)	3	535	676	664	264	151	(484)
Total Expenses	**$8,849**	**$10,210**	**$11,809**	**$13,275**	**$14,981**	**$15,829**	**$16,291**	**$16,751**	**$17,232**	**$17,729**
Bal/(Def) of Funds	($395)	($1,662)	($3,164)	($4,573)	($6,190)	($6,942)	($7,304)	($7,679)	($8,066)	($8,467)
Plus: Add'l Taxes	(20)	(84)	(159)	(230)	(311)	(349)	(367)	(386)	(406)	(426)
Total Bal/(Def) of Funds	**($415)**	**($1,745)**	**($3,323)**	**($4,803)**	**($6,502)**	**($7,291)**	**($7,672)**	**($8,065)**	**($8,472)**	**($8,893)**

City of Issaquah

2018 Water System Plan Update

APPENDICES

December 2018

Prepared by HDR, Inc. 2018

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List of Appendices

CITY OF ISSAQUAH WASHINGTON

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RESOLUTION NO. 2019-02

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ISSAQUAH WASHINGTON ADOPTING THE 2018 WATER SYSTEM PLAN UPDATE.

WHEREAS, the Administration presented the City Council with the Draft 2018 Water System Plan Update on March 19, 2018; and

WHEREAS, the Council Infrastructure Committee has considered the Plan and comments from various agencies and the public; and

WHEREAS, the Draft 2018 Water System Plan Update was modified to incorporate the various agency and public comments to become the Final Water System Plan Update dated December 2018; and

WHEREAS, the 2018 Water System Plan Update is consistent with and supports the policies set forth in the 2017 Issaquah Comprehensive Plan (Water Utility Element); and

WHEREAS, the Development Services Department issued a State Environmental Policy Act (SEPA) Declaration of Non-Significance which became final on January 25, 2019; and

WHEREAS, the Washington State Department of Health has approved the 2018 Water System Plan Update; and

WHEREAS, the King County Council has approved the 2018 Water System Plan Update; NOW THEREFORE,

THE CITY COUNCIL OF THE CITY OF ISSAQUAH HEREBY RESOLVES AS FOLLOWS:

Section 1. The City of Issaquah hereby adopts the 2018 Water System Plan Update dated December 2018 which is attached hereto as Exhibit A and incorporated by this reference as if set forth in full.

Section 2. The 2018 Water System Plan shall be used as a guide for developing City budgets, for location and sizing of water mains in the development of property, and as a basis for the exercise of substantive authority under the State Environmental Policy Act (SEPA).

PASSED by the City Council this 19th day of February, 2019.

Mariah Bettise

MARIAH BETTISE, DEPUTY COUNCIL PRESIDENT

APPROVED by the Mayor Pro Tem this 19th day of February, 2019.

SIGNING AS MAYOR

TOLA MARTS, MAYOR PRO TEM PRO TEMPORE

ATTEST:

CHRISTINE L. EGGERS, CITY CLERK

APPROVED AS TO FORM:

OFFICE OF THE CITY ATTORNEY

RESOLUTION NO: 2019-02
AGENDA BILL NO: AB 7538

Exhibit A: 2018 Water System Plan Update

Appendix B. Agency/Adjacent Purveyor Comments and Approval

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No.	Agency	Source	Date	Section	Comment	Further Comments	Response
1	Sammamish Plateau Water	Letter	7/26/2018	1.6.4, 3.6.2	These sections make no mention of or consider series of agreements between the City and SPW regarding non-assumption of areas within SPW's current service area that are within the current city limits.	Memorandum of Agreement dated January 13, 2014 including a 10-year non-assumption period.	All agreements between City of Issaquah and Sammamish Plateau Water referenced in these comments will be included in Appendix D (Interlocal Agreements), and reference will be made in Sections 1.6.4 and 3.6.2.
2						Agreement dated January 21, 2014 that includes setting the start date for the 10-year period at 3/17/2014. In addition, the Agreement includes references to 3-party discussions between Issaquah, SPW and Sammamish regarding service delivery options to commence no later than March 17,2017. [Note that the District has made overtures for these discussions in both 2016 and 2017, with no response.]	
3						Interlocal Agreement (ILA) dated March 18, 2014 regarding the decommissioning of the Lower Reid Infiltration Gallery	
4						Amendment No. 1 to the Agreement and ILA dated August 10, 2015, including extension of the non-assumption period for an additional 2 years.	
5	Sammamish Plateau Water	Letter	7/26/2018	3.9.4	The first sentence of this section appears to promote the protection of the aquifers, but the last sentence stresses the importance of quantity of recharge, without equal consideration of quality of the water to be infiltrated. The quality of the water to be recharged should be provided great importance, especially in wellhead capture zones. In addition, note should be made that tht Agreements and ILAs noted under comment 1 specifically restrict infiltration projects from a portion of the Issaquah Highlands area into the Lower Issaquah Valley		The policy text in the plan has been updated to match the Comprehensive Plan currently posted on the City's website which has policy U-C12 stating, "*Protect the aquifer recharge quantity and quality through the regulation of types of land use allowed, encouraging low impact development, and mitigation required on the uses within the identified recharge areas and wellhead capture zones*." This revised policy does not have the second sentence that is being referred to.
6	Sammamish Plateau Water	Letter	7/26/2018	7.4.1, 11.1.1	Multiple sections of the 2018 Plan reference a project for emergency supply from Lake Sammamish. Both of these reference the potential use of an emergency water supply from Lake Sammamish to be introduced into the distribution system. The implication is that this water could also be used by SPW either through and intertie or direct connection. If this project is pursued, SPW would need to be involved in any development to determine whether this would be an acceptable supply alternative for SPW.		Additional text has been added to 7.4.1 and 11.1.1 stating, "*SPW would be involved in any development of an emergency supply to determine whether the supply would be an acceptable alternative for both the City and SPW*."
7	Sammamish Plateau Water	Letter	7/26/2018	11.2, 12.5, Table 11-3,	The 2018 Plan identifies several significant costs, especially associated with the water treatment plant, and notes the need for future rate adjustments. It would seem appropriate to project the scale of these potential rate adjustments as part of this Plan.		Details regarding potential rate adjustments are not provided in the WSP, as they will result from a forthcoming rate study that the City intends to complete in 2019.
8	WDOH	Letter	7/31/2018	System Description	Provide a determination of local government consistency from the City of Issaquah's Planning Department.		See enclosed for this documentation, which will also be added to Appendix B.
9	WDOH				King County provided comments on your WSP on August 14, 2018. Please respond to their issues. Adequate responses to their issues will be necessary in order to receive a WSP Adoption Ordinance from King County		King County comments have been addressed, as documented in this Response to Comments.
10	WDOH				Noted discrepancies between Table 2-1 and the water facilities inventory (WFI). It might be appropriate to update the WFI		If the discrepancies between Table 2-1 and the current version of the WFI are referring to the list of existing intertie connections, then this comment is noted and the City will update the WFI with current information as appropriate during the next required WFI update to ensure the intertie list is accurate.

No.	Agency	Source	Date	Section	Comment	Further Comments	Response
11	WDOH			Basic Planning Data	Regarding Table 5-9, Projected Equivalent Residential Units by Operating Area, do the projected ERUS' include non-revenue demand? If so, is the non-revenue demand based on an assumed percentage? If not, how does the City account for non-revenue demand in the capacity analysis for operational areas?		The projected ERUs in Table 5-9 does include non-revenue demand. Current revenue demands (billed consumption) for each operating area was determined through the use of billing record data paired with GIS mapping of meters. The non-revenue demand of the entire system was allocated to each operating area based on a ratio of the operating area's revenue demand to total system revenue demand (i.e. if an operating area comprised 20% of the revenue demand, it was allocated 20% of the non-revenue demand). When forecasting future demands, the current operating area total demands (revenue + non-revenue) are increased by an annual percentage of growth. That total forecasted demand is then divided by the calculated value of an ERU (so the ERUs includes both revenue and non-revenue demands).
12	WDOH			System Analysis	Thanks you for providing Figure 2-4, Existing Hydraulic Profile. The executive summary refers to an additional three operating areas and the capital improvement plan includes projects that would change the existing hydraulic profile. Please provide a hydraulic profile incorporating the proposed system changes.		The three future pressure zones (Lakeside, Cougar Mountain, and Bergsma) are all currently shown on Figure 2-4 (see legend on figure showing dashed lines as "Future Pressure Zone"). An additional figure has been added to the CIP chapter (Figure 11-2) that is similar to Figure 2-4 but shows how the CIP projects that affect system hydraulics will fit into the hydraulic profile. See enclosed Figure 11-2.
13	WDOH				Very nice table (Table 9-1) showing the summary of storage ability to meet Department requierments and City policies. Not all the entries match the corresponding operating area storage capacity analysis tables. For example, Table 9-1 indicates that the Mount Hood Operating Area Storage Capacity Analysis shows the contrary. Please clarify.		Table 9-1 was reviewed against detailed tables of storage capacity analyses for the different operating areas. Table 9-1 entry for the Mount Hood operating area has been revised to state for the compliance with the City Policy for 40 psi at the 2nd story that there is a, "Deficiency to supply pressure at all service connections per City policy. However, DOH requirements are met."
14	WDOH				Thank you for the well thought out and clearly communicated hydraulic modelling approach to prioritize projects in the distribution system. The introduction to the hydraulic analysis section in chapter 9 indicates the future system-wide performance was evaluated. Please provide the table or figure of model results for the 10 year demand.		An additional figure showing 2027 (10-year) results has been added. This is similar to the current 20-year (2037) results figure since CIP projects were created to address deficiencies under both planning horizons. See enclose for a copy of this new figure.
15	WDOH			Water Quality	Please update section 8.2.2 Total Coliform Rule, section 8.2.4 Bacteriological Reporting Procedures, and any other reference to the Total Colifrom Rule to reflect the changes in the Revised Total Coliform Rule.		Section 8.2.2, 8.2.4, and related sections have been modified to include the key provisions of the Revised Total Coliform Rule.
16	WDOH				Table 8-9, Lead and Copper Monitoring, refers to the maximum contaminant level (MCL) for lead and copper. The state board of health has not established MCLs for lead and copper. MCLs refered to in Table 8-9 should be refered to as Action Levels.		References to MCL in LCR table have been changed to "Action Level".
17	WDOH				Table 8-10, Summary of Existing Regulatory Compliance indicates the City is out of compliance with the Unregulated Contaminants Monitoring Rule 3 (UCMR3) due to PFAS ddetection in Gilman Well Nos. 4 and 5. The contaminants monitored under UCMR3 are by definition unregulated and therefore cannot be out of compliance if detected.		For UCMR3, modified table to say that the City is in compliance but modified text to state that, "*Although not currently regulated, PFAS were detected in Gilman Well Nos. 4 and 5. Treatment has since been implemented and all levels have been under the practical quantification limit since the treatment system has been online* ."

No.	Agency	Source	Date	Section	Comment	Further Comments	Response
18	WDOH				Thank you for providing the Coliform Monitoring Plan in Appendix K. Please clarify: Table 2.2 notes that the Montreux operating area can have additional storage "provided from higher zones via PRVs." The higher zones of Grand Ridge, Highlands Summit, and Forest Rim cannot supply Montreux, correct? If so, perhaps higher Bellevue zones exist that can supply Montreux? This clarification is needed so we can complete our approval of the Reduced Triggered Source Monitoring program that the City uses to comply with the Groundwater Rule	The table of contents indicates there is an attachment of the coliform sampling standard operating procedure. We would appreciate a copy of the standard operating procedure.	The Coliform Monitoring Plan (Appendix K) has been updated, including addition of the sampling SOP, addressing these comments. See enclosed document.
19						Per the current WFI population, 30 samples are now needed each month, including July and August	30 samples required in all months except Oct=40 samples. See updated Appendix K.
20						Please identify the estimated number of connections served by each pressure zone The Department expects at least one routine coliform sample site to be provided in each pressure zone that serves 100 or more connections	A tabular summary of the estimated number of connections by pressure zone and operating area is enclosed with this response to comments.
21	WDOH				The Department concurs with the recommendation listed in Table 8-11 to develop an E. coli response plan in case the City should have an E. coli MCL violation or identify E. coli in its raw source water under the Groundwater Rule. Our Mercer Island experience indicates that consumers want this water quality information as soon as possible and an E. coli Response Plan can position a community to be successful.		Noted. No edit required. It is also noted that E. coli response has been included in the Water Sampling - Coliform SOP, which has been incorporated into the updated Coliform Monitoring Plan. See above response.
22	WDOH			Operations and Maintenance	Have you adopted the Water Main Break Protocol for Chlorinates Systems? (DOH Publication 331-583 - 1/1/2017)		The City intends to update its main break SOP by end of 2018, to incorporate the referenced protocol.
23	WDOH			Standard Plans & Specifications	The City's design standards should specify the required separation between water and sewer lines. The Department refers to Ecology's Criteria for Sewage Works.		Note 2 on Standard Detail No. G-06 states that, "*Sewer and water pipe shall have a minimum separation as defined in the Ecology 'Critieria for Sewage Works Design'* ." As this note calls out this requirement, no change has been made to the detail.
24	WDOH				The Standard Detail No. W-07 Air Vacuum Release Valve Assembly shows a drilled hole to drain the vent line. The Department considers this a potential cross-connection. Think about eliminating the drilled hole from the air vacuum release valve design		The City has modified the referenced standard detail. See enclosed.
25	WDOH			Capital Improvement Program	Has the water system implemented an asset management program, which includes a remaining useful life assessment of major water system facilities, and estimated costs to replace those facilities?		The City has an asset inventory and plans to update this with remaining useful life and replacement cost in the next 3 years.
26	WDOH				Table 9-13, South Cove Operating Area Storage Capacity Analysis identifies a future deficiency in meeting the required storage volume. The deficiency can be addressed by nesting fire suppression storage and standby storage. Does the local fire protection authority allow for nesting?		Yes.
27	WDOH			Financial Program	Table 12-4 Revenue Requirement Summary. Another Table that shows rate increases necessary to achieve a balanced financial budget would be helpful.		Details regarding potential rate adjustments are not provided in the WSP, as they will result from a forthcoming rate study that the City intends to complete in 2019.
28	WDOH			Other Documentation	The water system must meet the consumer input process outlines in WAC 246-290-100(8). Please include documentation of a consumer meeting discussing the WSP, prior to DOH approval of the WSP		The Water System Plan was discussed at a City Council Infrastructure Committee meeting (April 11, 2018) and at a regular City Council meeting (May 7, 2018), at which WUE goals were also discussed. These meetings satisfy the consumer meeting requirement. The agendas for these meetings are enclosed.
29	WDOH				We understand that a signed SEPA checklist and Threshold Determination; an adoption resolution from the City Council; and comments from adjacent puveyors will be provided with the final WSP submittal.		The SEPA process will be completed in December, with documentation provided in Appendix C once completed.
30	WDOH				Is the (water system) a member of WARN		The City is filling out the forms to become a member. Membership is imminent.
31	King County	Letter	8/14/2018		Please include estimates of six and 20-year employment projection for the water use retail service area as part of the forecast water; or describe the relationship of the commercial water use projections done as compared to employee water use.		The analysis does not directly use employment projections. Consistent with the prior WSP, it uses commercial square footage for Central Issaquah (to reflect employee water use) and then in some zones residential and commercial demands are grouped together as a buildout demand of ERUs (developer can do any combination of residential/commercial as long as the total demand is a certain number of ERUs).

No.	Agency	Source	Date	Section	Comment	Further Comments	Response
32	King County				Provide consistency statements by local jurisdictions, or documentation for self-certification of consistency, as described in WAS 246-290-108		See enclosed for this documentation, which will also be added to Appendix B.
33	King County				Include a complete King County Water Reclamation Evaluation Checklist that can be found at https://www.kingcounty.gov/~/media/environment/dnrp/documents/WaterReclamationChecklist12_2011.ashx?la=en		The King County Water Reclamation Evaluation Checklist has been completed. It will be included in Appendix B. It is also enclosed with this response to comments.
34	King County				Include a completed SEPA Checklist and threshold Determination		The SEPA process will be completed in December, with documentation provided in Appendix C once completed.
35	King County				Confirm the City will continue to issue or use certificates of water availability for service of water to parcels located in unincorporated King County		Yes, the City will continue to issue certificates of water availability for service of water to parcels located in unincorporated King County when needed to comply with State law.
36	King County				The City Franchise 8101 expired in 2010. In order to gain Water System Plan approval, the City must begin the franchise renewal process, which is a separate process from the Water System Plan Process.		The City is in good standing, per follow-up communications between King County and the City.
37	City of Bellevue	Email	6/14/2018	Table 2-1	The table indicates 12" meter size at the Lakemont triangle Intertie, but there is no meter at this intertie. Lakemont Triangle is a "direct-read" area where wheeled volume is estimated using the sum of the individual customer meter volumes in the downstream area		A footnote has been added to the table stating, "*A master meter is not located at the Lakemont Triangle Intertie. The 12-inch size refers to the pipe size for the intertie. Demands through the intertie connection are estimated using the sum of individual customer meter volumes in the operating area* ."
38	City of Bellevue			Section 9.1	Storage for the Lakemont Operating Area and Montreux Operating Area are provided in Bellevue's system per agreement. See City of Bellevue 2016 Water System Plan, Volume 1 page 4-28, and Volume 2 Appendix K (Tables 12, 14)		Additional text has been added to the chapter stating, "*For the Lakemont and Montreux Operating Areas, storage is provided in the City of Bellevue's system per agreement and therefore are not analyzed in this chapter* ." Additionally, a footnot has been added stating, "*Additional information on storage for the Lakemont and Montreux Operating Areas can be found in the City of Bellevue's 2016 Water System Plan, Volume 1, pages 4-28; and in Volume 2, Appendix K, Tables 12 and 14* ."
39	Cascade Water Alliance	Email	8/9/2018		Ray and I [Michael Gagliardo] have both looked quickly at the draft Plan and have no specific comments.		Noted. No edits required.

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

Local Government Consistency Determination Form

Water System Name: Issaquah Water System PWS ID: 363505

Planning/Engineering Document Title: 2018 Water System Plan Plan Date: March 9, 2018

Local Government with Jurisdiction Conducting Review: City of Issaquah.

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

By signing this form, the local government reviewer confirms the document under review is consistent with applicable local plans and regulations. If the local government reviewer identifies an inconsistency, he or she should include the citation from the applicable comprehensive plan or development regulation and explain how to resolve the inconsistency, or confirm that the inconsistency is not applicable by marking N/A. See more instructions on reverse.

Local Government Consistency Statement	For use by water system: Identify the page(s) in submittal	For use by local government: Yes or Not Applicable
a) The water system service area is consistent with the adopted land use and zoning within the service area.	Figures 4-1 and 4-2	Yes
b) The growth projection used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	Section 4.2	Yes
c) For cities and towns that provide water service: All water service area policies of the city or town described in the plan conform to all relevant utility service extension ordinances.	Sections 3.1.1 and 3.1.2	Yes
d) Service area policies for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	Chapter 3	Yes
e) Other relevant elements related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.	Sections 2.2, 3.6, 7.2, 7.3, 7.4.1, 7.4.2, 7.4.4	Yes.

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.

Christen Smith-Leeson. 6.12.18

Signature Date

Christen Leeson, Senior Planner, City of Issaquah

Printed Name, Title, & Jurisdiction

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AGENDA
Council Infrastructure Committee

6:30 PM - Wednesday, April 11, 2018
Council Chambers, 135 E. Sunset Way, Issaquah WA

Page

COMMITTEE MEMBERS
Bill Ramos, Chair
Stacy Goodman
Victoria Hunt

Staff Liaison: Sheldon Lynne, Public Works Engineering Director

1. CALL TO ORDER

2. AGENDA ITEMS

3 - 114 a) **AB 7535 - Amendments to IMC 18.07.505 and IMC 3.64 regarding Wireless Communication Facilities, including Small Cell Design Guidelines, (A)** — **6:30 PM** [45 min.]
Presented by:
Keith Niven, Economic & Development Services Director

115 - 370 b) **AB 7538 - Updated Water System Plan, (D)** — **7:15 PM** [60 min.]
Presented by:
Robert York, Engineering Manager
Jeff Hansen, Consultant

371 - 379 c) **Gilman Blvd. Project Update, (I)** — **8:15 PM** [30 min.]
Presented by:
Brianne Ross, Senior Engineer

381 - 410 d) **Grant Applications - Newport: 54th to SR-900 and Maple to Sunset, (I)** — **8:45 PM** [30 min.]
Presented by:
Brianne Ross, Senior Engineer

411 - 416

e) **Project Updates, (I)** **9:15 PM**

Presented by: [5 min.]

Sheldon Lynne, Public Works Engineering Director

3. ADJOURNMENT

The next meeting is currently scheduled for May 17, 2018 / Council Chambers.

INQUIRIES

Please contact Tisha Gieser at (425) 837-3000 or tishag@issaquahwa.gov.

Meeting room is wheelchair accessible. American Disability Act (ADA) accommodations available upon request. Please phone 425-837-3000 at least two business days in advance.

Note: Times listed for meetings topics are approximate and items are subject to being shifted from the original order.

(I) Informational, (A) Action Needed, (D) Discussion

	CITY COUNCIL **AGENDA BILL** City Council Regular Meeting - 19 Mar 2018	NEW AB 7538 - Consent Calendar

Updated Water System Plan	**Proposed Council Action:** Refer to Council Infrastructure Committee

DEPARTMENT OF	PWE - Public Works Engineering, Bob York
COUNCIL LIAISON	n/a
OTHER COUNCIL MEETINGS	n/a
COMP PLAN POLICY NOS.	U-C1, U-C2, U-C3, U-C4, U-C5, U-C6, U-C7, U-C8, U-C9, U-C10, U-C11
OTHER POLICIES	Resolution No. 2014-05
EXHIBITS	A. Draft Resolution

SUMMARY STATEMENT

This agenda bill requests adoption of the 2018 Water System Plan (WSP). The City of Issaquah owns and operates a Public Water System and is required to maintain a current Water System Plan (WSP) approved by the Washington State Department of Health (WDOH), per Washington Administrative Code (WAC) 246-290-100. A WSP must:

- Provide an overview of the existing water system including adjacent purveyors, the boundary of the service area, operating areas, and supply, storage and distribution system facilities
- Describe the water utility policies and criteria for operation, design and planning to ensure future improvements and expansions are consistent with the City's Comprehensive Plan.
- Estimate the effect of future land uses on demographic trends within the service area.
- Analyze historical production and water sales to develop future demand projections.
- Describe the City's water use efficiency goals and identify the role that water conservation will have in reducing future water requirements and how the City's water conservation program will be implemented.
- Document existing water resources available to the City and analyze the ability to meet future water resource needs.
- Review existing water quality data for the system and discuss existing and forthcoming regulatory requirements applicable to the City water system.
- Assess the capability of the existing water system to meet existing and future demands using a hydraulic model.
- Document operations and maintenance (O&M) programs.
- Present a Capital Improvement Program (CIP), indicating priorities for construction, to address potential future water system deficiencies.
- Document the City's financial program for the water utility and identifies steps to be taken in order to ensure adequate funding of the water system in the future.

The last WSP update was prepared in 2012 and was adopted by Resolution No. 2014-05. At the time of adoption, WDOH required that system plans be updated once every 6 years. Since the 2012 WSP was prepared, many changes have occurred in the water system service area, including the adoption of the Central Issaquah Plan and several Development Agreements, and expansion of the service area, primarily due to the assumption of over 1,000 service connections in the South Cove/Greenwood Point neighborhood. These changes, along with the upcoming WDOH deadline for approving an updated plan, necessitate an update to the WSP.

Updated Plan:
The 2018 WSP meets all the requirements outlined above. It provides an evaluation of the City's existing water infrastructure and emerging regulatory trends. In particular, it was developed by coordinating closely with the Development Services Department to generate growth projections based on the 2017 Comprehensive Plan Update. Water supply and usage data were then used to develop a water demand forecast, including the impact of continued water conservation. This demand forecast was used to evaluate options to meet future demand and develop a Capital Improvement Plan over a 20 year timeframe. A primary finding is that the City will need to provide additional treatment of its groundwater supplies relatively soon as the groundwater supplies will need to be blended with regional supplies to enable operational flexibility to reliably serve future demands throughout the water system. Once adopted, the 2018 WSP will be valid for up to 10 years, as WDOH now allows more time to pass before an update is required.

Policy Considerations:
1. The WSP causes no changes to and is consistent with other currently adopted policies.
2. The WSP includes some adjustments to the future water system boundaries, the most significant of which is to recognize the City's desire to work with King County to exclude the East Cougar Potential Annexation Area in King County's 2020 Comprehensive Plan update.
3. There is currently no City policy related to groundwater treatment (e.g., fluoride addition). New policy would need to be developed in conjunction with the capital project proposed in the WSP to treat/blend water supplies.

Next Steps:
The review and comment period is anticipated to take approximately six months. Therefore, it is recommended that the WSP be referred to the Council Infrastructure Committee for review and comment during the same time that outside Agency comments and approvals are sought by WDOH, King County Utility Technical Review Committee, and neighboring water utilities.

Council Infrastructure will then make a recommendation to the full Council regarding the adoption of the 2018 WSP which would supersede the 2012 WSP. A draft resolution is included as Exhibit A.

As discussed in the updated WSP, the need for long term treatment is a critical path item for meeting anticipated future demands from water users. During budget deliberation in 2017, Council requested the development of the WSP prior to approval of funding for design work for a future water treatment plant. Due to the lengthy process to implement a water treatment project, an agenda bill to request funding from the City Council to begin the first phase of planning for a water treatment plant will be on the City Council meeting agenda in April for referral to Committee for review and recommendation.

Financial Information:
Adoption of the 2018 Water System Plan itself, does not obligate the City to perform any new capital projects or require any changes to any ongoing operation and maintenance procedures. Chapter 11 of the WSP provides recommended capital improvements (approximately $61 million of projects over a 20 year planning period) that are needed to continue providing reliable service. Decisions related to funding the projects will be made as part of the capital budgeting process, where recommended capital projects may be included in the 2020-2024 Capital Improvement Plan (CIP). Chapter 12 of the WSP provides a discussion of financial impacts. As part of the upcoming budget process, the Administration plans to request Council approval to perform a rate study in 2019 to assess impacts to water rates and charges.

Administration's Recommendation:
Approve the proposed resolution adopting the 2018 Water System Plan.

Update:
n/a

Alternative(s):
Do not adopt the 2018 WSP. [Impact: The City would not meet WDOH requirements for operating a Public Water System.]

RECOMMENDATION

Administration / Public Works Engineering Department:

MOVE TO: Refer AB 7538 to the April 11, 2018 (and subsequent) Council Infrastructure Committee meetings for review and recommendation, returning to the full Council on or before Nov. 19, 2018.

RESOLUTION NO. _________

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ISSAQUAH WASHINGTON ADOPTING THE 2018 WATER SYSTEM PLAN UPDATE.

WHEREAS, the Administration presented the City Council with the Draft 2018 Water System Plan Update on March 19, 2018; and

WHEREAS, the Council Infrastructure Committee has considered the Plan and comments from various agencies and the public; and

WHEREAS, the Draft 2018 Water System Plan Update was modified to incorporate the various agency and public comments to become the Final Water System Plan Update dated _______________; and

WHEREAS, the Draft 2018 Water System Plan Update was modified to incorporate the various agency and public comments to become the Final Water System Plan Update dated _______________; and

WHEREAS, the 2018 Water System Plan Update is consistent with and supports the policies set forth in the 2017 Issaquah Comprehensive Plan (Water Utility Element); and

WHEREAS, the Development Services Department issued a SEPA Declaration of __________________on _________________; and

WHEREAS, the Washington State Department of Health has approved the 2018 Water System Plan Update; and

WHEREAS, the King County Council has approved the 2018 Water System Plan Update; NOW THEREFORE,

THE CITY COUNCIL OF THE CITY OF ISSAQUAH HEREBY RESOLVES AS FOLLOWS:

Section 1. The City of Issaquah hereby adopts the 2018 Water System Plan Update dated _________________.

Section 2. The 2018 Water System Plan shall be used as a guide for developing City budgets, for location and sizing of water mains in the development of property, and as a basis for the exercise of substantive authority under SEPA.

PASSED by the City Council this ________day of ________, 2018.

____
TOLA MARTS, COUNCIL PRESIDENT

APPROVED by the Mayor this ________day of ________, 2018.

____
MARY LOU PAULY, MAYOR

ATTEST:

____
CHRISTINE L. EGGERS, CITY CLERK

APPROVED AS TO FORM:

____
JAMES E. HANEY, CITY ATTORNEY

RESOLUTION NO: 2018-
AGENDA BILL NO: AB 7538

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AGENDA
City Council Regular Meeting

7:00 PM - Monday, May 7, 2018

Council Chambers, 135 E. Sunset Way, Issaquah WA

Page			
	1.	**CALL TO ORDER**	
	2.	**PLEDGE OF ALLEGIANCE**	
	3.	**SPECIAL BUSINESS**	
5 - 6		a)	AB 7585 - Affordable Housing Week Proclamation *Hear Presentation*
	4.	**AUDIENCE COMMENTS**	
	5.	**COMMITTEE / REGIONAL REPORTS**	
	6.	**MAYOR'S REPORT**	
	7.	**CONSENT CALENDAR**	
7 - 112		a)	ID 0214 - Accounts: Payables and Payroll of May 7, 2018, $ 2,649,173.15
113 - 120		b)	Minutes: City Council Regular Meeting, April 16, 2018 *Approve*
121 - 122		c)	Minutes: Council Committee-of-the-Whole, April 24, 2018 *Approve*
123 - 128		d)	AB 7558 - 2018 Curb Ramp Enhancement Project *Refer to Council Infrastructure Committee*
129 - 133		e)	AB 7559 - 2018 Stormwater Rehabilitation Project *Award Bid*

135 - 138 f) AB 7565 - Interfund Loan Extension for Roadway Improvements
Refer to Council Services & Safety Committee

139 - 157 g) AB 7595 - Amendment to Salary Ordinance
Refer to Council Services & Safety Committee

159 - 258 h) AB 7599 - 2019-2024 Six-Year Transportation Improvement Program (TIP)
Set Public Hearing; Refer to Council Infrastructure Committee

259 - 262 i) AB 7601 - Eastside Fire & Rescue Memorandum of Understanding
Refer to Council Services & Safety Committee

8. PUBLIC HEARING

263 - 295 a) AB 7533 - First Major Amendment to the Costco Development Agreement
Conclude Public Hearing; Approve Resolution

297 - 312 b) AB 7604 - Water Use Efficiency Goals
Conduct Public Hearing

9. REGULAR BUSINESS

313 - 366 a) AB 7507 - Amendments to IMC and Central Issaquah Standards Regarding Inclusionary Zoning Requirements for Central Issaquah
Adopt Ordinance

367 - 380 b) AB 7522 - Creating the Visit Issaquah Organization
Approve Resolution

381 - 423 c) AB 7535 - Amendments to IMC 18.07.505 and IMC 3.64 regarding Wireless Communication Facilities, including Small Cell Design Guidelines
Adopt Ordinance

10. GOOD OF THE ORDER

a) Upcoming Council Meetings
>View website calendar

11. EXECUTIVE SESSION

12. ADJOURNMENT

Meeting room is wheelchair accessible. American Disability Act (ADA) accommodations available upon request. Please phone 425-837-3000 at least two business days in advance.

Guidelines for Public Participation: Citizen comments are an important part of the public process. We take them seriously and factor them into the decisions we make. Anyone from the public who wishes to comment will have the opportunity to do so. Please direct comments to the whole Council and not individuals. While this is not a question and answer session, we will contact you to follow up, if needed.

The Mayor will announce the allotted time for comments, from 3-5 minutes per person, depending on the number of those in attendance.

When recognized,

1. Use the lectern and speak into the microphone.
2. State your: **Name, Address,** and **Relationship to City** (e.g. resident, property owner, business owner).
3. Limit comments to the allotted time as announced by the Mayor.
4. Submit any written comments to the City Clerk.

A visual timer has been placed on the lectern. The timer will turn yellow when you are nearing the end of your comment period and will sound to indicate the end of your time.

Personal attacks, obscene language, derogatory remarks and disruptive behavior will not be permitted. If a speaker is out of order, the Mayor will direct the speaker to return to his or her seat. If a speaker does not comply, the Mayor will ask him or her to leave the Council Chambers.

Again, citizen comments, written and verbal, are an important aspect of the pubic process. The City takes comments seriously, and we thank members of the public for taking the time to address us during our meetings.

CITY OF ISSAQUAH WASHINGTON

CITY COUNCIL
AGENDA BILL
City Council Regular Meeting - 07 May 2018

NEW
AB 7604 -
Public Hearing

Water Use Efficiency Goals	**Proposed Council Action:** Conduct Public Hearing

DEPARTMENT OF	PWE - Public Works Engineering, Bob York
COUNCIL LIAISON	n/a
OTHER COUNCIL MEETINGS	n/a
COMP PLAN POLICY NOS.	U-C10, U-C11
OTHER POLICIES	n/a
EXHIBITS	A. Notice of Public Hearing B. Presentation

SUMMARY STATEMENT

The purpose of this agenda bill is to conduct a public hearing on the Water Use Efficiency (WUE) Goals, which are in Chapter 6 of the 2018 draft Water System Plan (WSP). These goals must be included in the WSP to meet the State's requirement for implementing a water use efficiency plan.

The draft WSP's proposed WUE goal is based on the regional goal developed by Cascade Water Alliance. In addition, the draft WSP includes City-specific informal targets.

Regionally, the City supports Cascade Water Alliance's goal of dedicating necessary resources, "to achieve a cumulative drinking water savings of 0.6 million gallons per day on an annual basis and 1.0 million gallons per day on a peak season (June – September) basis by 2020." This City has participated in numerous water conservation programs and services towards this effort.

The City's informal target is to reduce water consumption by 228,000 gallons per day by 2027. This reflects a 5% reduction in single-family use and a 2% reduction in commercial and multi-family use based on 2016 water use. Examples of activities the City has taken towards reduction include:

- Reminding customers to follow irrigation best practices
- Participating in the National Mayor's Water Conservation Challenge
- Encouraging efficient water use in new construction through the Green Building Program, incentives, rates, and standards.
- Working on aging watermain replacement.
- Establishing procedures to manage water loss for water main flushing.

This WUE goal, targets, and conservation activities are further detailed in Chapter 6 of the Water System Plan.

Public Hearing

As part of the Water System Plan planning process, a public forum is required to allow opportunity for the public to participate and comment on the proposed Water Use Efficiency goals presented in the draft plan. The following state regulations (WAC 246-290-830) establish the public comment requirements:

> (a) Goals shall be set in a public forum that provides opportunity for consumers and the public to participate and comment on the water use efficiency goals;
> (b) Public notice must occur at least two weeks prior to the public forum. Public notice must include the purpose, date, time, and place of the forum, and where materials supporting the rationale for the proposed goals can be reviewed;

(c) The elected governing board or governing body of the public water system shall review and consider all comments received;
(d) The following must be made available to the public for the purpose of fully documenting the basis for each goal:
(i) The information listed under WAC 246-290-810(4);
(ii) Annual water use efficiency performance reports prepared under WAC 246-290-840;
(iii) Water supply characteristics description in accordance with WAC 246-290-100 (4)(f)(iii)(B) or source description in accordance with WAC 246-290-105 (4)(f); and
(iv) A summary of the comments received and how they were considered.

All applicable information related to WAC 246-290-830(d)(i), (ii), and (iii) is available in the draft Water System Plan available at issaquahwa.gov/waterplan. Notice of the hearing was published in the Issaquah Sammamish Reporter on April 20, 2018, exceeding the requirement of WAC 246-290-830(b). The public hearing notice is attached as Exhibit A.

The objective of the hearing is for Council to hear and consider testimony on the draft goals. This is important because changes can be requested and made to the goals during the review stage of the Water System Plan.

A brief presentation (Exhibit B) of the draft Water Use Efficiency goal and an overview of Chapter 6 of the draft Water System Plan will be provided prior to the public hearing. No formal Council action is requested at Monday's meeting.

Continued Review

The Water System Plan is currently in the Council Infrastructure Committee for review (AB 7538). Additional opportunities for discussion of the Water Use Efficiency goals and the Water System Plan will occur during Council Infrastructure Committee meetings and Council Committee Work Sessions held periodically over the coming months. Adoption of the Plan is anticipated in November, 2018.

Financial Information:
n/a

Administration's Recommendation:
The Administration recommends conducting the public hearing to obtain public comments regarding the City's Water Use Efficiency Goals.

Update:
n/a

Alternative(s):
n/a

RECOMMENDATION

Administration / Public Works Engineering Department:

MOVE TO: n/a [Conduct Public Hearing]

Legal Notice
Date submitted: April 13, 2018

CITY OF ISSAQUAH
NOTICE OF COMMENT PERIOD AND PUBLIC HEARING
CITY OF ISSAQUAH WATER USE EFFICIENCY GOALS

The Issaquah City Council will hold a public hearing at its regular meeting of May 7, 2018 to receive and consider comments regarding the proposed Water Use Efficiency Goals in the City's Draft 2018 Water System Plan. The Water Use Efficiency Goals, which are in Chapter 6 of the Plan, identify the role that water conservation will have in reducing future water requirements and how the City's water conservation program will be implemented.

The City's Draft 2018 Water System Plan Update, including Chapter 6, Water Use Efficiency, is available on the City's website at issaquahwa.gov/waterplan. The Plan can also be reviewed at City Hall Northwest, 1775 – 12th Avenue NW, during business hours.

The Council meeting will begin at 7 PM, in the Council Chambers located at 135 East Sunset Way. The hearing will commence as soon after the beginning of the meeting as business permits. Anyone interested may appear at the hearing and provide comments regarding the Water Use Efficiency Goals.

Written comments will be accepted in advance of the hearing until 3 PM, May 7, 2018, via email to: waterplan@issaquahwa.gov.

Questions? Contact: Bob York, Utilities Engineering Manager at 425-837-3449.

City of Issaquah
2018 Water System Plan

Water Use Efficiency Program and Goals

Public Hearing – May 7, 2018

HDR

CITY OF ISSAQUAH WASHINGTON

Presentation Outline

- Purpose for Public Hearing
- History of Water Conservation in Issaquah
- Water Use Efficiency Rule Requirements
- Conservation Measures/Activities
- Historical Water Savings
- Water Use Efficiency Goals

Purpose for Public Hearing

Water Use Efficiency Goals → Water Use Efficiency Program → Water System Plan

- Water Use Efficiency Goals are a required component of a Water System Plan.
- Goals must be discussed in a public forum, so consumers and the public can comment (WAC 246-290-830).
- This public hearing exceeds the requirement as a way to formally receive comment.
- Public notice was provided on April 20th, more than the required two weeks.
- Council will hear comment, but is not required to act tonight (further discussion in Council Workshops over the coming months prior to Water System Plan adoption).

History of Water Conservation in Issaquah

- 1989
  - East King County Coordinated Water System Plan (Regional Objectives)
- 1996
  - Conservation Program Developed
- 2001
  - Conservation Program Updated
- 2004
  - Cascade Water Alliance Regional Conservation Program Begins
- 2007
  - Water Use Efficiency Rule adopted at the State level
- Ongoing
  - Continued Participation in Cascade's Regional Conservation Program

Water Use Efficiency Rule Requirements

- Meters (Production & Customer)
- Track Water Production & Consumption
- Forecast Demand with Conservation
- Maintain Distribution System Leakage ≤ 10%
- Implement ≥ 6 Conservation Measures
- Submit Annual Report to State

Conservation Measures/Activities

Regional (Cascade Water Alliance)

- Free Conservation Devices
  - Shower timers, rain gauges, etc.
- Device Installation at Commercial Customers
  - Showerheads, faucet aerators
- Educational Programs
  - Gardening classes, school presentations, landscape contractor and parks/schools staff training
- Water Audits
- Irrigation System Upgrade Rebates

Conservation Measures/Activities

Local

- Conservation-based Rate Structure
  - “Inclining block” rates
- Focused Interaction with Commercial Customers
  - Irrigation settings, best practices
- National Mayor’s Water Conservation Challenge
  - Residents pledge to conserve
- Green Building Program
  - Permit incentives, landscape code, soil amendment standards, etc.

Historical Water Savings

Gallons per Day, by Customer Class

Parameter	1996	2001	2010	2016	Planning Value (1)
Single Family Residential (per home)	228	209	150	141	150
Multi Family Residential (per unit)	135	135	124	84	124
Commercial (per 1,000 sq ft)	181	134	92	73	92

(1) Used for Demand Forecast. Consistent with 2012 Water System Plan assumptions. Conservative, for water supply planning purposes.

Comparison with other Utilities

Gallons per Day, by Customer Class

Parameter	Issaquah 2016	Issaquah Planning (1)	Sammamish Plateau	Bellevue	Redmond
Single Family Residential (per home)	141	150	224	185-232	176
Multi Family Residential (per unit)	84	124	153	125-143	125
Commercial (per 1,000 sq ft)	73	92	NA	51-118	NA

(1) Used for Demand Forecast. Conservative, for water supply planning purposes.

Values for other utilities are based on data presented in most recent Water System Plans.

Water Use Efficiency Goals

- In 2013, the City adopted Cascade Water Alliance's regional goal as its formal goal
  - Consistent approach taken by all Cascade members, and approved by State Department of Health
- The 2013 goals (still in effect) are to reduce water use by 2020 by the following amounts:
  - Annual basis: 0.6 million gallons per day
  - Peak season (June-Sept) basis: 1.0 million gallons per day
- Progress towards current goal
  - As of end of 2016, Cascade estimates regional savings of approximately 260,000 gallons per day (43% of goal)
- City's proposed formal Water Use Efficiency Goal:
  - Regional goal, which the Cascade Water Alliance Board will review/update in 2019/2020

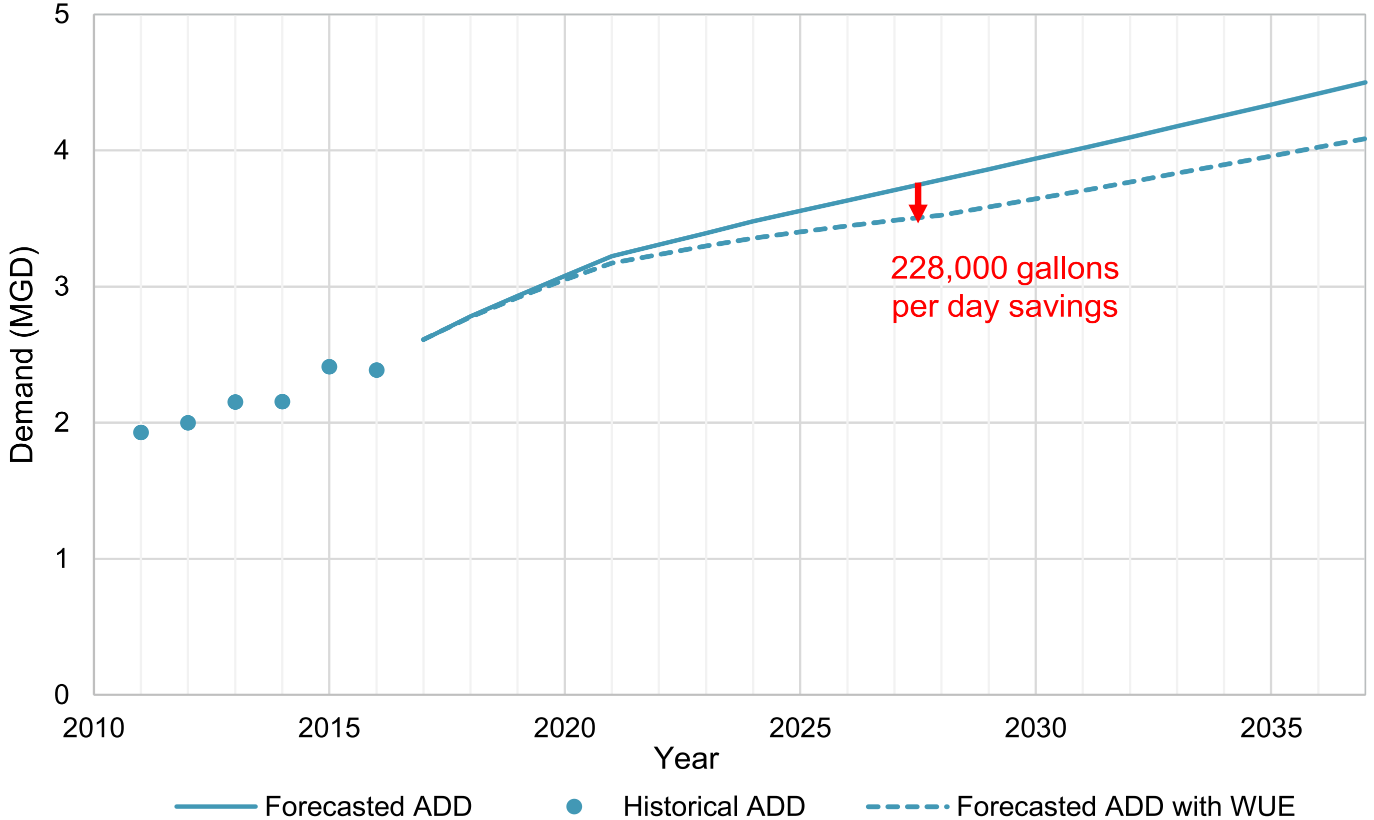
Water Use Efficiency Targets

- The City proposes establishing informal longer-range "targets" to extend beyond the current regional goal timeframe
- Proposed targets, relative to 2016 water use characteristics:

Parameter (gallons per day)	2016	2026	% Reduction
Single Family Residential (per home)	141	134	5%
Multi Family Residential (per unit)	84	82	2%
Commercial (per 1,000 sq ft)	73	71	2%

- These are not proposed as formal, adopted goals
  - They are informal targets, to aid the City in tracking continued progress in water conservation

Water Demand Forecast with Conservation Targets



ADD = Average Day Demand

WUE = Water Use Efficiency

MGD = Million Gallons per Day

Next Steps

- Receive Public Comment
  - Written comments received until 3:00 pm on May 7 (earlier today)
  - Public hearing tonight
  - Input from State, King County, adjacent water utilities by late summer
- Continued Council Consideration through September
  - Council Infrastructure Committee
  - Council Workshops
- Water System Plan Adoption in Fall
  - Water Use Efficiency Goals included

For questions, call Kristina Westbrook,
King County Reclaimed Water Program Manager at (206) 296-5279
www.kingcounty.gov/reclaimedwater

King County

Water Reclamation Evaluation Checklist
For Systems with 1,000 or more Connections

Please use this checklist, including the inventory template, to ensure that your water system plan includes sufficient information about opportunities for reclaimed water and your system's efforts to develop those opportunities. If a question is not applicable or the information is unavailable, then answer, "unknown" or "n/a." King County will consider the checklist completed if each answer is filled in with the best available information, even if the utility states that it is not aware of any reclaimed water opportunities within its service area.

The County and State recognize that changing conditions could initiate a need to respond in new ways to future water quality standards, wastewater discharge requirements, take advantage of advances in treatment technologies and/or allow our region to be positioned to respond to changes associated with climate change and population growth.

In 2003, Chapter 90.46 of the Revised Code of Washington (RCW) was amended to require public water systems serving 1,000 or more connections to evaluate opportunities for reclaimed water when completing their water system plans. Please use this checklist to meet King County consistency requirements in responding to this legislation.

Water System Name: Issaquah Water System
Date: 10/15/2018
PWS ID# 363505
Contact: Robert York

1. **Identifying Potential Future Demand for Reclaimed Water:** King County maintains a database and map of potential reclaimed water users for evaluating future projects. Please use the template below, or similar table, to provide information to assist King County in further researching these potential uses.
   - **Large Utility Water Users** (choose one):
     - [x] Attached is an inventory of twenty large (above 20,000 gallons/month on average), non single-family residential, water users served by our utility that have a potential for reclaimed water use, or
     - [ ] Attached is an inventory of our utility's top twenty water users, or
     - [ ] The information requested is unknown or not available.
       Additional Comments: ______
   - **Large Self Suppliers** (choose one):
     - [x] Attached is an inventory of large, self-supplied water users within our water utility's service boundaries - especially those near wastewater treatment plants, mainlines, outfalls, and pump stations or similar reclaimed water facilities), or
     - [ ] The information requested is unknown or not available.
       Additional Comments: ______
   - **Other** (choose one):
     - [ ] Attached is an inventory of other water users (such as those that are clustered near one another and could be served by a single system) that may be likely candidates for reclaimed water use, or
     - [x] The information requested is unknown or not available.
       Additional Comments: ______

2. **Environmental Commitment**: Are you a city/town, or providing water service to a city/town, that has made commitments within resource management plans, salmon recovery plans, or other environmental initiatives for which there is a potential opportunity for using reclaimed water to assist in meeting commitments? (choose one)

   ☑ Yes, here are plans that have potential for reclaimed water use in our service area to meet the above commitments:
   This is discussed in Section 6.2.6 of the 2018 Water System Plan and in the Cascade Water Alliance 2012 Transmission Supply Plan.

   ☐ The information requested is unknown, not available.
   Additional Comments: ______

3. **Identifying Areas of Potential Use of Reclaimed Water for Environmental Benefit:**
   Below are ***examples*** of uses of reclaimed water ***that comply with State, Federal and other reclaimed water environmental, health and safety standards***. All of these uses are currently in effect somewhere in Washington State. To the best of your knowledge, are any of these potential uses for reclaimed water applicable to your area?

   River Augmentation (choose one):

   ☐ Yes, our water rights are limited by instream flows. For more information, King County may contact:
   ______
   ______

   ☑ The information requested is unknown, or not available.
   Additional Comments: City held water rights are for ground water supply. Regional supply comes from CWA (see Transmission and Supply Plan).

   Groundwater Recharge (choose one):

   ☑ Yes, we withdraw water from an aquifer that is in a groundwater management area, or from a declining aquifer, where water levels may need to be replenished or to maintain aquifer storage. For more information, King County may contact:
   ______

   ☐ The information requested is unknown, or not available.
   Additional Comments: ______

   Water Rights Mitigation (choose one):

   ☐ Yes, our area is pursuing, or planning to pursue, new or additional water rights, and there may be an opportunity to use reclaimed water for mitigation of those new water rights. For more information, King County may contact:
   ______

   ☑ The information requested is unknown, or not available.
   Additional Comments: ______

   Potential Areas of Environmental Need (choose one):

   ☑ Yes, parts of our service area include potential environmental enhancement locations, such as wetlands enhancement, aquifer recharge, stream flow augmentation, that might be candidates for reclaimed water use. For more information, King County may contact:
   ______

   ☐ The information requested is unknown, or not available.
   Additional Comments: ______

4. **Local Reclaimed Water Legislation**: If water reclamation is mandated for this water system through local government agreement, contract, local regulations, ordinances, or other mechanisms, please provide a copy of the governing mechanism (choose one).

   ☐ Yes, local legislation exists in our area in support of reclaimed water use. The following relevant legislation is attached (please list titles of documents):
   ____
   ____

   ☑ No water reclamation legislation exists, or is known to exist, at a local level in our service area.

5. **Coordination with Local Wastewater Utility:** Include a brief description of your interactions with any wastewater or reclaimed water utility (King County or other) adjacent to your service area to evaluate any potential opportunities to develop reclaimed water (choose one).

   ☑ Describe if applicable:
   Reclaimed water opportunities are studied on a regional level through membership with the Cascade Water Alliance. For Issaquah, this was last completed as part of CWA's 2012 Transmission and Supply Plan.
   ____

   ☐ None. Additional Comments: ____

Template for
Inventory of Water Users and Identification of Potential Reclaimed Water Users

Site Owner or Site Name	Site Address (for general mapping purposes)	Estimated Annual Water Use	Water uses not requiring potable water[1]	Is this a Potential Reclaimed Water Customer?

[1] See Washington State Reclamation and Reuse Standards, September 1997, Section 1, Articles 1-5 for allowable uses of reclaimed water.
http://www.ecy.wa.gov/PROGRAMS/WQ/reclaim/standards.html

Top 20 Non-Residential Water Users*					
Site Owner or Site Name	**Site Address**	**Meter Type**	**Estimated Annual Water Use (CCF)**	**Water Uses Not Requiring Potable Water**	**Is This a Potential Reclaimed Water Customer?**
Darigold	611 Front ST N	Commercial	99,800	Unknown	Yes
Swedish Issaquah Hospital Campus	751 NE Blakely Dr	Commercial	17,900	Unknown	Yes
Atlas Apartments	1118 7th AVE NW	Irrigation	16,300	16,300	Yes
The Commons Shopping Center	755 NW Gilman BLVD	Commercial	13,100	Unknown	Yes
Costco Campus	1045 Lake DR	Irrigation	12,000	12,000	Yes
Town & Country Square	1185 NW Gilman BLVD	Commercial	10,800	Unknown	Yes
YWCA Family Village	930 NE High ST	Commercial	8,400	Unknown	Yes
Pickering Place	1435 11th AVE NW	Irrigation	6,600	6,600	Yes
Pickering Square	1802 129th AVE NE	Commercial	6,300	Unknown	Yes
Talus	Shangri-La Way NW	Irrigation	6,200	6,200	Yes
Windsong Apartments	600 Front St S	Irrigation	6,100	6,100	Yes
Issaquah High School and Middle School	700 2nd AVE SE	Public	5,900	Unknown	Yes
Discovery West Apartments	580 8th AVE NE	Irrigation	5,600	5,600	Yes
Costco Campus	800 Lake DR	Irrigation	5,600	5,600	Yes
Pickering Square	1802 129th AVE NE	Irrigation	5,400	5,400	Yes
Heritage Square	700 NW Gilman BLVD	Commercial	5,100	Unknown	Yes
Costco	1801 10th AVE NW	Irrigation	4,900	4,900	Yes
Pickering Barn	965 10th AVE NW	Irrigation	4,800	4,800	Yes
Homewood Suites	1484 Hyla AVE NW	Commercial	4,700	Unknown	Yes
Meadows Shopping Center	1620 NW Gilman BLVD	Commercial	4,500	Unknown	Yes

** Issaquah billed consumption broken into customer classes of apartments, commercial, duplex, multifamily, public irrigation, private irrigation, public, and single family residential. Table is the largest 20 users from the following categories: commercial, public irrigation, private irrigation, and public.*

Largest Self-Supplied Water Users*				
Site Owner or Site Name	**Site Address**	**Annual Water Right Qa (ac-ft)**	**Water Uses Not Requiring Potable Water**	**Is This a Potential Reclaimed Water Customer?**
King County Dept. of Natural Resources	Section 20, T24N R6E	1,200	Unknown	Yes
Issaquah Creamery	NE 1/4 of SE 1/4 of Sec. 28, T24N R6E	405	Unknown	Yes
Consolidated Dairy	NE 1/4 of Section 28, T24N R6E	1,232	Unknown	Yes

** List of locations from Table 6.2 of Appendix D - Reclaimed Water Opportunities from the 2012 Cascade Water Alliance Transmission Supply Plan*

Table of Service Connections by Operating Area and Pressure Zone

Created by GIS join of pressure zone layer (HDR created) with service connection layer (City created)

Date created: 2018-11-28

Row Labels	Count of FID
COUGAR RIDGE	**69**
COUGAR RIDGE 431	69
FOREST RIM	**96**
FOREST RIM 1201	96
GRAND RIDGE	**39**
GRAND RIDGE 1355	39
HIGHWOOD	**389**
HIGHWOOD 677	80
HIGHWOOD 715	14
HIGHWOOD 782	204
HIGHWOOD 950	91
ISSAQUAH HIGHLANDS CENTRAL PARK	**979**
ISSAQUAH HIGHLANDS CENTRAL PARK 742	979
ISSAQUAH HIGHLANDS SUMMIT	**1817**
ISSAQUAH HIGHLANDS SUMMIT 1000	1397
ISSAQUAH HIGHLANDS SUMMIT 1234	271
ISSAQUAH HIGHLANDS SUMMIT 750	149
LAKEMONT	**50**
LAKEMONT 520	50
MONTREUX	**261**
MONTREUX 1005	208
MONTREUX 1150	1
MONTREUX 364	15
MONTREUX 617	14
MONTREUX 744	23
MOUNT HOOD	**712**
MOUNT HOOD 483	712
SOUTH COVE	**1036**
SOUTH COVE 260	954
SOUTH COVE 270	82
TALUS MOUNTAIN VIEW	**308**
TALUS MOUNTAIN VIEW 752	308
TALUS SHANGRI-LA	**466**
TALUS SHANGRI-LA 616	466
VALLEY	**1806**
VALLEY 297	1806
WILDWOOD	**113**
WILDWOOD 588	22
WILDWOOD 634	91
Grand Total	**8141**

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Appendix C. SEPA Checklist and Determination of Non-Significance

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SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [HELP]

1. Name of proposed project, if applicable:
   City of Issaquah 2018 Draft Water System Plan Update (Plan)

2. Name of applicant:
   City of Issaquah – Public Works Engineering Department

3. Address and phone number of applicant and contact person:

Robert York, P.E., Engineering Manager – Utilities; Phone: 425-837-3449

Address: P.O. Box 1307, Issaquah, WA 98027

4. Date checklist prepared:

December 6, 2018

5. Agency requesting checklist:

City of Issaquah, Washington State Department of Health (DOH)

6. Proposed timing or schedule (including phasing, if applicable):

The 2018 Water System Plan Update is expected to be adopted in 2019. The plan provides a water demand forecast for 20 years and identifies capital improvement projects across the 20-year planning period. A new update of the plan will be completed in 10-years.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

This Plan, which discusses the operation and improvements to the City's water system, is a non-project action. Specific projects are identified in this Plan, each of which will require a separate SEPA review, except for those projects or actions that are categorically exempt from SEPA. Any amendments to this Plan would be also subject to a separate SEPA review. The Plan is required to be updated every 10 years.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

The Plan includes a look at potential water conservation savings. The Plan also reiterates polices, some environmentally related, that are relevant to the water system and are also outlined in the City's Comprehensive Plan.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No known government approvals are pending of other proposals directly affecting the property covered by this Plan.

10. List any government approvals or permits that will be needed for your proposal, if known.

Approval will be needed of the final Plan by King County and DOH.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

This Plan summarizes Issaquah's existing water system, establishes the water utility policies and criteria in accordance with the City of Issaquah Comprehensive Plan framework, projects future water demands, analyzes the existing water system and recommends improvements to correct deficiencies and meet future water service needs. The Plan provides the City with a guide to continued effective and efficient management of its water utility, particularly in the light of challenges associated with continued growth throughout its service area and redevelopment in the Central Issaquah area.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The Plan covers the entire City of Issaquah water service area and potential annexation areas. Certain areas of the City are currently served by Sammamish Plateau Water; these areas were not studied in this plan.

B. Environmental Elements [HELP]

1. Earth [help]

a. General description of the site:

The existing and future service areas include all categories of terrain – flat, steep, slopes, rolling, hilly, and mountainous.

b. What is the steepest slope on the site (approximate percent slope)?

Slopes vary from 0 to 50 percent.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

All types of soils are present, including clay, sand, gravel, peat, and muck.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

According to the King County sensitive areas map, there are two landslide hazard areas in the service area, as follows:

- Near Timberlake Park, approximately from 176th Avenue SE to 185th Place SE.
- South of Newport Way, approximately from 179th Avenue SE to 191st Avenue SE.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Minor amounts of filling, excavation, and grading may occur when implementing projects associated with the proposed capital program outlined in this plan. A SEPA checklist will be prepared for each project, unless categorically exempt.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

None of the proposed projects in the plan are anticipated to require significant clearing or earth disturbance.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

No projects proposed in this plan are anticipated to create significant new impervious surface.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

A temporary erosion and sediment control (TESC) plan will be prepared for each project that has the potential to disturb earth.

2. Air [help]

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Minor amounts of air emissions may occur when implementing projects associated with the proposed capital program outlined in this plan. A SEPA checklist will be prepared for each project or action , except for those projects or actions that are categorically exempt from SEPA.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No known off-site sources of emissions or odor affect this proposal. A SEPA checklist will be prepared for each project, unless categorically exempt from SEPA.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

No emissions will be generated based on adoption of this plan; however, standard emission controls for construction equipment will be utilized during construction of individual projects. A SEPA checklist will be prepared for each project, unless categorically exempt.

3. Water [help]

a. Surface Water: [help]

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

There are multiple surface water bodies and 5 major wetlands in the water service area, as follows:

- Lake Sammamish borders the north end of the service area.
- Issaquah Creek is a Class 1 stream that, including its tributaries, flows through a major portion of the service area, eventually flowing into Lake Sammamish.
- Tibbetts Creek is a Class 2 stream that, including its tributaries, extends through the western portion of the service area, eventually flowing into Lake Sammamish.

- Other creeks, such as Lewis Creek are also located partially inside the service area.
- Five major wetlands, including
  - Issaquah Creek Wetland No.2 is located south of Lake Sammamish. This (approximately) 200 acre wetland is classified as Palustrine Emergent Persistent (PEM1 – MEADOW).
  - Issaquah Creek Wetland No.3 is also located south of Lake Sammamish and southwest of Issaquah Creek Wetland No.3. This (approximately) 7 acre wetland is classified as Palustrine Emergent Persistent (PEM1 – SHALLOW MARSH).
  - Tibbetts Creek Wetland No.51, which is approximately 4 acres, is also located south of Lake Sammamish but west of Issaquah Creek Wetland No.3. This (approximately) 7 acre wetland is classified as Palustrine Forested Deciduous (PF01 – FORESTED).
  - Issaquah Creek Wetland No.60 is located in the northeast of the intersection of SR-900 and SE 78th Street, and is approximately 1.9 acres in size. This wetland is classified as Palustrine Aqua Bed Floating-leaved (PAB4 –OPEN WATER).
  - Issaquah Creek Wetland No.61B is located southeast of Wetland No.60, and is approximately 1.4 acres. This wetland is classified as Palustrine Scrub-Shrub Broad-Leaved Deciduous and Palustrine Emergent Persistent.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

This plan does not require work near the described waters; however, adoption of this plan may lead to specific projects which may require work within the areas of concern. Each project will require its own environmental evaluation, unless categorically exempt from SEPA .

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

No fill and dredge material is anticipated to be placed or removed from surface water or wetlands.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

One project in the CIP identifies an Emergency Water Filtration Plan at Lake Sammamish. This would create an emergency supply from Lake Sammamish, including treatment and transmission to distribution systems, which could be utilized by the Issaquah and Sammamish Plateau Water (SPW) systems. If the project were to be completed its own environmental evaluation / SEPA will be conducted.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

This plan does not require work within the 100-year floodplain; however, adoption of this plan may lead to specific projects which may require work within the areas of concern. Each project will require its own environmental evaluation, unless categorically exempt from SEPA .

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No.

b. Ground Water: [help]

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

The Plan discusses optimizing the current water supply wells to provide additional supply. However, the withdrawals will be within the City's existing water rights. If completed, some specific projects will require their own environmental evaluation, unless categorically exempt from SEPA .

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No waste material will be discharged into the ground as a result of adoption of this plan.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

No runoff of water will occur as a result of adoption of this plan.

2) Could waste materials enter ground or surface waters? If so, generally describe.

No waste material will be discharged into the ground or to surface waters as a result of adoption of this plan.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

None.

4. ***Plants*** [help]

a. Check the types of vegetation found on the site:

__X__deciduous tree: alder, maple, aspen, other
__X__evergreen tree: fir, cedar, pine, other
__X__shrubs
__X__grass
__X__pasture
_____crop or grain
_____ Orchards, vineyards or other permanent crops.
__X__ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
__X__water plants: water lily, eelgrass, milfoil, other
_____other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

No vegetation will be removed or altered given the adoption of this plan. However, specific projects described in the Plan may require work within the areas of concern. Each project will require its own environmental evaluation, unless categorically exempt from SEPA .

c. List threatened and endangered species known to be on or near the site.

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within specific areas. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within specific areas. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

e. List all noxious weeds and invasive species known to be on or near the site.

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within specific areas. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

5. ***Animals*** [help]

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Birds: Include hawk, heron, eagle, songbirds
Mammals: Include deer, bear, beaver
Fish: Include bass, salmon, trout

b. List any threatened and endangered species known to be on or near the site.

Chinook salmon, chum salmon, sockeye salmon, steelhead, and bull trout. Environmental studies for specific projects will describe any known species.

c. Is the site part of a migration route? If so, explain.

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within specific areas. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

d. Proposed measures to preserve or enhance wildlife, if any:

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within specific areas. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

e. List any invasive animal species known to be on or near the site.

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within specific areas. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

6. Energy and Natural Resources [help]

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

N/A

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

The Plan discusses water conservation measures. If implemented, water demand decreases as well as the associated energy costs for pumping that water.

7. Environmental Health [help]

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

1) Describe any known or possible contamination at the site from present or past uses.

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within specific areas. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within specific areas. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

None.

4) Describe special emergency services that might be required.

None.

5) Proposed measures to reduce or control environmental health hazards, if any:

None.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within this area of concern. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Not applicable as this is a planning document covering the entire water service area. However, specific projects described in the Plan may require work within this area of concern. Each project will require its own environmental evaluation, unless categorically exempt from SEPA.

3) Proposed measures to reduce or control noise impacts, if any:

None.

8. Land and Shoreline Use [help]

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Areas within the water service area include residential, office/retail, commercial, mixed use, vacant, and park. Adoption of the Plan itself will not affect current land uses.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

No.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No.

c. Describe any structures on the site.

There are many different types of existing and proposed new structures within the service area, ranging in size from single family homes to large corporate headquarters.

d. Will any structures be demolished? If so, what?

No.

e. What is the current zoning classification of the site?

Zoning varies across the service area and includes all zoning classifications contained in the City's Comprehensive Plan.

f. What is the current comprehensive plan designation of the site?

Not applicable as this is a planning document covering the entire water service area.

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

Portions of the service area are classified as critical areas.

i. Approximately how many people would reside or work in the completed project?

The City has a population of approximately 37,000.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not applicable.

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Consistency checklists have been completed by the City of Issaquah planning department and by King County.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

Individual projects will be reviewed for consistency with existing land uses and plans.

9. Housing [help]

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Not applicable.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Not applicable.

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable.

10. Aesthetics [help]

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

Not applicable as this is a planning document.

b. What views in the immediate vicinity would be altered or obstructed?

Not applicable as this is a planning document.

b. Proposed measures to reduce or control aesthetic impacts, if any:

Not applicable as this is a planning document.

11. Light and Glare [help]

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Not applicable as this is a planning document.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

Not applicable as this is a planning document.

c. What existing off-site sources of light or glare may affect your proposal?

Not applicable as this is a planning document.

d. Proposed measures to reduce or control light and glare impacts, if any:

Not applicable as this is a planning document.

12. Recreation [help]

a. What designated and informal recreational opportunities are in the immediate vicinity?

Not applicable as this is a planning document covering the entire water service area.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

Not applicable.

13. Historic and cultural preservation [help]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.

The Issaquah Depot, Gilman Town Hall/Museum, and Issaquah Sportsmen Clubhouse are all registered landmarks.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

Not applicable.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Not applicable.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Not applicable.

14. Transportation [help]

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

The entire City of Issaquah street system and portions of I-90 and SR-900 are within the water service area.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

Yes. The service area is served by King County Metro and Sound Transit bus service.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

None.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

No.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

None.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

No.

h. Proposed measures to reduce or control transportation impacts, if any:

Not applicable.

15. Public Services [help]

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

No.

b. Proposed measures to reduce or control direct impacts on public services, if any.

Not applicable.

16. Utilities [help]

a. Circle utilities currently available at the site:

Utilities throughout the service area include electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, cable TV, etc.

c. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

The projects included in the plan focus on upgrades and rehabilitation of the water system.

C. Signature [HELP]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: Robert J. York

Name of signee Robert J. York

Position and Agency/Organization Utilities Engg Manager - PWE (City of Issaquah)

Date Submitted: 12/7/18

D. Supplemental sheet for nonproject actions [HELP]

(**IT IS NOT NECESSARY** to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

   The Plan evaluated the capacity of the current water system, and identifies projects to improve the water system and resolve deficiencies. There would be no increased discharges to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise associated with adoption of this plan, other that incidental construction impacts associated with individual projects. An environmental study would be performed for each individual project prior to implementation, unless categorically exempt from SEPA.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

   The Plan will not directly affect plants, animals, fish, or marine lift. Projects identified in the CIP of the Plan will have an environmental study would be performed to implementation, unless categorically exempt from SEPA.

3. How would the proposal be likely to deplete energy or natural resources?

   There would be no depletion of energy or natural resources associated with adoption of the Plan.

   Proposed measures to protect or conserve energy and natural resources are: N/A

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

There will be no affect upon environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands associated with adoption of the Plan. However, an environmental study would be performed for each individual project identified in the CIP prior to implementation, unless categorically exempt from SEPA.

Proposed measures to protect such resources or to avoid or reduce impacts are: N/A

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

There will be no affect upon shoreline use with adoption of the Plan. However, an environmental study would be performed for each individual project identified in the CIP prior to implementation, unless categorically exempt from SEPA.

Proposed measures to avoid or reduce shoreline and land use impacts are: N/A

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

There will no increased demands on transportation infrastructure as part of the Plan. The Plan focuses on meeting public water needs across the 20-year planning period.

Proposed measures to reduce or respond to such demand(s) are: N/A

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

The Plan was prepared to be compatible with local, state, or federal laws or requirements for the protection of the environment. An agency review draft was sent to King County and DOH for review and comment. All review comments will be addressed prior to finalizing the plan.

CITY OF ISSAQUAH
PROPOSED DETERMINATION OF NONSIGNIFICANCE (DNS)

Description of Proposal: The City of Issaquah is proposing a non-project action for the adoption of the City of Issaquah 2018 Draft Water System Plan (Update). The draft plan summarizes the existing water system, establishes the water utility policies and criteria in accordance with the City of Issaquah Comprehensive Plan framework, projects future water demands, analyzes the existing water system and recommends improvements to correct deficiencies and meet future water service needs. The Plan also provides the City with a guide to continue effective and efficient management of its water utility, particularly in the light of challenges associated with continued growth throughout its service area and redevelopment in the Central Issaquah area.

Proponent: City of Issaquah
1775 – 12th Avenue NW
Issaquah, WA. 98027

Public Meeting before the City Council: 22 January 2019

Permit Number: SEP18-00020

Location of Proposal: Citywide

Lead Agency: City of Issaquah

Determination: The lead agency for this non-project proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

Comment Period: This Proposed DNS is issued under WAC 197-11-340(2). The City shall not act on this proposal for 14 days.

Comments: Please direct any comments concerning this threshold determination to:
Emily Arteche, Senior Planner -Long Range of Development Services; 1775 – 12th Avenue NW, Issaquah, WA 98027; 425-837-3086; emilya@issaquahwa.gov

SEPA Responsible Official: Emily Arteche

Position/Title: Development Services, Senior Planner, Long-Range

Address/Phone: P.O. Box 1307, Issaquah, WA 98027-1307, (425) 837-3086

Date: January 11, 2019 **Signature:** Emily Arteche

cc: Washington State Department of Ecology
Muckleshoot Indian Tribe
Snoqualmie Indian Tribe
U.S. Army Corps of Engineers
Washington State Department of Fish and Wildlife
Washington State Department of Archeology and Historic Preservation (DAHP)
Parties of Record

LEGAL NOTICE FOR PUBLICATION IN THE ISSAQUAH REPORTER – 1-11-2019

PUBLIC NOTICE
SEPA DETERMINATION

The Issaquah City Council will hold a Public Meeting on January 22, 2019, at 7:00 PM in the City Hall South Council Chambers, 135 E. Sunset Way, Issaquah, Washington.

At this public meeting the City Council is anticipated to adopt the City of Issaquah 2018 Water System Plan Update.

Pursuant to the provisions of Issaquah Ordinance No. 1633 and the State Environmental Policy Act, Chapters 43.21[c] RCW and WAC 197-11-510, notice is given that the City of Issaquah issued a Proposed Determination of Nonsignificance (DNS), File Number SEP18-00020 on January 11, 2019 for non-project action to adopt the City's 2018 Water System Plan Update. After review of a completed environmental checklist and other information on file with the agency, the City of Issaquah has determined that this proposal would not have a probable significant adverse impact on the environment. This DNS is issued under WAC 197-11-340(2).

There is a 14-day comment period from January 11, 2019 to January 25, 2019. Anyone wishing to comment may submit written comment to the Responsible Official, Emily Arteche, Sr. Planner at (425) 837-3086 or by email at emilya@issaquahwa.gov. The Responsible Official may reconsider the determination based on timely comments. At the completion of the comment period, the City will issue a Final Determination. Any person aggrieved by this determination may appeal by filing a Notice of Appeal with the City of Issaquah Permit Center no later than 5:00 PM on February 8, 2019. Appellants should prepare specific factual objections.

Additional information and copies of the proposed Plan Update are available for review during business hours at the Issaquah Public Works Engineering Department, 1775 12th Avenue NW, Issaquah WA, or by contacting Robert York, Engineering Manager at (425) 837-3449.

Published in the Issaquah Reporter: 1-11-2019

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Appendix D. Interlocal Agreements

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AMENDMENT NO. 1 TO
AGREEMENT AND TO INTERLOCAL AGREEMENT

THIS AMENDMENT NO. 1 TO AGREEMENT AND TO INTERLOCAL AGREEMENT ("Amendment" or "Amendment No. 1") is made by and between the Sammamish Plateau Water and Sewer District, a municipal corporation ("District"), and the City of Issaquah, a municipal corporation ("Issaquah" or "City"), (individually a "Party" and collectively the "Parties") for the purposes set forth herein.

SECTION 1: RECITALS

1.1 The Parties entered into a Memorandum of Agreement dated January 13, 2014, addressing the disposition of stormwater from approximately 81 acres within the Issaquah Highlands development ("Project Area"), including the decommissioning of the Lower Reid Infiltration Gallery ("LRIG") and funding for the management of stormwater within the Project Area (the "MOA").

1.2 The MOA in Section 1 required the Parties to negotiate and agree to an interlocal agreement providing for the decommissioning of the LRIG and funding for the management of stormwater within the Project Area. Thereafter, the Parties negotiated and entered into an interlocal agreement dated March 18, 2014 (the "ILA") addressing the LRIG decommissioning and stormwater management funding.

1.3 The MOA in Section 2 also required the Parties to negotiate and agree to a separate contract addressing non-assumption, city annexation, public records and other issues. Thereafter the Parties negotiated and entered into an agreement dated January 21, 2014 (the "Agreement") addressing non-assumption and other issues.

1.4 Section 2.03 of the ILA obligated the District to pay the cost for the City to decommission the LRIG and to design, construct, and install other stormwater management projects, facilities or systems (collectively "Projects") to manage stormwater generated in the Project Area, including but not limited to retention/detention, water quality treatment, land acquisition for flood control, and other mitigation for increased flows resulting from the surface water discharge(s) of stormwater generated in the Project Area at a cost of up to One Million Dollars ("District Funding"). Section 2.04 of the ILA required the City to provide the District with a list of the Projects, their estimated cost, and a schedule for their completion, required the City to complete the Projects within five years of the date of the ILA, and required the District to pay for the cost for the City to complete the Projects, not to exceed the District Funding, including the cost to decommission the LRIG. The Parties acknowledge the City has decommissioned the LRIG and the District has paid the City the sum of $355,021.39 pursuant to Section 2.03 of the ILA.

1.5 Section 2.04 of the ILA obligated the City to provide the District with a list of the Projects referenced in Section 2.03 of the ILA to be constructed by the City to manage stormwater generated in the Project Area. However, a dispute arose between the Parties regarding the eligibility of some of the Projects identified by the City to be paid for by the District. Pursuant to Section 4.09 of the ILA, the City's Mayor and the District's General Manager met to informally resolve and clarify Project funding eligibility, and reached agreement on such eligibility and funding. Therefore, the Parties now desire to amend and supersede the provisions of Section 2.04 of the ILA to provide for the District's acceptance of the list of Projects provided by the City as eligible for District Funding, to provide for the District's payment of $644,978.61 ("Remaining Funding") to the City to undertake such Projects and to revise the schedule for the City to complete such Projects. The District shall make the $644,978.61 payment to the City in full within thirty (30) days of the Parties' approval of this Amendment.

1.6 In Section 1 of the Agreement, the City agreed to forebear its right to attempt to assume all or a part of the District located within the City pursuant to Chapter 35.13A RCW within ten years of March 17, 2014, unless the District consented to any such assumption. In consideration of the District's agreement to pay the City the Remaining Funding as provided in Section 1.2 above, the Parties now desire to modify, amend and supersede the provisions of Section 1 of the Agreement to provide for the extension of the City's forbearance agreement for an additional two (2) year period, for a total of twelve (12) years from the date of March 17, 2014.

1.7 The Parties are authorized by Chapter 39.34 RCW to enter into interlocal agreements for joint action.

Now, therefore, in consideration of the terms and conditions contained herein, the Parties agree as follows:

SECTION 2: AMENDMENT OF SECTION 2.04 OF ILA

2.1 Section 2.04 of the ILA is hereby rescinded and deleted in its entirety, and superseded and replaced in its entirety with the following provision:

> 2.04 The Parties acknowledge the City has provided the District with a list of Projects referenced in Section 2.03 above to be completed by the City and their estimated cost as set forth on Page 25 of a report prepared by Mead & Hunt entitled "Issaquah Highlands Decommissioning of Lower Reid Infiltration Gallery (LRIG) – Mitigation Report" dated December 2014 (the "Report"), which is incorporated herein in full by this reference. The District agrees the Projects listed in the Report ("Listed Projects") meet the definition of Projects in Section 2.03 above and are eligible for District Funding. Therefore, District shall pay the Remaining Funding to the City within thirty (30) days of the Effective date of this Amendment. The City shall undertake and complete the Listed Projects within twelve (12) years of March 17, 2014, provided the City shall have the right in its sole discretion to determine which Listed Projects to undertake and complete, and to revise and amend the Listed Projects on the condition any newly designated

Projects comply with the definition of Projects set forth in Section 2.03 above. The Remaining Funding shall be used by the City to pay the cost for the City to plan, design, and complete the Listed Projects, and as such Listed Projects may be revised and amended. Within one (1) year of the City's completion of the Projects for which the Remaining Funds were used to complete, the City shall provide the District with a list of the Projects completed with the Remaining Funds, and a reporting of the amount of the Remaining Funds applied to each Project.

SECTION 3: AMENDMENT OF SECTION 1 OF THE AGREEMENT

3.1 Section 1 of the Agreement is hereby rescinded and deleted in its entirety, and superseded and replaced in its entirety with the following provision:

1. If, within twelve (12) years of March 17, 2014, the City determines to proceed with an assumption of all or part of the District and its property and utility facilities located within the City under Chapter 35.13A RCW, or to allow or to consent to another city proceeding with the assumption of all or part of the District and its property and utility facilities located within the City, , pursuant to RCW 35.13A.070, the City agrees to only do so with the consent of the District and based on a process and schedule agreed to by the Parties. Provided, the City shall have the right to proceed with a unilateral attempt to assume the District immediately after the expiration of such twelve-year period. Beginning no later than year three (3) of the twelve-year period, the Parties will undertake three-party discussions, including the City of Sammamish, regarding governance and utility service delivery options relative to the District, Issaquah, and Sammamish. As part of such discussions, the Parties agree to promptly and in good faith provide and disclose non-exempt public records to facilitate the discussion and study process.

SECTION 4: GENERAL PROVISIONS

4.1 The recitals set forth in Section 1 above are incorporated in full into this Amendment by this reference.

4.2 Except as expressly amended by this Amendment, the Agreement and the ILA remain in full force and effect according to their terms and conditions and are not otherwise modified or amended.

4.3 This Amendment may be executed in one or more counterparts, each of which shall be deemed an original and with the same effect as if all Parties had signed the same document. All such counterparts shall be construed together and shall constitute one instrument, but in making proof hereof it shall only be necessary to produce one such counterpart.

4.4 The Parties represent and warrant this Amendment has been duly approved and authorized by their respective legislative authorities, that each Party has the full power and

authority to enter into this Amendment and to carry out all actions required of them by the Agreement, the ILA and this Amendment. All persons executing this Amendment in a representative capacity represent and warrant they have the full power and authority to bind their respective municipal entities.

4.5 This Amendment shall take effect on the date by which both Parties have executed this Amendment ("Effective Date").

IN WITNESS WHEREOF, the Parties have executed this Amendment as set forth below.

CITY OF ISSAQUAH

By: ______________________
Fred Butler, Mayor

Dated: 8/10/15

ATTEST:

By: ______________________
Christina Eggers, City Clerk

APPROVED AS TO FORM:
OFFICE OF CITY ATTORNEY:

By: Jeff Cray / mlom
~~Wayne D. Tanaka~~ by Jeff Cray, OCWL

SAMMAMISH PLATEAU WATER & SEWER DISTRICT

By: ______________________
Lloyd Warren, President

Dated: 8·26·15

APPROVED AS TO FORM:

By: ______________________
John W. Milne

INTERLOCAL AGREEMENT

This Agreement ("Agreement") is made by and between the Sammamish Plateau Water and Sewer, a municipal corporation ("District"), and the City of Issaquah, a municipal corporation ("Issaquah" or "City"), (individually a "Party" and collectively the "Parties") for the purposes set forth herein.

Section 1: Recitals

1.01 Issaquah has applied to the Washington State Department of Ecology ("Ecology") for a permit to discharge stormwater ("Waste Discharge Permit") from the area generally described as approximately 81 acres within the Issaquah Highlands development, including the Town Center, West 45 area, the Lower Reid Infiltration Gallery ("LRIG"), and Upper Reid Pond ("Project Area") into the LRIG, and from the LRIG into the ground in the Lower Issaquah Valley ("LIV"). The Project Area and the LIV are more specifically identified and depicted, respectively, on **Exhibits A** and **B** attached hereto and incorporated herein by this reference. The District maintains public water supply wells in the Lower Issaquah Valley Aquifer ("LIVA") located down gradient of the LRIG which provide approximately fifty (50) per cent of the District's water supply.

1.02 The Parties have undertaken a process in good faith to address the disposition of stormwater from the Project Area. The Parties have agreed to the decommissioning of the LRIG, the discharge of stormwater from the Project Area to surface water, and to provide additional funding for management of stormwater generated within the Project Area. The Parties enter into this Agreement to address their mutual objectives and concerns regarding the disposition of the Project Area stormwater in a manner that protects the LIVA.

1.03 The purpose of this Agreement is to describe and memorialize the commitments agreed upon by the Parties related to the foregoing.

Now, therefore, in consideration of the terms and conditions contained in this Agreement, the Parties agree as follows:

Section 2: LRIG Decommissioning and Project Funding

2.01 The City agrees not to inject or infiltrate stormwater from the Project Area to the LRIG, the LRIG site or to any other site or area within the LIV. The City further agrees to withdraw its application to Ecology for a Waste Discharge Permit to discharge stormwater at the LRIG within ten (10) days of the Effective Date of this Agreement.

2.02 The City shall decommission the LRIG in a manner acceptable to the District, which acceptance shall not be unreasonably withheld, and the decommissioning design agreed to by the Parties shall be stamped by a Washington State licensed engineer who shall certify the decommissioning will render the LRIG inoperable for injection or infiltration of stormwater into the ground. The City shall decommission the LRIG in the manner acceptable to the District by December 31, 2014. The City agrees it will not re-commission the LRIG to inject or infiltrate stormwater at the LRIG without the prior written approval of the District.

2.03 The District shall pay the cost for the City to decommission the LRIG and to design, construct and install other stormwater management projects, facilities or systems (collectively "Projects") to manage stormwater generated in the Project Area, including but not limited to retention/detention, water quality treatment, land acquisition for flood control, and other mitigation for increased flows resulting from surface water discharge(s) of stormwater generated in the Project Area at a cost up to One Million Dollars ($1,000,000.00) ("District Funding"). The portion of the District Funding for decommissioning the LRIG shall be paid by the District to the City to reimburse the City for its costs incurred to decommission the LRIG after the LRIG has been decommissioned by the City. The City shall provide the District with detailed invoices of the work undertaken and the costs incurred by the City to decommission the LRIG and for the other Projects pursuant to this Agreement for reimbursement. The District shall have the right to enter upon the real property where the LRIG is located following at least forty eight (48) hours prior written notice to the City and accompanied at all times by a City representative to confirm the LRIG has been and remains decommissioned.

2.04 By December 31, 2014, the City shall provide the District with a list of the Projects referenced in Section 2.03 above to be constructed by the City, the estimated cost of each Project, and a schedule for their completion. The City shall undertake and complete the Projects identified by the City within five (5) years of the Effective Date of this Agreement. The City may revise the list of Projects, the estimated cost of each Project and the schedule for completion within such five (5) year period consistent with this Agreement, provided the City shall give the District ninety (90) days prior written notice of any such changes. Any such revision(s) shall constitute the Projects as defined herein. The District shall pay the cost for the

City to plan, design, and pursue completion of the Projects not to exceed the District Funding, including the cost to decommission the LRIG. The District Funding for the Projects shall be paid by the District to the City to reimburse the City for its costs incurred for the Projects once the Projects have been completed by the City or the City has incurred costs eligible for District Funding. The City shall provide the District with detailed invoices of the work undertaken and the costs incurred by the City for reimbursement. The District shall have no obligation to pay for and reimburse to the City the costs of any Projects incurred by the City after five (5) years of the Effective Date of this Agreement.

2.05 The City shall own and assume sole operational and maintenance responsibility for any Projects constructed by the City pursuant to this Agreement.

2.06 This Agreement is not contingent on any monitoring or reporting requirements; any such requirements are not subject to this Agreement, but rather shall be subject to the City's coverage under the Western Washington Phase II Municipal Stormwater Permit dated August 1, 2012 ("Phase II Permit"). The District agrees not to appeal the City's permit to discharge stormwater under the Phase II Permit or otherwise challenge the City's discharge of stormwater from the Project Area to surface water.

2.07 The District agrees to dismiss its pending appeal regarding the Phase II Permit presently before the PCHB. The Parties further agree to waive any and all claims either Party may have against the other Party related to the LRIG as long as the LRIG site is not used to inject or infiltrate stormwater. The release and waiver of claims regarding the City's proposed wastewater discharge permit for the LRIG will be mutual and each Party agrees to bear its own fees and costs.

2.08 Following the mutual execution of this Agreement, the Parties agree to issue a joint press release regarding the resolution of the issues addressed in this Agreement, the contents of which the Parties shall mutually agree to. Neither Party will issue a press release or public communication regarding the issues addressed in this Agreement in a manner that deviates from the agreed-upon terms of the joint press release.

2.09 The Parties agree that all terms and conditions of this Agreement shall be subject to enforcement in an action for specific performance.

2.10 The Parties acknowledge the requirements of Paragraph 2 of a Memorandum of Agreement dated January 13, 2014, between the Parties relative to the subject of this Agreement ("MOA") have been satisfied.

Section 3: Interlocal Provisions

3.01 This Agreement shall terminate by its terms, or sooner by written agreement of the Parties.

3.02 No separate legal or administrative entity is created by this Agreement.

3.03 Any joint or cooperative undertaking resulting from this Agreement does not require the joint financing, budgeting, acquisition, holding or disposal of any real or personal property.

3.04 To the extent necessary, this Agreement shall be administered jointly by the City's Mayor and the District's General Manager.

3.05 Consistent with RCW 39.34.040, this Agreement shall be filed for recording with the King County Department of Records upon full execution or posted on the City's and the District's respective websites listed by subject matter.

Section 4: General

4.01 This Agreement is made under, and shall be governed by and construed in accordance with the laws of the State of Washington. Venue and jurisdiction of any lawsuit involving this Agreement shall exist exclusively in state and federal courts in King County, Washington. If either Party breaches or threatens to breach this Agreement, the other Party shall be entitled to seek all legal, injunctive or other equitable relief.

4.02 All notices and/or correspondence hereunder, shall be mailed, faxed or hand-delivered and addressed as follows:

To District:

General Manager
Sammamish Plateau Water & Sewer District
1510 228th Avenue SE
Sammamish, Washington 98075
Phone: 425-392-6256, Fax: 425-391-5389.

To City:

Mayor
City of Issaquah
1775 - 12th Ave. NW
Issaquah, WA 98027

Phone: 425-837-3020

4.03 If any part or provision of this Agreement is held invalid or unenforceable as written, it shall not affect any other part. If any part of this Agreement is held to be unenforceable as written, it shall be enforced to the maximum extent allowed under applicable law.

4.04 The waiver of any breach of this Agreement or failure to enforce any provision of this Agreement shall not waive any later breach.

4.05 The term "Party" as used in this Agreement shall include, but not be limited to, the Party's employees, staff, agents, contractors, sub-contractors and any other persons, parties or entities acting on behalf of or providing services to the Party for the purposes set forth herein.

4.06 This Agreement shall be effective on the date by which both Parties have executed this Agreement ("Effective Date").

4.07 This Agreement may be executed in counterparts, each of which shall be deemed an original and with the same effect as if the Parties had signed the same document. All such counterparts shall be construed together and shall constitute one instrument, but in making proof hereof it shall only be necessary to produce one such counterpart.

4.08 The Parties represent and warrant this Agreement has been duly approved and authorized by their respective legislative authorities, that each Party has the full power and authority to enter into this Agreement and to carry out the actions required of them by this Agreement, and all persons signing this Agreement in a representative capacity represent and warrant they have the full power and authority to bind their respective municipal entities.

4.09 It is the Parties' intent to resolve any disputes relating to the interpretation or application of this Agreement informally through discussions by the Mayor of the City and the General Manager of the District. If unsuccessful, then the Parties agree to submit the dispute to mediation administered by a professional mediator before resorting to a lawsuit. All fees and expenses for mediation shall be borne by the Parties equally. However, each Party shall bear the expense of its own counsel, experts, witnesses, and preparation and presentation at the mediation.

4.10 The Parties agree to perform all duties and obligations in this Agreement with due diligence and in good faith. Time is of the essence to perform all duties and obligations in this Agreement.

4.11 The Recitals set forth above in Section 1 are incorporated by reference herein and made part of this Agreement.

4.12 This Agreement is made for the sole benefit of the Parties and is not intended to benefit any other person or entity.

IN WITNESS WHEREOF, the Parties have executed this Agreement as set forth below.

CITY OF ISSAQUAH

By: ____________________
Fred Butler, Mayor

Dated: 3/18/14

ATTEST:

By: ____________________
Christine Eggers, City Clerk

APPROVED AS TO FORM:
OFFICE OF CITY ATTORNEY:

By: ____________________
Wayne D. Tanaka

SAMMAMISH PLATEAU WATER
& SEWER DISTRICT

By: ____________________
Robert Abbott, President

Dated: 3-17-14

APPROVED AS TO FORM:

By: ____________________
John Milne

EXHIBIT A

DEPICTION OF PROJECT AREA

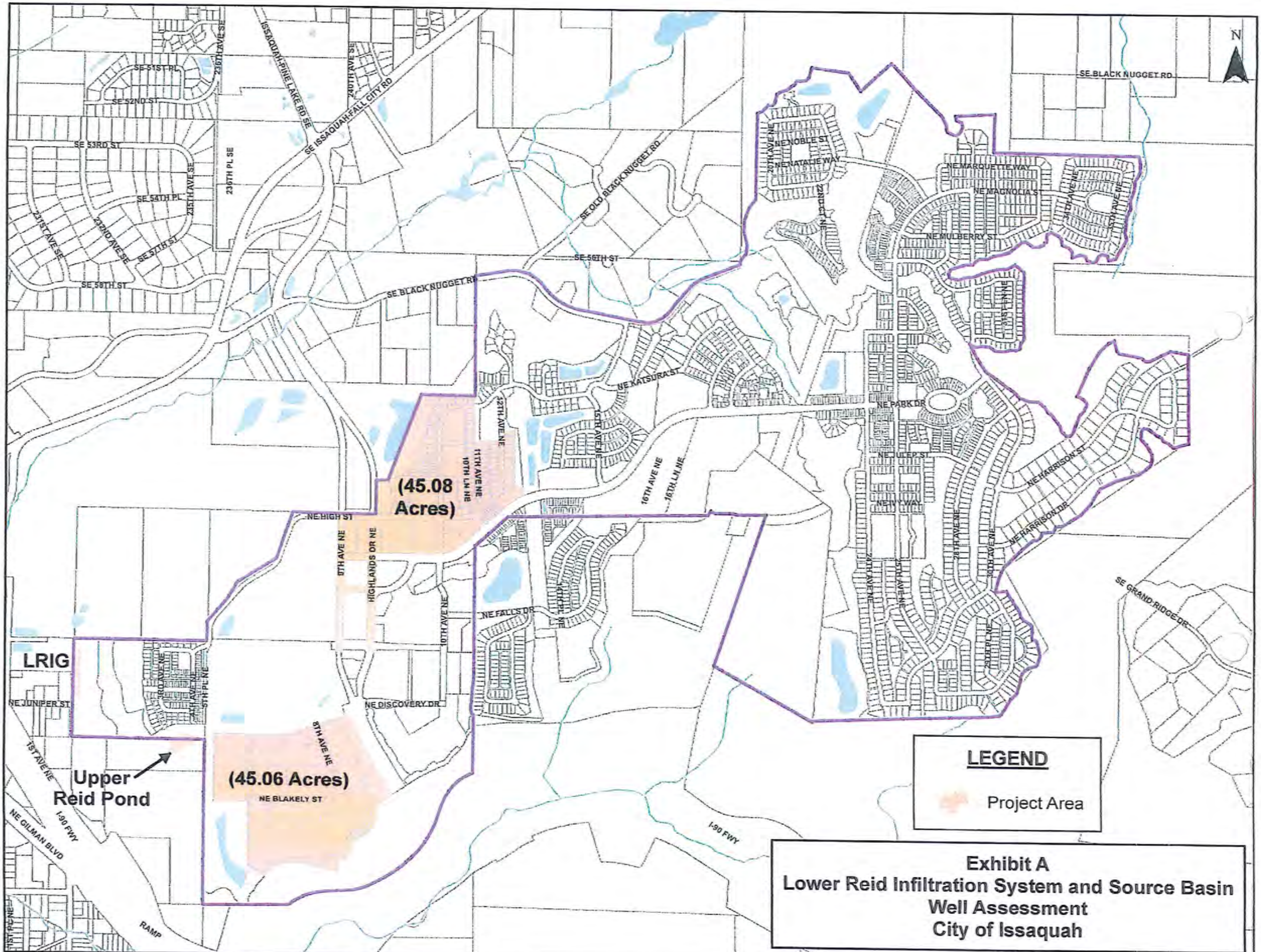
N
SE BLACK NUGGET RD
ISSAQUAH-PINE LAKE RD SE
SE ISSAQUAH-FALL CITY RD
240TH AVE SE
236TH AVE SE
SE 51ST PL
SE 52ND ST
SE 53RD ST
236TH PL SE
SE 54TH PL
233TH AVE SE
231ST AVE SE
232ND AVE SE
SE 57TH ST
SE 58TH ST
SE OLD BLACK NUGGET RD
SE 56TH ST
SE BLACK NUGGET RD
20TH AVE NE
NE NOBLE ST
NE NATATIE WAY
22ND CT NE
NE MARQUETTE WAY
NE MAGNOLIA ST
34TH AVE NE
35TH AVE NE
NE MULBERRY ST
31ST LN NE
NE KATSURA ST
NE PARK DR
12TH AVE NE
15TH AVE NE
11TH AVE NE
10TH LN NE
NE JULEP ST
NE HARRISON ST
(45.08 Acres)
16TH AVE NE
16TH LN NE
NE IVY WAY
NE HARRISON DR
NE HIGH ST
8TH AVE NE
HIGHLANDS DR NE
24TH AVE NE
25TH AVE NE
28TH AVE NE
30TH AVE NE
SE GRAND RIDGE DR
10TH AVE NE
NE FALLS DR
14TH PL NE
LRIG
3RD AVE NE
4TH AVE NE
5TH PL NE
NE JUNIPER ST
NE DISCOVERY DR
32ND PL NE
8TH AVE NE
1ST AVE NE
Upper Reid Pond
(45.06 Acres)
NE BLAKELY ST
I-90 FWY
NE GILMAN BLVD
I-90 FWY
RAMP
1ST PL NE
LEGEND
Project Area
Exhibit A
Lower Reid Infiltration System and Source Basin
Well Assessment
City of Issaquah

EXHIBIT B

DEPICTION OF LIV

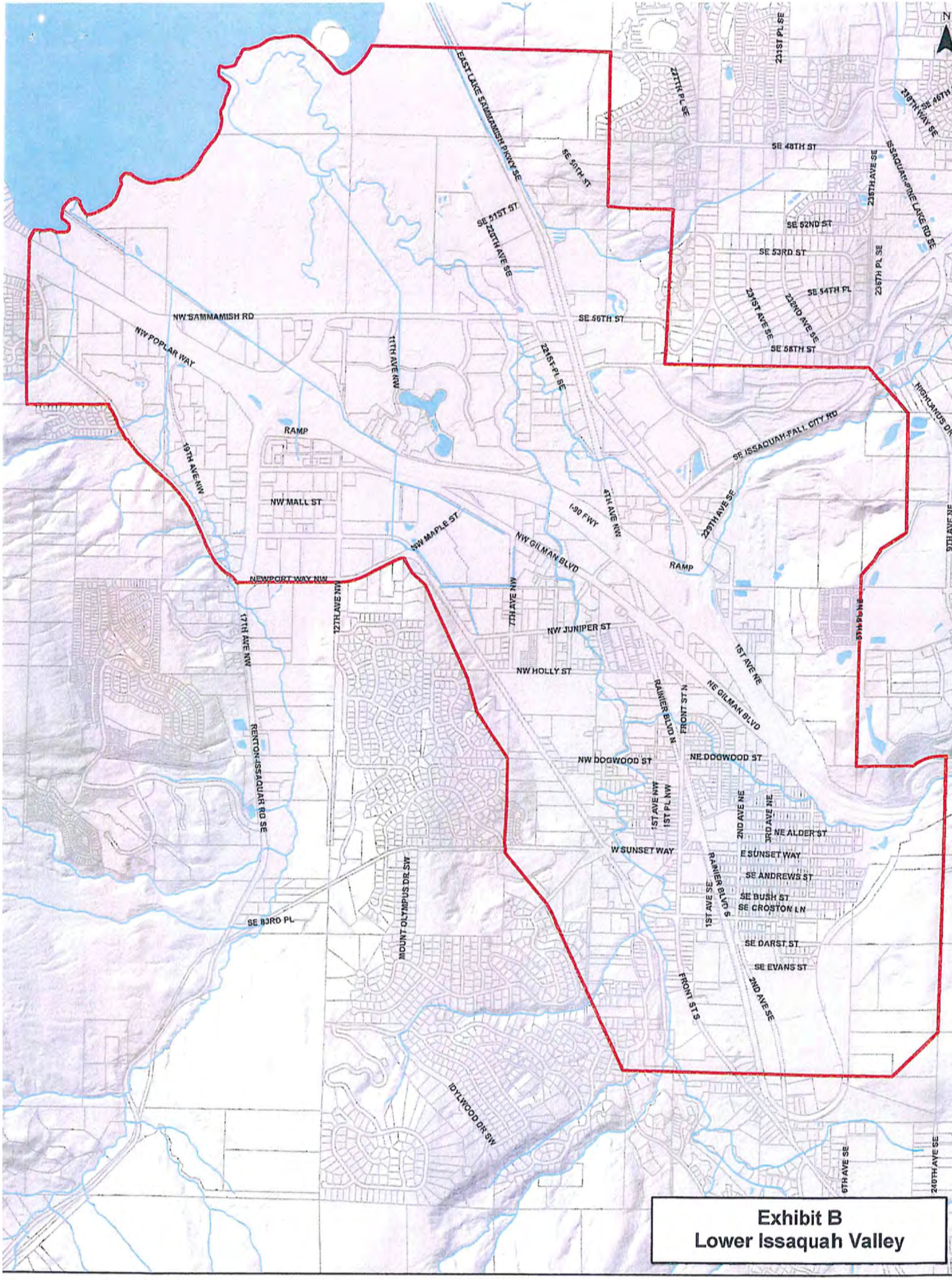

Exhibit B
Lower Issaquah Valley

ATTACHMENT B

2014-2018 LRIG MITIGATION PROJECT LIST

This list is prepared in accordance with Sections 2.04 of the City of Issaquah / Sammamish Plateau Water and Sewer District Interlocal Agreement on Lower Reid Infiltration Gallery (LRIG) Decommissioning (City Resolution 2014-01; District Resolution #4330).

Table 1 – Project List and Cost Summary

Project Name	Description	Date	Estimated Cost
Mitigation Project Design	Prepare final design, specification and estimate for LRIG mitigation projects. Recommended projects were evaluated and proposed in report entitled *Issaquah Highlands Decommissioning of Lower Reid Infiltration Gallery (LRIG) – Mitigation Report (Mead & Hunt December 2014)*	2015	$50,000
Wetland NF10 low flow diversion/augmentation	New connection to system, add WQ vault and spreaders to wetland	2016-2017	$260,000
Wetland NF18 low flow diversion/augmentation	Increase splitter baseflow, enlarge WQ swale, add flow spreaders	2016-2017	$85,000
Wetland NF27 low flow diversion/augmentation	Increase clean water flow split, add flow spreaders	2016-2017	$5,000
Wetland EF13 low flow diversion/augmentation	Increase clean water flow split, add flow spreaders	2016-2017	$81,000
Wetland NF34 low flow diversion/augmentation	Increase baseflow from mixed flow pre-pond splitter, add WQ swale, add flow splitters	2016-2017	$110,000
Contingency		2016-2017	$63,000
Subtotal			$654,000
2014 Expenditures	LRIG Mitigation Design, decommissioning construction contract, and LRIG Mitigation Report	2014	$346,000
Total 2014-2018 Cost			$1,000,000

ATTACHMENT C

Issaquah Highlands Decommissioning of Lower Reid Infiltration Gallery (LRIG) – Mitigation Report

Final Report prepared for:

City of Issaquah

Report prepared by

Mead & Hunt

Offices Nationwide

www.meadhunt.com

December 2014

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1.0 Introduction

Issaquah Highlands is a 577-acre master planned community comprised of residential, commercial, and public developments. Initial planning and permitting began around 1996. The community is located in the northeastern part of the City of Issaquah on the Sammamish Plateau. Storm water runoff from most of the community discharges into North Fork Issaquah Creek at an outfall near the intersection of Interstate 90 and East Lake Sammamish Parkway, about 1 mile southeast of the North Fork confluence with Issaquah Creek. Other smaller portions of the community discharge to North Fork Issaquah Creek farther upstream and also to East Fork Issaquah Creek.

This report focuses on the storm system discharges into North Fork Issaquah Creek, as well as stream hydraulics of the creek upstream and downstream of the main project discharge. The City of Issaquah has signed an agreement with the Sammamish Plateau Water and Sewer District (SPWSD) to decommission the Lower Reid Infiltration Gallery (LRIG), an infiltration facility close to the main project discharge to North Fork Issaquah Creek. This facility was originally intended to provide storm water disposition through infiltration and was designed to receive 6 cfs (cubic feet per second) of peak inflow.

After the Camp Creek Landslide in 2004, the Issaquah Highlands Major Development Review Team (MDRT) studied infiltration in Development Area 4 and recommended that all infiltration be discontinued in this area except the LRIG and Microsoft facilities. Part of this recommendation was that the LRIG's capacity be increased from 6 cfs to 9 cfs. For the purposes of this study, the maximum infiltration function of the LRIG when online during the 100-year event is 9 cfs, as approved in an amendment to the development agreement.

The purpose of this study is to investigate potential hydrologic and/or hydraulic mitigation measures that will offset the decommissioning of the LRIG and the loss of that 9 cfs infiltration capacity. Project permits, including State Environmental Policy Act (SEPA) review, require that this quantity of infiltration (or an equivalent) be replaced with other storm water management controls in order to meet drainage standards and mitigate other project impacts.

2.0 Background

Issaquah Highlands was originally permitted in 1996. In recent years, the SPWSD has contended that the LRIG, which receives storm water from a portion of the development, was possibly contaminating the Lower Issaquah Valley Aquifer (LIVA) that a nearby SPWSD well draws from. This claim has not been substantiated but a settlement between the City of Issaquah and SPWSD has been agreed upon, which includes abandonment of the LRIG. This report evaluated modifications of existing hydrologic models to quantify potential impacts that abandonment of the LRIG might have on North Fork Issaquah Creek downstream of the main outfall and to develop storm system retrofit projects that will mitigate peak flow rate increases that will result from the abandonment.

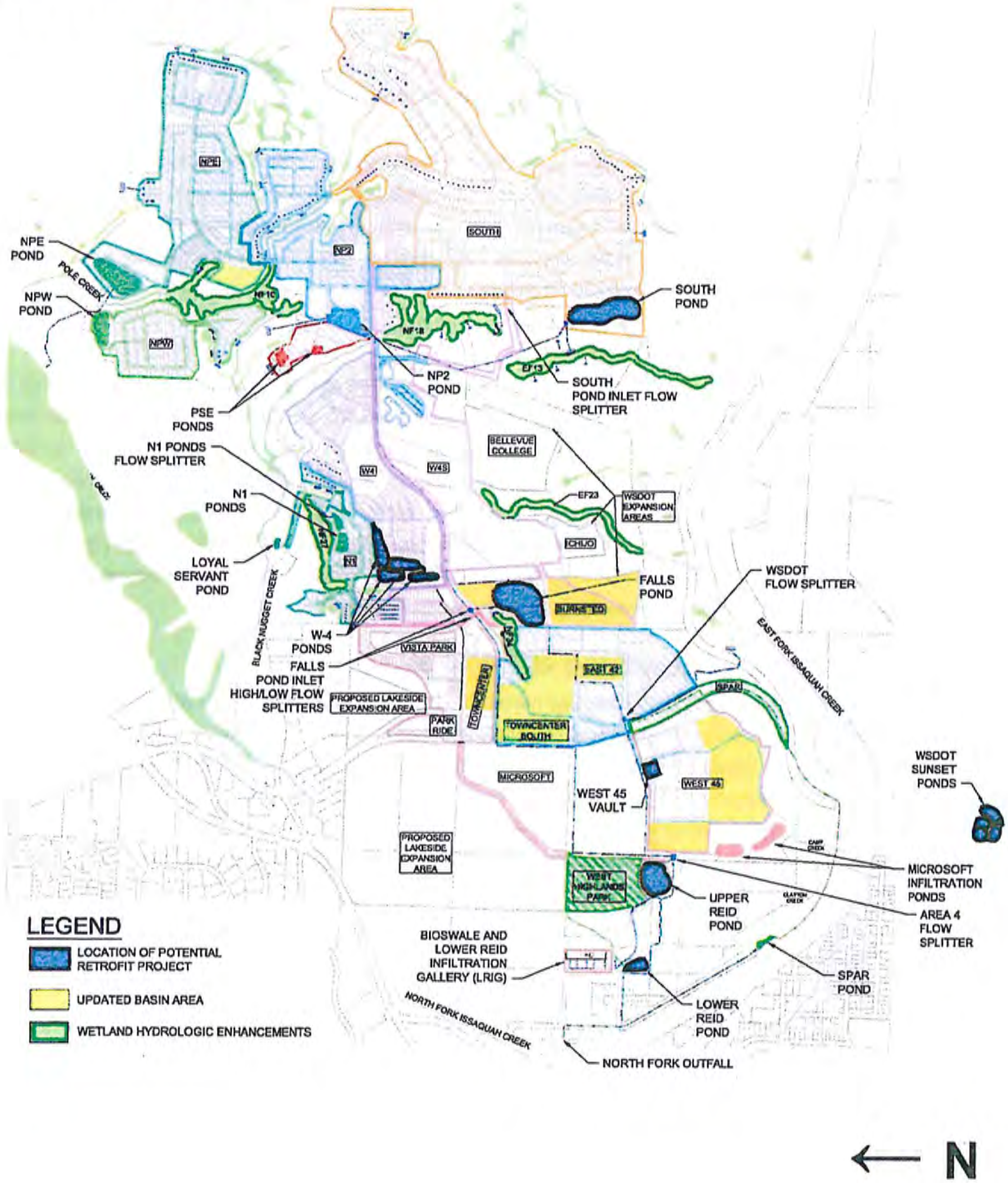
On January 13, 2014, a memorandum of agreement (MOA) was prepared between the City of Issaquah and SPWSD. This MOA settles the dispute between the two parties. Since the MOA, an interlocal agreement (ILA) (dated March 17, 2014) has been prepared between the two parties to decommission the LRIG. As part of the ILA, SPWSD has agreed to fund up to $1,000,000 for design, construction, and installation of new storm water management projects, facilities, or systems to manage storm water generated in the project area, including but not limited to retention/detention, water quality treatment, land acquisition for flood control, and other actions, as necessary, to mitigate the impacts of increased surface water discharge of storm water caused by the loss of groundwater infiltration at the LRIG.

Mead & Hunt has previously studied the Issaquah Highlands storm drainage system in the *Issaquah Highlands Comprehensive Storm Drainage Model 2012 Update* and *Issaquah Highlands Optimization of the Comprehensive Storm Drainage Model 2012 Update*. In the model update study, a WWHM4 (Western Washington Hydrology Model, Version 4.0) model was constructed to analyze the system using tools and storm water standards that had been updated since the original planning and construction in the mid-1990s. The tools and findings of these studies served as a starting point in the 2014 WWHM4 model update, calibration effort, and study of the LRIG decommissioning effect on outflows to North Fork Issaquah Creek.

Mead & Hunt has also previously studied the hydrology and hydraulics of North Fork Issaquah Creek for the City. Flows to this creek are affected by the function (or non-function) of the LRIG facility. An updated Hydrologic Engineering Center River Analysis System (HEC-RAS) hydraulic model based on the existing FEMA regulatory HEC-2 floodplain model was previously compiled and executed by Mead & Hunt engineers at the request of the City. This previously developed model was used as a starting point for the hydraulic study conducted to check sensitivity of upstream and downstream areas to flow change at various frequency storm events.

Figure 1 shows the overall study area, the LRIG facility, the primary Issaquah Highlands outfall to North Fork Issaquah Creek, areas of 2014 updates to the WWHM4 model, locations where existing storm facilities might be retrofitted to obtain flow rate reductions, and locations where partial flows may be diverted from closed conveyances into wetlands. In this report it will be shown that diversion of flows to wetlands would reduce peak flows discharging to North Fork Issaquah Creek, mitigating the loss of the LRIG, and provide additional benefits such as wetland recharge, groundwater recharge, and surface water runoff volume reduction. Aspects of proposed wetland hydration mitigation strategies are discussed in more detail later in this report.

Figure 1. Project Area and Study Features



3.0 Methodology

To study the impacts from the LRIG decommissioning and possible mitigation measures, two distinct but related hydraulic systems were studied. First, outflows from the Issaquah Highlands development to North Fork Issaquah Creek were calculated using the updated WWHM4 model to evaluate the performance of the LRIG and on-site mitigation measures. Second, since North Fork Issaquah Creek is the downstream discharge channel and a mapped floodplain, a previously developed HEC-RAS model was used to estimate channel hydraulics and investigate whether off-site, in-stream hydraulic improvements would be beneficial mitigation measures. On-site mitigation measures were investigated, including enhancing existing wetland flows and retrofitting existing storm water management facilities. Improvements to North Fork Issaquah Creek were considered as off-site mitigation measures.

3.1 Issaquah Highlands WWHM4 Model

The Issaquah Highlands WWHM4 model is a continuous runoff simulation modeling platform powered by a locally calibrated Hydrological Simulation Program-Fortran (HSPF) engine. The model simulates runoff response to decades of continuously recorded rainfall data in order to capture the varying effects of back-to-back and discrete bursts of rainfall during various times of the year. WWHM4 modeling can produce statistically derived peak flows for "frequency events" such as the 100-year flood. These frequency event flow estimates were used to simulate a range of flow performance for the LRIG, and compared to published frequency event flow estimates in the project HEC-RAS hydraulic model of North Fork Issaquah Creek to investigate potential channel improvements as a result of flow change.

3.2 North Fork Issaquah Creek HEC-RAS Model

Updated as part of a previous task for the City, the HEC-RAS model is a steady-state step backwater model commonly used to estimate energy and water surface elevations in open channels. As part of the hydrologic and hydraulic study to support the effective FEMA regulatory floodplain mapping for North Fork Issaquah Creek, flows in the channel were estimated for the 10-, 50-, and 100-year frequency storms. These flows provided a starting point for adjustment based on estimated outflow from the Issaquah Highlands development, and extrapolation to estimated flows during more frequent events such as the 1.1- and 2-year events.

3.3 Wetland Enhancements

Dr. Sarah Spear Cooke, a wetland scientist, has been studying the wetlands within the Issaquah Highlands area since the development began in the 1990s. Mead & Hunt staff met with Dr. Cooke to discuss areas where, based on several years of observation, wetlands in the upper elevation portions of the development would thrive with more discharge directed to them from the storm water system. With the goal of increasing wetland hydration during a full range of storm events, opportunities to adjust existing flow splitter manholes or make new connections to draw additional flow from the existing storm system were vetted. These facilities were evaluated for their potential to meet the mitigation needs associated with the LRIG decommissioning.

3.4 Facility Retrofits

The City identified retrofits to two existing storm water management facilities in the development where additional volume appears to be available as currently configured. These facilities were evaluated for their potential to meet the mitigation needs associated with the LRIG decommissioning.

3.5 Creek Improvements

The North Fork Issaquah Creek HEC-RAS Model was used to evaluate the channel stability within the Creek and evaluate impacts of the LRIG decommissioning and the potential for in-stream mitigation.

4.0 WWHM4 Basin Updates and Calibration

The WWHM4 model developed in 2012 was updated for 2014 to reflect construction that has been observed completed or breaking ground in the study area, based on 2014 aerial photos. New development since 2012 is either complete or in progress in the West 45, Town Center, Town Center South, East 42, Burnstead, and NPE basins, as shown in **Figure 1**. Where recent construction was complete, detailed measurements in CAD mapping were used to update basin parameters. Where construction in progress was observed, build-out impervious surfaces previously established by established zoning in each basin were used to prorate full development in the selected areas into the overall basin parameters in the WWHM4 model.

One of the study goals was to improve calibration of the WWHM4 model by comparing the physically measured system response to actual storm events with the response to similar events in the HSPF synthetic rainfall record as predicted by the updated WWHM4 model. Data loggers attached to in-pipe volumetric weirs were used to measure inlet and outlet flows for selected ponds during the months of May and June 2014, with the goal of providing calibration data for adjustment of the hydrologic parameters in the WWHM4 model study area. Data was collected periodically from the loggers and compared to actual gage data from a nearby location published on the internet by Weather Underground (The Weather Channel, LLC). Once adjustments to the existing model were complete, scenarios were executed to establish outflows to North Fork Issaquah Creek from the Issaquah Highlands development in the estimated 2014 condition, with the LRIG both online and offline.

4.1 Construction Updates to 2012 Model

Based on aerial photos, revised impervious land uses were calculated for basins containing projects that were observed to have been recently completed. For basins where a construction project was observed to have broken ground, the fraction of the subbasin that showed construction was prorated to reflect build-out conditions, then the overall basin definition updated. **Figure 1** shows the areas where basin land use has been updated to reflect observed construction. **Table 1** provides a summary of the updates to various basins in the WWHM4 model, organized by affected land use types.

Table 1. Basin Update Parameters

Basin	Total Area	Const. Area	Roads EX	Roads 2014	Lawn Ex	Lawn 2014	Dvwy EX	Dvwy 2014	Roof EX	Roof 2014	Sdwk EX	Sdwk 2014
Upper Reid (Towncenter/Vista Park)	80.03	3.56	31.31	31.76	19.83	17.52	26.78	27.45	0.00	0.85	0.00	0.34
NPE	55.87	14.22	13.86	13.86	19.51	19.51	19.51	14.54	0.00	0.00	0.00	4.97
W4S	71.14	13.14	13.97	13.97	32.34	29.86	22.14	24.62	0.00	0.00	0.00	0.00
E42	57.14	2.46	18.71	18.71	32.25	31.04	6.18	6.61	0.00	0.77	0.00	0.00

4.2 Data Collection

In-pipe volumetric weirs were placed in the following locations to monitor flows and facility performance:

- NPE Pond Inlet
- NPE Pond Outlet
- NP2 Pond Outlet

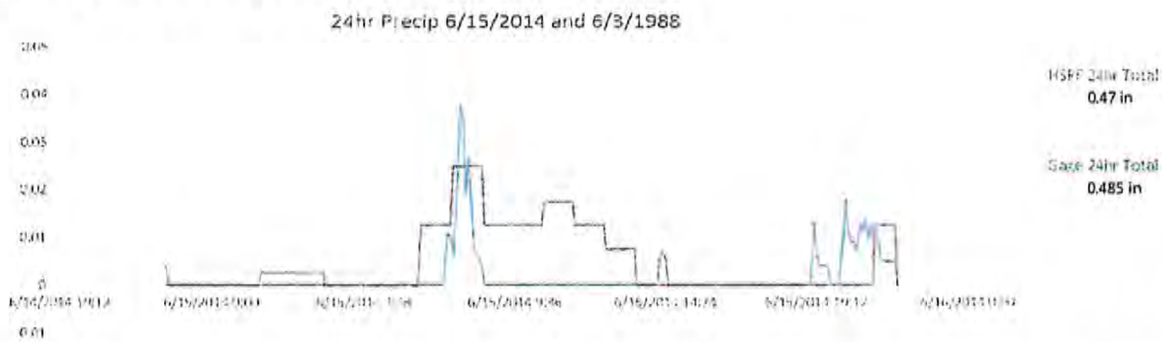
Stages in these pipes were measured from May 29, 2014 through July 10, 2014, allowing back-calculation of flows through the pipes during this period based on the volumetric weir rating tables.

The in-pipe weir at the inlet of the NPE Pond was flushed out of position during the early hours of June 13, 2014, during an early burst of rainfall just before a 0.5" precipitation event. The weir was repositioned and braced on June 25, 2014.

Precipitation data was downloaded from a rain gage located at Highland Creek Estates, which is maintained by Weather Underground. Gaged precipitation data for the periods when flows were measured was compiled and searched for measured actual rainfall events.

The HSPF precipitation time series was downloaded for the period from October 1, 1973 to September 30, 1998 from the WWHM4 model for the Sea-Tac rain gage. A storm event that began on June 2, 1988 in the HSPF time series most closely matched a measured real event (June 14, 2014 to June 15, 2014) in terms of total volume, flow intensity, and peak distribution. Preference was given to synthetic storms that occurred in the June timeframe to try to match up seasonal hydrologic conditions in the calibration comparison. **Figure 2** presents the selected 24-hour precipitation period chosen for calibration study.

Figure 2. HSPF and Gaged Storm Events

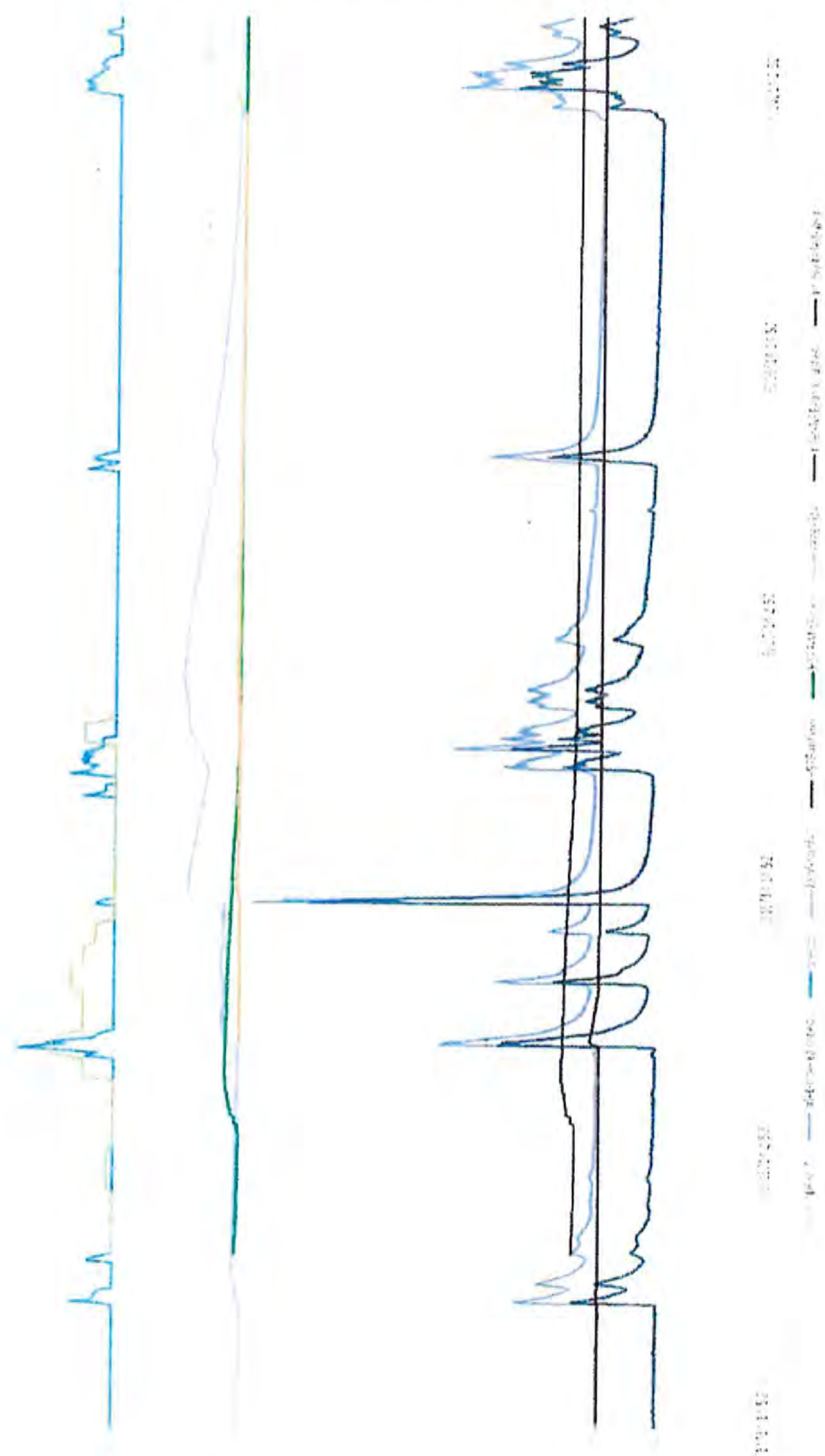


Although the inlet pipe to the NPE Pond had its weir blown out during this event, the outlet pipe data was intact, and this appeared to be the strongest available correlation storm. Unlike NP2 Pond, where inlet flows were not gaged, the weir gage data from the inlet pipe to NPE allows observation of base flows before and after the in-pipe weir was pushed out of position.

4.3 Calibration

The correlation between the predicted HSPF response to the synthetic storm and the real response to the actual storm showed the estimated response by the WWHM4 to be overly conservative in terms of both stage and flow for the storm analyzed. Because no events over approximately 0.5" were recorded, it was decided that calibration of peaks or recession curves to reduce modeled flows would include too large of a margin of error to be valuable, and may have yielded results that underestimated flows in larger events based on adjustment of hydrologic parameters. Therefore, no adjustments were made to the WWHM4 calibration parameters. Further flow gaging during wetter months of the year will yield data more likely to contribute to a valuable calibration exercise. In addition the time series data will be revised to use the rain gauge used to calibrate against as opposed to Seatac. **Figure 3** shows the precipitation, inlet, and outlet stages of NPE Pond used in the calibration exercise.

Figure 3. Calibration Graphic – 6/14 – 6/15/2014 Storm Event



Mead&Hunt

While further calibration of the WWHM4 model would add value, use of the model's default parameters is considered to yield a sufficiently conservative estimate of flows for conveyance sizing and is also valid for capturing the interplay between storm water management facilities and the various outfalls at creek and wetland discharge points.

4.4 Flow Comparison from Updated Model

Once adjustments to the existing model were complete, scenarios were executed to establish outflows to North Fork Issaquah Creek from the Issaquah Highlands development in the estimated 2014 condition, with the LRIG both online (Condition 1) and offline (Condition 2). **Table 2** illustrates the results of both conditions.

Table 2. Outflows to North Fork Issaquah Creek with LRIG Online and Offline

Outflows to North Fork Issaquah Creek with LRIG Online / Offline

Return Period	North Fork Outflow - LRIG Online - Condition 1 (cfs)	North Fork Outflow - LRIG Offline - Condition 2 (cfs)
2 year	22.33	28.96
5 year	26.64	34.30
10 year	29.32	37.62
25 year	33.70	41.62
50 year	36.10	44.51
100 year	38.44	47.32

As shown in this table, removal of LRIG from the system results in a 9 cfs increase in the 100-year peak discharge at the North Fork Outfall. This is expected, because this is equal to the infiltration capacity of the LRIG, and flows shunted around the LRIG go directly to the outfall. Since the LRIG discharges primarily base flow, similar increases in outfall discharge are found throughout the entire range of flow frequencies.

5.0 North Fork Issaquah Creek HEC-RAS Model

In order to investigate the hydraulic effects of increased flow in North Fork Issaquah Creek due to the LRIG decommissioning, a hydraulic model of the creek was needed. An existing HEC-2 floodplain hydraulic model for the creek, which was originally the basis for the FEMA Flood Insurance Study (FIS) and had previously been updated to the current HEC-RAS software standard, was the basis for developing the model for this study. While models compiled with the goal of performing a flood study contain a range of simulation flows corresponding to flooding events, they generally do not include estimates of more frequently encountered flow rates that do not necessarily cause flooding problems, but may cause channel incision and bed material transport. Additionally, the watershed footprint used to derive the original FIS flow values may not take into account changes in drainage patterns brought about by intervening development.

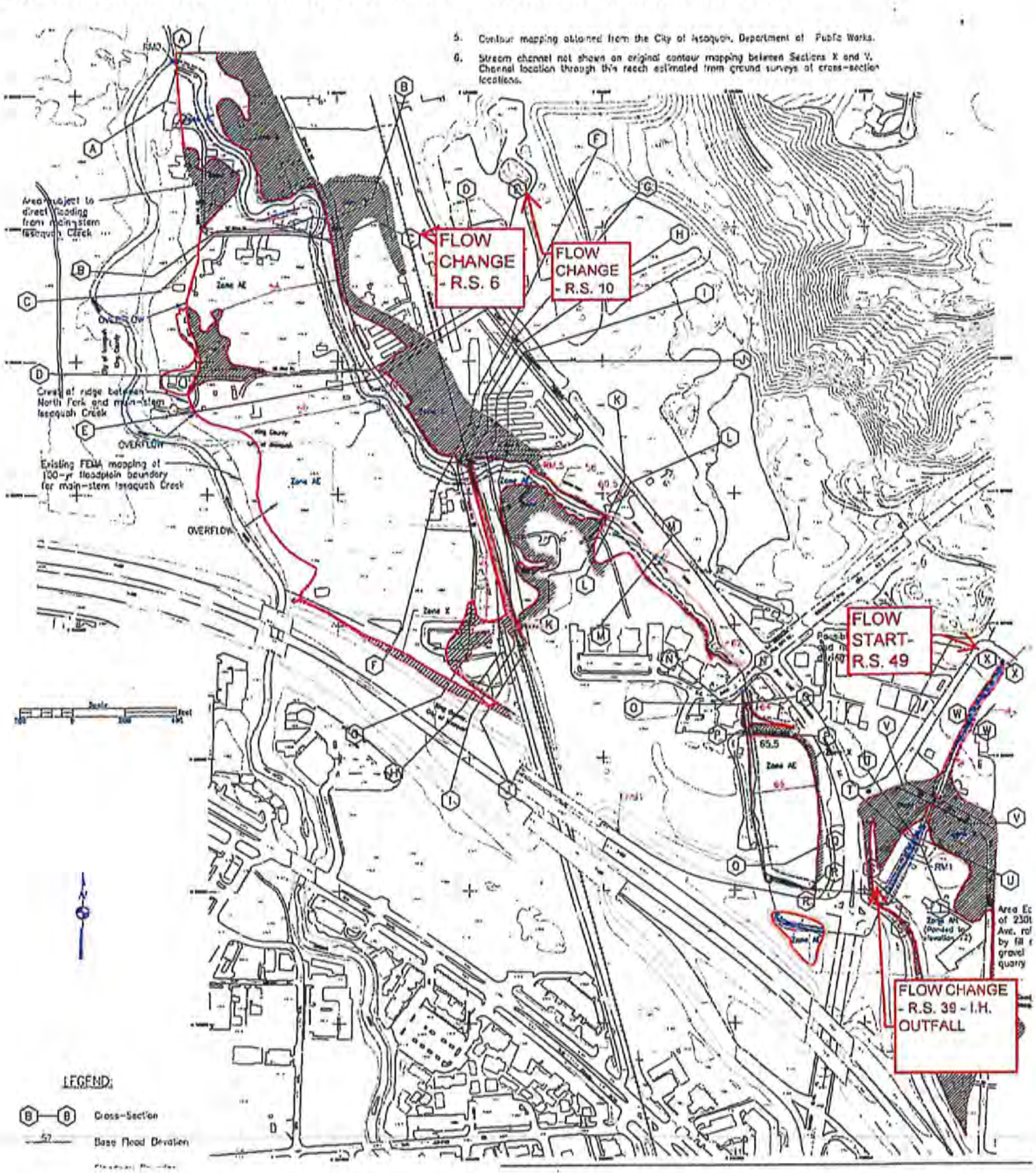
In the case of the North Fork Issaquah Creek watershed, the original total drainage area considered in the FIS study is slightly different from the more recently defined boundary shown on King County iMap. Additionally, neither basin boundary entirely includes the Issaquah Highlands within the basin boundary. The flow change locations coded along the length of the previous model do not reflect the addition of the main outflow to the Creek from Issaquah Highlands just upstream of the I-90 crossing.

In order to specifically study hydraulic effects of the LRIG decommissioning and develop potential mitigation measures, a revised model was needed which included revisions to the flow inputs to consider a widened range of frequent events, the additional area drawn into the basin through the Issaquah Highlands development, and the flow change in the creek that occurs at the project's main North Fork outfall. The following is a discussion of how these revisions were enacted for this study.

5.1 Existing Model Files

The existing condition HEC-RAS model, developed by Northwest Hydraulic Consultants for the 1995 FEMA re-study of North Fork Issaquah Creek, was used as the geometric basis for hydraulic modeling in North Fork Issaquah Creek. **Figure 4** shows the Limited Map Maintenance Project (LMMP) work map used as part of the FEMA re-study, with flow change locations on the North Forth Issaquah Creek model.

Figure 4. LMMP Work Map with Cross-Section and Flow Change Locations



5.2 Modeling Flows

Modeling flows for the HEC-RAS model of the downstream portion of North Fork Issaquah Creek were developed using a combination of published FIS flows, study of King County-delineated drainage basin boundaries, and basin and flow information from the Issaquah Highlands WWHM4 model. Flows in the model were adjusted to reflect input from the North Fork Outfall, as well as changes in the contributing basin areas in the years after the 1995 FEMA study.

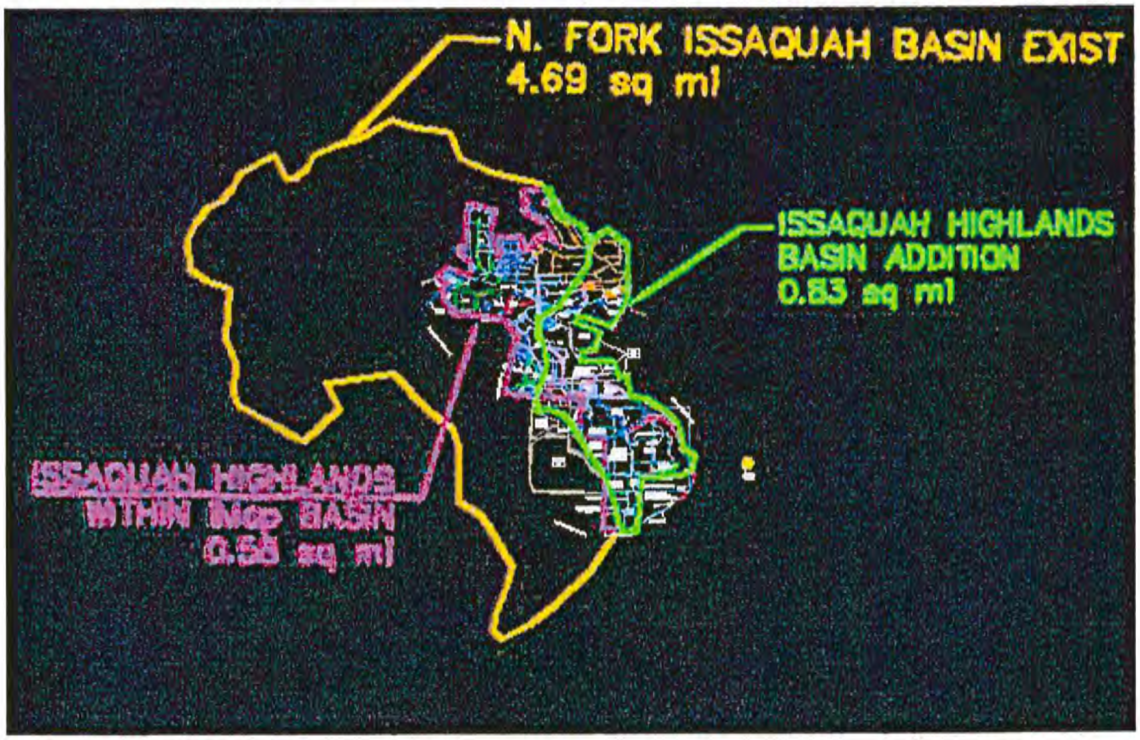
In the published FIS flows, during the 10-year event, a single flow is used throughout the entire reach of North Fork Issaquah Creek, whereas during events above 10 years, overflow from the main stem is included at lower areas of the reach. **Table 3** shows the FIS study model flows.

Table 3. FIS Published Flows – North Fork Issaquah Creek

Flow Change Location	River Station	10-yr	50-yr	100-yr	Note:
1	49	176	269	315	Top of reach, assumes no overflow, same as mouth for 10-yr
2	10	176	469	755	Flow change @ Section "E," SE 61st St, includes overflow from main stem above 10-year
3	6	176	489	835	Flow change @ Section "C," @ end of SE 60th St

Basin areas referenced in the effective King County FIS were compared to basin areas shown on the King County iMap drainage database. The FIS lists the drainage area as 4.8 square miles, whereas King County shows approximately 4.69 square miles. It was found that the development of Issaquah Highlands pulled an additional 0.83 square miles into the tributary area for North Forth Issaquah Creek, and 0.58 square miles are within the previously delineated drainage basin. The breakout of these areas is shown in **Figure 5.**

Figure 5. Contributing Flow Areas – Updated HEC-RAS Model



Upstream flows of the North Fork outfall were prorated to remove the fraction comprised by the Issaquah Highlands area. A new flow change location was added to the model at River Station 39, to add flows from the Issaquah Highlands North Fork outfall, as calculated by the WWHM4 model. Downstream flow increase increments from the main stem of Issaquah Creek were kept the same. An estimated flow for more frequent storm events was desired, since the majority of material transport in creeks fed by urbanized areas occurs nearer to 50% of the 2-year event, according to recent research published by the U.S. EPA. Once the published FIS flows were adjusted for the 10-, 50-, and 100-year events, they were charted at each flow change location, and regression equations were developed for the trend lines in each LRIG scenario. These equations were used to estimate flows for 50% of the 2 year and the 2-year events for the HEC-RAS model. **Tables 4a** and **4b** summarize the revised project flow inputs to the HEC-RAS model.

Table 4a. Revised Flow Inputs – LRIG Online

	Regressed Flows		Adjusted FIS Flows			
Freq. (yrs) River Station	50% of 2 Year	2 Year	10 Year	50 Year	100 Year	Note:
49	130	133	154	236	276	Top of Reach
39	157	160	184	272	314	IH-North Fork Outfall
10	112	119	184	472	754	North Fork - Sect. E
6	111	118	184	492	834	North Fork - Sect. C

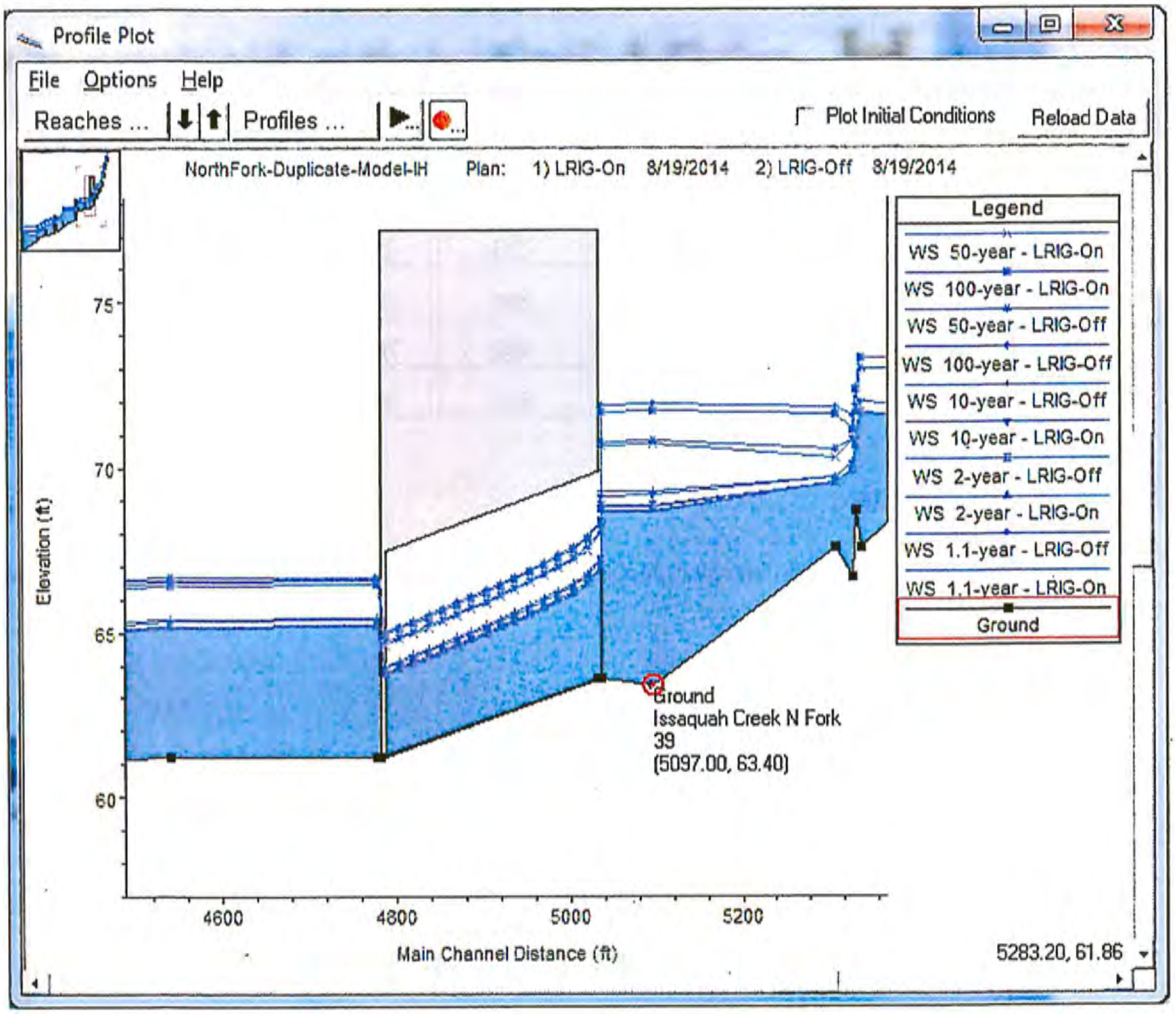
Table 4b. Revised Flow Inputs – LRIG Offline

	Regressed Flows		Adjusted FIS Flows			
Freq. (yrs) River Station	50% of 2 Year	2 Year	10 Year	50 Year	100 Year	Note:
49	130	133	154	236	276	Top of Reach
39	166	168	192	280	323	IH-North Fork Outfall
10	120	128	192	480	763	North Fork - Sect. E
6	119	127	192	500	843	North Fork - Sect. C

5.3 Model Results

The HEC-RAS water surface (WS) elevation profile at the Issaquah Highlands North Fork outfall (Station 39) is shown in **Figure 6**.

Figure 6. HEC-RAS Flow Profiles – North Fork Issaquah Creek at Issaquah Highlands Outfall



The tabulated results of the project HEC-RAS modeling at Station 39 are presented in **Table 5**.

Table 5. HEC-RAS Revised Existing Result Summary at North Fork Outfall

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Vel Chnl (ft/s)	Top Width (ft)
N Fork	39	50% of 2-year	LRIG-On	157	63.4	68.66	1.8	34.99
N Fork	39	50% of 2-year	LRIG-Off	166	63.4	68.83	1.81	36.05
N Fork	39	2-year	LRIG-On	160	63.4	68.72	1.81	35.35
N Fork	39	2-year	LRIG-Off	168	63.4	68.86	1.82	36.28
N Fork	39	10-year	LRIG-On	184	63.4	69.16	1.83	38.11
N Fork	39	10-year	LRIG-Off	192	63.4	69.3	1.84	39.01
N Fork	39	50-year	LRIG-On	272	63.4	70.7	1.88	50.83
N Fork	39	50-year	LRIG-Off	280	63.4	70.84	1.88	53.81
N Fork	39	100-year	LRIG-On	314	63.4	71.73	1.76	73.1
N Fork	39	100-year	LRIG-Off	323	63.4	71.95	1.73	77.99

The results of the revised modeling show that in all simulated events, unmitigated additional flows from the LRIG decommissioning cause the water surface elevation to rise 0.1–0.2′, the top width of the water surface to increase 3–4′, and the average channel velocity to increase by 0.01 ft/sec at the lower end of the flow range and decrease by 0.03 ft/sec in the 100-year event. The rise in water surface elevation dissipates upstream at River Station 43 (Section "U" as shown on **Figure 4**). The rise in water surface elevation reduces to 0.1′ just downstream of the I-90 culvert and dissipates completely by River Station 8 (Section "D" as shown on **Figure 4**). In areas where the 100-year flows exceed the ordinary channel, the modeled width of the floodplain dissipates the effect of the additional flow such that the rise is only a few hundredths of a foot and the floodplain width only expands by a few feet. In general, the modeled increase in flow of an unmitigated decommissioning of the LRIG does not appear to have significant flooding impacts. This is because of the relatively small increase in flows—approximately 5% during the 2-year event and 3% at the 100-year event.

6.0 On-Site Mitigation – Wetland Flow Enhancement

The wetland areas identified within the Issaquah Highlands that could benefit from additional flow augmentation are primarily in the upstream (higher elevation) areas of the development's drainage area. A strategy proposed to mitigate outflows in response to abandoning the LRIG is to direct more base flow and primary runoff flows to those wetlands that have been identified as lacking sufficient hydrology.

Dr. Cooke worked with Mead & Hunt staff to identify areas where wetlands have at times over the year been observed to be under-hydrated. Based on estimates of flow at various points in the Issaquah Highlands during various storm events obtained from the WWHM4 model, Mead & Hunt engineers investigated the feasibility of making new connections or altering existing connections to the development's conveyance system to direct more storm flow to the identified potential wetland augmentation areas. These connections would divert storm water that has been treated either by existing storm water ponds or will be treated by new treatment vaults that would be designed as part of this process.

6.1 Methodology

At each location that showed potential for wetland flow augmentation, the estimated flow available to divert was checked based on the WWHM4 modeling results, and the feasibility of new connections was checked based on City of Issaquah system map invert elevations, knowledge of the areas from field observations, and King County iMap published topography. Initial designs were developed at six locations where it appears feasible to draw additional flows from the system to the wetlands/stream corridors. The method used to demonstrate mitigation for the removal of the LRIG was to match the 50 year cumulative daily volume that was infiltrated with the cumulative volume of the additional flow to the wetlands. This method was determined to be the most accurate method as peak flows in WWHM are determined using regression for return periods and therefore introduce error when an attempt is made to mathematically combine them. Each conceptual design took into account the new connection point or adjustment to the existing conveyance system, preliminary layout of new drainage features, the target discharge increase at that location, and planning level cost for that particular project. Dr. Cooke evaluated each location with field observations and provided recommendations for refinement at each location, which are summarized in **Appendix C**.

6.2 Project Opportunity Locations

Initially the following six wetlands as shown in **Figure 1** were identified as potential project areas:

1. NF10 above Pole Creek
2. NF18 along southeastern edge
3. NF27 by N1 Pond
4. EF13 west of South Pond
5. EF23 below College Road
6. NF34 along eastern edge below Falls Pond

Upon further detailed analysis of the site infrastructure, wetland site EF23 was determined to no longer be a practical option as this storm pipe for the flow diversion is approximately 30 feet deep and located behind a retaining wall. Concept plans and cost estimates have been developed for the remaining five locations where increasing base flows to wetlands is predicted to yield mitigation benefits for reducing flows at the North Fork outfall while also benefiting wetland health through augmenting the post development flows that have been observed by Dr. Cooke to be reduced over pre-development conditions. A description of each modification is described in **Table 6** and concept plans and cost estimates are included as **Appendix D**. The flow values used in the tables are approximations and will be determined precisely upon actual full project design.

Table 6. Wetland Hydrology Improvement Areas

Existing Wetland	Inflow Source(s) - Current	Current Configuration	Proposed Modification	Approximated Discharge Flow Increase (100-year)	Preliminary Cost	Cost/cfs of flow (100-year)
NF 10	Direct roof connections - Basin NPE	Piping directly from downspouts	Add splitter just upstream of NPE Pond, add WQ vault and dispersion piping with lateral spreaders	2.0 cfs	$260,000	~$80,000
NF 18	South Basin via flow splitters	South Pond baseflow Splitter #1 + swale	Increase baseflow from Splitter #1, augment existing swale and flow spreaders as necessary	2.5 cfs	$85,000	~$34,000
NF 27	Clean water flow spreader - N1 Pond Cell 1; currently designed for .25 cfs	Low flows directed to flow spreader	Modify flow split to increase primary (wetland) discharge limit, add additional flow spreaders	1.5 cfs	$5,000	~$3,300
EF 13	South Pond outlet flow spreader (clean water)	South Pond outlet splitter feeds low flows	Modify flow split to increase primary (wetland) discharge limit, add flow spreaders	2.0 cfs	$81,000	~$40,500
NF 34	Minor orifice flow of mixed (clean and dirty) Falls Pond main inflows, emergency overflow from Falls Pond	Mixed flow-downturned elbow with 0.5" orifice, birdcage emergency outflow	Increase baseflow from final pre-pond mixed-flow splitter into NF 34 with treatment	2.0 cfs	$110,000	~$55,000

6.3 Summary – Wetland Flow Enhancement

Based on this review, it is concluded that the runoff volume from the decommissioned LRIG can be feasibly mitigated through increased baseflow discharge to wetlands that have been identified as prime candidates to receive additional hydration. This mitigation strategy will benefit the ecological health of the wetlands within the Issaquah Highlands development. A summary of the anticipated flow mitigation flow rate and conceptual cost for each wetland area is included in **Table 7.**

Table 7. Wetland Flow Enhancement Project Cost Summary

Wetland Project	Approximated 100 yr Flow Rate Mitigation	Time Series Volume (Acre-Ft)	Conceptual Cost
Wetland NF 10	2.0 cfs	5,970	$260,000
Wetland NF 18	2.5 cfs	12,543	$85,000
Wetland NF 27	1.5 cfs	2,284	$5,000
Wetland EF 13	2.0 cfs	3,073	$81,000
Wetland NF 34	2.0 cfs	7,400	$110,000
Totals	**10 cfs**		**$541,000**

7.0 On-Site Mitigation – Facility Modifications

Another potential strategy to mitigate for the decommissioning of the LRIG by reducing outflows to North Fork Issaquah Creek, the City identified retrofits to two existing storm water management facilities in the development: the W4 ponds and the Area 4 flow splitter, which could direct more flow to the Upper Reid Pond, where additional volume appears to be available as currently configured.

7.1 Methodology

Primarily based on the methodology of the previous Optimization Study, the WWHM4 model was used to simulate modifications to the Upper Reid Pond outflow control structure and the associated Area 4 splitter connection. Modifications to the W4 ponds were considered through modification of the outflow structure as well as increase in the cell volume.

7.2 Project Opportunity Locations

Storage in the W4 ponds, Cell 4, could potentially be increased by excavating additional volume. This would allow this facility, with flow control modifications, to reduce peak discharges from this pond. The cost of this over-excavation will vary depending on the amount of flow attenuation but could range from $50,000 to $100,000, including modification of the flow control structure.

Another potential on-site mitigation measure to reduce flows at the North Fork outfall is modification of the Area 4 flow splitter. By opening the 12-inch gate valve that conveys high flows from the Falls Pond high flow splitter into the Upper Reid Pond via the Area 4 flow splitter, the Upper Reid Pond's available volume could be used to manage a larger portion of drainage flows from the development and effect a net reduction in flow, which may assist in mitigating for the decommissioning of the LRIG. This modification to the function of the Area 4 splitter will be mainly an operational change but may require improvement of the existing valves, conveyance, and outfall features. Estimated cost would be in the range of $25,000 to $50,000.

7.3 Summary – Facility Modifications

Modifications to existing facilities may assist in part in achieving flow mitigation for the decommissioned LRIG facility. Adding volume at desired locations and making minor adjustments to flow splitting and outlet control at selected facilities is a way to assist with the overall flow reduction strategy. However, these facility changes are being proposed as part of a separate initiative to improve performance of the Issaquah Highlands storm water system. The City has stated that other mitigation options should be identified to offset the loss of the LRIG.

8.0 Channel Stability and Potential In-stream Mitigation

Osborn Consulting, Inc. (Osborn) was retained to evaluate the channel stability within North Fork Issaquah Creek as a result of the LRIG decommissioning for consideration of off-site mitigation within the creek. As an additional option to wetland baseflow augmentation and facility modifications, mitigation of upstream or downstream hydraulic impacts through stabilization projects was considered. The range of flow increases up to 9 cfs during various frequency events from an unmitigated decommissioning of the LRIG, and their effects on the stages, velocities, and flow widths within the channel were evaluated to determine the effects on bed material transport.

8.1 Methodology

Osborn has completed their analysis which compares stable sediment distribution within the channel for the scenarios with the LRIG online and offline. To do this, the creek system was broken up into four segments corresponding to the HEC-RAS flow change locations, and the analysis was performed for several river stations within each segment.

The potential for loss of the LRIG causing a change in bed sediment distribution is based on the streambed gravel design method and roughened channel design outlined in Chapter 3 of the *2013 Water Crossing Design Guidelines* (Washington Department of Fish and Wildlife [WDFW]). The analysis steps were as follows:

1. Calculate the 84th percentile sediment diameter (D_{84}) based on channel slope, channel width, and 100-year flow at various river stations using the unit-discharge bed design – Bathurst equation.

2. The calculated D_{84} and the provided channel flow depth were compared against Table 3-1 in the WDFW *2013 Water Crossing Design Guidelines*. Table 3-1 displays predicted water depth, D_{84} and slope relations based on Paleohydraulic analysis performed by J.E. Costa. Using the average depth and the average channel slope, Table 3-1 identified a D_{84}. These D_{84} were consistently higher than those identified during Step 1. So the D_{84} determined in this step were considered the maximum values of D_{84} required for the site.

3. The resulting values of D_{84} were compared for the two scenarios: LRIG online and LRIG offline.

4. Ratios were applied to D_{84} to calculate D_{100}, D_{50}, and D_{16} resulting in a streambed gravel gradation that represents a natural sediment distribution. Results were plotted to show the predicted range of sediment distribution throughout the creek.

The assessment prepared by Osborn is included as **Appendix E**.

8.2 Summary – Creek Improvements

Table 8 presents the results of the gradation study.

Table 8. Calculated Streambed Gravel Design Comparison – LRIG Online and Offline

Summary of D_{84}		
LRIG On		
Flow, cfs	D_{84} Average, feet	D_{84} Max. feet
276	1.00	3.00
314	0.20	2.00
754	0.20	2.50
834	0.20	1.50
LRIG Off		
Flow, cfs	D_{84} Average, feet	D_{84} Max. feet
276	1.00	3.00
323	0.20	2.00
763	0.20	2.50
843	0.20	1.50

These initial results indicate that the proposed LRIG offline condition will not result in a measureable change in the bed sediment distribution compared to the LRIG online condition. Both scenarios predicted the same D_{84}. Additional field assessment is necessary to confirm if the actual sediment distribution is within the predicted range (via pebble count) and if channel conditions appear stable (look for signs of erosion). If field assessment finds signs of instability, recommendations for improved channel stability will be made.

9.0 Summary

Mitigation for decommissioning the LRIG was studied through three strategies: existing pond volume optimization, addition of wetland enhancement features, and improvements to the channel in North Fork Issaquah Creek. This study work was based on updates to published land uses and creek flows to the extent possible, and builds on optimization studies previously performed for the Issaquah Highlands system. The following is a summary of the areas of study and findings as of this report, with additional details summarized in **Table 9.**

Table 9. Summary of Project Opportunities Studied

Location	Proposed Modification	Peak Flow Goal	Project Benefits	Estimated Project Cost
Wetland NF 10	New connection to system, add WQ vault and spreaders to wetland	2.0 cfs	Decreases project outfalls to North Fork Issaquah Creek, improves wetland ecology	$260,000
Wetland NF 18	Increase splitter baseflow, enlarge WQ swale, add flow spreaders	2.5 cfs	Decreases project outfalls to North Fork Issaquah Creek, improves wetland ecology	$85,000
Wetland NF 27	Increase clean water flow split, add flow spreaders	1.5 cfs	Decreases project outfalls to North Fork Issaquah Creek, improves wetland ecology	$5,000
Wetland EF 13	Increase clean water flow split, add flow spreaders	2.0 cfs	Decreases project outfalls to North Fork Issaquah Creek, improves wetland ecology	$81,000
Wetland NF 34	Increase baseflow from mixed flow pre-pond splitter, add WQ swale, add flow splitters	2.0 cfs	Decreases project outfalls to North Fork Issaquah Creek, improves wetland ecology	$110,000
W4 Ponds Cell 4	Increase pond volume, modify flow control structure	3.4 cfs	Increases storage capacity and attenuation of peak flows	$50,000–$100,000
Area 4 Splitter	Open valve to direct high flows from Falls Pond to Upper Reid Pond, improve outfall at Upper Reid Pond	9.3 cfs	Allows Upper Reid Pond to manage inflows from Falls Pond during high flow events	$25,000–$50,000

WWHM4 Model Update and Calibration

Land use updates to the WWHM4 model were made based on observations of construction activity between 2012, the last time the model was updated, and 2014. Calibration data was gathered during the spring of 2014 at two of the detention pond facilities in the development, and a correlation was attempted between real measured rainfall events and historic rainfall events, which are coded into the WWHM4 model. Study of measured flow data for calibration of the model did not appear to contain significant enough storm events to justify adjustment to the hydrologic calculation parameters within the model. Revised outflows to North Fork Issaquah Creek were determined for the revised condition with the LRIG both online and offline. This analysis confirmed that the loss of infiltration capacity at the LRIG would result in a corresponding increase in discharge at the North Fork Outfall—about 8–9 cfs throughout the range of flow frequencies.

HEC-RAS Model Preparation

A hydraulic model of North Fork Issaquah Creek was needed in order to investigate potential downstream impacts from a decommissioning of the LRIG if it was not supported by hydrologic mitigation within the Issaquah Highlands drainage basin. While the physical parameters of the existing HEC-RAS model used in a previous study were not altered, flow inputs were changed to add another flow change point at the North Fork outfall from the Issaquah Highlands. Flows originally derived from the FEMA FIS were used as a basis for the flows used in the hydraulic modeling. These flows were adjusted based on revised basin delineation since construction of the Issaquah Highlands development, and regression equations were developed to estimate more frequent flows than those defined in the FIS study. The model was executed with the revised set of flows, which showed that the water surface, velocity, and bankful width effects of the LRIG decommissioning appear to be fairly minor at the North Fork outfall, resulting in increased 100-year flow elevations on the order of 0.1–0.2' downstream of the outfall.

On-Site Mitigation – Wetland Flow Enhancement

Areas in the upper elevations of the Issaquah Highlands development were studied to see if existing wetlands could benefit from additional storm water flow drawn from the development's storm water conveyance system. An experienced wetland biologist, Dr. Cooke, has monitored the health of these wetlands for several years and was consulted regarding where additional storm water flow might be beneficially directed. Six wetland areas were identified and studied for potential new or additional inflow, conceptual designs were developed to implement additional watering of the wetlands, and planning-level costs were assigned to each project.

Depending on location and configuration, the cost to implement varies by location, amount of flow sought to be diverted, and whether the storm water flows are considered "clean" or require water quality treatment. The total cost to provide mitigation for LRIG decommissioning using this strategy is about $541,000.

On-Site Mitigation – Facility Modifications

Modifications to select existing facilities were considered as possible ways to assist in mitigating for increased flows from the LRIG decommissioning. Adding capacity to the W4 ponds and making adjustments to the Area 4 flow splitter were identified as areas where potential projects would be desirable to the City. The additional volume in the W4 ponds would allow for varying increases in flow attenuation depending on amount excavated. The Area 4 splitter would direct high flows from the Falls Pond to the Upper Reid Pond to take advantage of storage capacity that does not appear to be utilized based on current modeling. The costs of these modifications are expected to range from $25,000 to $100,000, depending on desired outflow reduction from this measure. However, these improvements have been identified under a separate project to improve the operation and performance of the Issaquah Highlands storm water system, and therefore are not recommended for LRIG mitigation unless other options are not available.

Off-Site Mitigation – Creek Improvements

The HEC-RAS model developed for the project was given to Osborn Consulting in order to perform a local study of bank instability and/or potential bed degradation, which could potentially be triggered by a change in flows resulting from the LRIG decommissioning. Initial study findings indicate that the design stable channel gradation is the same for both the LRIG online and LRIG offline conditions. Additional field assessment may indicate signs of current instability, at which point recommendations for improved channel stability will be made.

10.0 Conclusion

It appears that the 9 cfs that was originally discharged to the LRIG during the 100-year event is most effectively mitigated through increased discharge to selected upstream wetlands within the study area. Additional wetland discharges would not only help mitigate additional outflow but also assist in maintaining the beneficial ecology and aesthetics of the development area. Additional flow mitigation, if needed, can also be achieved through previously identified facility modification projects. Opportunities to adjust facilities have been studied thoroughly in recent years, and selected facility modifications have been discussed recently with the City. However, these facility modifications are intended to address other watershed enhancements and are, therefore, less desirable to provide the needed mitigation for this project. Hydraulic improvement projects upstream and downstream within the North Fork Issaquah Creek channel are expected to provide nominal benefit as it is expected that the impacts from the LRIG decommissioning will have a nominal effect on the channel hydraulics and stability. It is entirely possible that there might be isolated areas along North Fork Issaquah Creek that would benefit from stabilization improvements, but this was not part of the analysis for the report.

The general conclusion of this report is that on-site mitigation measures, primarily through wetland hydrology augmentation, will likely be able to effectively reduce or eliminate the increase in peak outflow to North Fork Issaquah Creek brought about by the decommissioning of the LRIG.

AGREEMENT

This Agreement ("Agreement") is made by and between the City of Issaquah, Washington ("Issaquah" or "City"), and the Sammamish Plateau Water and Sewer District ("District") (individually a "Party" and collectively the "Parties") for the purposes set forth below.

Whereas, the Parties have entered into a Memorandum of Agreement ("MOA") dated January 13, 2014 which sets forth certain commitments agreed upon by the Parties, and

Whereas, pursuant to that MOA, and in consideration of the terms and conditions set forth herein, the Parties agree as follows:

1. If Issaquah determines to proceed with an assumption of all or part of the District and its property and utility facilities located within Issaquah under Chapter 35.13A RCW, or to allow or to consent to another city proceeding with the assumption of all or part of the District and its property and utility facilities located within Issaquah, within 10 years of March 17, 2014, pursuant to RCW 35.13A.070, Issaquah agrees to only do so with the consent of the District and based on a process and schedule agreed to by the Parties. Provided, the City shall have the right to proceed with a unilateral attempt to assume the District immediately after the expiration of such ten-year period. Beginning no later than year three (3) of the ten-year period, the Parties will undertake three-party discussion, including the City of Sammamish, regarding governance and utility service delivery options relative to the District, Issaquah, and Sammamish. As part of such discussions, the Parties agree to promptly and in good faith provide and disclose non-exempt public records to facilitate the discussion and study process.

2. The District shall not take any formal position with respect to Issaquah's proposed annexation of the Klahanie PAA relative to the February 11, 2014 election. The District further agrees not to publicly respond to Issaquah's August 2013 Assumption Study of the District ("Assumption Study") nor to release any report on the Assumption Study unless required to do so as a matter of law. The City agrees the Assumption Study will not be used in the future with respect to any assumption of all or any portion of the District.

3. The Parties agree to resolve all outstanding claims regarding public records act disputes, agree to withdraw existing public records requests, and mutually waive all claims for alleged violation of the public records act. The City and the District shall bear their own costs and fees associated with those requests and related disputes.

4. Within forty eight (48) hours of the Effective Date of this Agreement, the District shall remove its signs referencing the District's web site www.letstalkaboutourwater.org, decommission such web site, and de-link such web site from the District's general web site and remove all related links from the District's general web site.

5. This Agreement is made under, and shall be governed by and construed in accordance with the laws of the State of Washington. Venue and jurisdiction of any lawsuit involving this Agreement shall exist exclusively in state and federal courts in King County, Washington. If either Party breaches or threatens to breach this Agreement, the other Party shall be entitled to seek all legal, injunctive or other equitable relief. All terms and conditions of this Agreement shall be subject to enforcement in an action for specific performance.

6. This Agreement shall be effective on the date by which both Parties have executed this Agreement ("Effective Date").

7. This Agreement may be executed in counterparts, each of which shall be deemed an original and with the same effect as if the Parties had signed the same document. All such counterparts shall be construed together and shall constitute one instrument, but in making proof hereof it shall only be necessary to produce one such counterpart.

8. The Parties represent and warrant this Agreement has been duly approved and authorized by their respective legislative authorities, that each Party has the full power and authority to enter into this Agreement and to carry out the actions required of them by this Agreement, and all persons signing this Agreement in a representative capacity represent and warrant they have the full power and authority to bind their respective municipal entities.

CITY OF ISSAQUAH

By: ______________________
Fred Butler, Mayor

Dated: 1/21/14

ATTEST:

By: ______________________
Christine Eggers, City Clerk

APPROVED AS TO FORM:
OFFICE OF CITY ATTORNEY:

By: ______________________
Wayne D. Tanaka

SAMMAMISH PLATEAU WATER
& SEWER DISTRICT

By: ______________________
Robert Abbott, President

Dated: 1-21-14

APPROVED AS TO FORM:

By: ______________________
John Milne

MEMORANDUM OF AGREEMENT

This Memorandum of Agreement ("Agreement") is made by and between the Sammamish Plateau Water and Sewer, a municipal corporation ("District") and the City of Issaquah, a municipal corporation ("Issaquah") (individually a "Party" and collectively the "Parties") for the purposes set forth herein.

RECITALS

A. Issaquah has applied to the State of Washington Department of Ecology ("Ecology") for a permit to discharge stormwater from approximately 81 acres within the Issaquah Highlands development ("Project Area") into the Lower Reid Infiltration Gallery ("LRIG") and from the LRIG into the ground in the Lower Issaquah Valley ("LIV"). The District maintains public water supply wells in the Lower Issaquah Valley Aquifer ("LIVA") located down gradient of the LRIG which provide approximately fifty (50) per cent of the District's water supply.

B. The Parties, together with City of Sammamish representatives, have undertaken a process in good faith to address the disposition of stormwater from the Project and have agreed to decommissioning of the LRIG and to provide additional funding for stormwater management within the Project Area which the Parties feel will address the objectives and concerns of all of the Parties regarding the disposition of the Project Area stormwater.

C. The purpose of this Agreement is to describe the commitments agreed upon by the Parties.

AGREEMENT

NOW, THEREFORE, in consideration of the mutual considerations contained in this Agreement, the Parties agree as follows:

1. This Agreement shall be signed by authorized representatives of the Parties by Monday, January 13, 2014, or shall have no further force or effect. The execution of this Agreement will require the Parties to negotiate an Interlocal Agreement (ILA) which will provide for the decommissioning of the LRIG and funding for the management of stormwater within the Project Area. A draft ILA shall be prepared no later than February 18, 2014, for consideration and final action and approval by the City Council and District Board of Commissioners no later than March 17, 2014, or this Agreement with respect to the ILA shall have no further force and effect.

2. The Parties also agree to prepare a separate contractual agreement which shall be approved by the District Board of Commissioners and the City Council and executed by duly authorized representatives by January 21, 2014, fully incorporating the terms and conditions in Paragraph No's 8, 10, 11 and the further provision that the District agrees not to publically respond to the City's August 2013 Assumption Study of the District ("Assumption Study") or release any report on the Assumption Study unless required to do so as a matter of law.

3. The District shall fund up to $1,000,000.00 for the decommissioning of the LRIG and funding for management of stormwater within the Project Area. The District's funding for decommissioning the LRIG will be available to reimburse Issaquah once the District has approved plans to decommission the LRIG and the LRIG has been decommissioned. The balance of the funding commitment from the District up to a total of $1,000,000 will be available to reimburse invoices submitted by the City for stormwater management projects within the Project Area.

4. Issaquah shall decommission the LRIG in 2014 in accordance with an agreed schedule as set forth in the ILA. The City agrees to decommission the LRIG in a manner acceptable to the District that will render the LRIG inoperable for injection or infiltration of stormwater as set forth in the ILA. The City further agrees that it will not re-commission the LRIG to inject or infiltrate stormwater at the LRIG without the written approval of the District.

5. Issaquah shall own and assume sole operational and maintenance responsibility for any additional stormwater treatment or management facilities within the Project Area and related structures and piping.

6. This Agreement is not contingent on any monitoring or reporting requirements; any such requirements would be outside this Agreement and subject to the City's Phase II Municipal Stormwater Permit for Western Washington ("Phase II Permit"). The District agrees it will not appeal the City's permit to discharge stormwater under the Phase II Permit or otherwise challenge the City's discharge of stormwater from the Project Area to surface water.

7. Issaquah agrees not to inject or infiltrate stormwater from the Project Area to the LRIG site or to another site within the Lower Issaquah Valley and will withdraw its application to DOE for a Washington State waste discharge permit within ten (10) days of the execution of the ILA.

8. The Parties agree if Issaquah determines to proceed with an assumption of all or part of the District and its property and utility facilities located within Issaquah under Chapter 35.13A RCW, or to allow or to consent to another city proceeding with the assumption of all or part of the District and its property and utility facilities located within Issaquah, within ten (10) years of the effective date of the ILA, Issaquah agrees to only do so with the consent of the District and based on a process and schedule agreed to by the Parties. Provided, the City shall have the right to proceed with a unilateral attempt to assume the District immediately after the expiration of such ten-year period. Beginning no later than year three (3) of the ten-year period, the Parties will undertake three-party discussions, including Sammamish, regarding governance and utility service delivery options relative to the District, Issaquah, and Sammamish. As part of such discussions, the Parties agree to promptly and in good faith provide and disclose non-exempt public records to facilitate the discussion and study process.

9. The District agrees to dismiss its pending appeal regarding the Phase II Permit presently before the PCHB and further agrees to waive any and all claims related to the LRIG as long as the LRIG site is not used to inject or infiltrate stormwater. The release and waiver of claims regarding the City's proposed wastewater discharge permit for the LRIG will be mutual and each Party agrees to bear its own fees and costs.

10. The District will not take any formal position with respect to the City's proposed annexation of the Klahanie PAA area relative to the February 11, 2014 election.

11. The Parties agree to resolve all outstanding claims regarding public records act disputes, withdraw existing public records requests, and shall mutually waive all claims and each bear their own costs and fees, associated with those requests and related disputes. The Assumption Study will not be used in the future.

12. The Parties agree that any press release regarding this Agreement shall be jointly approved and shall clearly state that the terms of this Agreement are in anticipation of and contingent upon the execution of an ILA between the Parties. Following the mutual execution of an ILA as referenced in Section 1 above, the Parties will issue a joint press release regarding the resolution of the issues addressed in the ILA, the contents of which the Parties shall mutually agree to. Neither Party will issue a press release or communicate with news services regarding the issues addressed in the ILA that deviates from the agreed-upon terms of the joint press release. Within 48 hours of execution of the separate agreement described in Paragraph 2 above, the District shall also remove its signs referencing the District's web site www.letstalkaboutourwater.org, decommission such web site, and de-link such web site from the District's general web site and remove all related links from the District's general web site.

13. The Parties agree that all terms and conditions of the ILA and the non-assumption agreement described in Paragraph 2 above shall be subject to enforcement in an action for specific performance.

14. The above Recitals are incorporated by reference herein and made part of this Agreement.

SAMMAMISH PLATEAU WATER AND SEWER DISTRICT

By: ______________________

Its: Board of Commissioners President

Dated: 1/13/2014

CITY OF ISSAQUAH

By: ______________________

Its: Mayor

Dated: 1/13/2014

4820-3739-5223, v. 1

AGREEMENT BETWEEN BELLEVUE AND CITY OF ISSAQUAH REGARDING THE ASSUMPTION OF SOUTH COVE AND GREENWOOD POINT (2015)

RESOLUTION NO. 2015-14

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ISSAQUAH, WASHINGTON, ACCEPTING THE INTERLOCAL AGREEMENT BETWEEN CITY OF BELLEVUE AND CITY OF ISSAQUAH AS THE NOTICE OF INTENT TO PETITION FOR ASSUMPTION OF UTILITIES FOR THE AREA KNOWN AS SOUTH COVE AND GREENWOOD POINT, PROVIDING FOR THE ASSUMPTION WATER AND SEWER SERVICES FROM THE CITY OF BELLEVUE, AND AUTHORIZING THE MAYOR TO SUBMIT A NOTICE OF INTENTION FOR CITY OF BELLEVUE WATER AND SEWER UTILITIES BOUNDARY ASSUMPTION APPLICATION TO THE WASHINGTON STATE BOUNDARY REVIEW BOARD OF KING COUNTY.

WHEREAS, the City of Issaquah, Washington, and the City of Bellevue have entered into an Interlocal Agreement, Exhibit A, that sets forth a cooperative relationship for Issaquah's assumption of the water and sewer services, which serves as mutual consideration for each party, for the area generally known as South Cove and Greenwood Point and described and identified in the site map in Exhibit A; attached hereto and incorporated by this reference as if set forth in full; and

WHEREAS, the City Council has decided and advised the City of Bellevue that the City of Issaquah will accept the proposed assumption of the water and sewer services, in accordance with the Interlocal Agreement; NOW, THEREFORE,

THE CITY COUNCIL OF THE CITY OF ISSAQUAH, WASHINGTON, HEREBY RESOLVES AS FOLLOWS:

Section 1. That the City Council accepts the proposed assumption of water and sewer services as generally described in Exhibit A.

Section 2. All property within the territory hereby sought to be assumed shall have water and sewer service provided by the City of Issaquah.

Section 3. The Mayor is hereby authorized and directed to submit the required Notice of Intent for the City of Bellevue Water and Sewer Utilities Boundary Assumption to the Washington State Boundary Review Board for King County. The Notice of Intent shall be filed as soon as may be practicable (but not longer than 180 days) after the City receives the signed Interlocal Agreement referenced in Section 1 from the City of Bellevue.

PASSED by the City Council of the City of Issaquah the 3rd day of August, 2015.

APPROVED:

PAUL WINTERSTEIN, COUNCIL PRESIDENT

Approved by the Mayor of the City of Issaquah the 3rd day of August, 2015.

FRED BUTLER, MAYOR

ATTEST/AUTHENTICATED:

CITY CLERK, CHRISTINE EGGERS

APPROVED AS TO FORM:
OFFICE OF THE CITY ATTORNEY

By:

RESOLUTION NO. 2015-14 (AB 6844)

Exhibit A:
Bellevue/Issaquah Interlocal Agreement regarding the Water and Sewer Utilities Assumption of South Cove and Greenwood Point

WATER AND SEWER UTILITY ASSUMPTION AGREEMENT
BETWEEN
CITY OF BELLEVUE AND CITY OF ISSAQUAH

THIS AGREEMENT is made by and between the City of Bellevue, a municipal corporation, in King County, Washington ("Bellevue"), and the City of Issaquah, a municipal corporation, in King County, Washington ("Issaquah") for the purposes set forth herein.

RECITALS

WHEREAS, the City of Bellevue assumed the King County Water District No. 97 which provided water service in the South Cove and Greenwood Point areas in 1973; and

WHEREAS, the City of Bellevue assumed the Eastgate Sewer District which provided sewer service in the South Cove and Greenwood Point areas on December 31, 1994; and

WHEREAS, the City of Issaquah annexed the South Cove/Greenwood Point areas on March 2, 2006; and

WHEREAS, the City of Bellevue continues to provide water and sewer service for the South Cove and Greenwood Point areas despite those areas being annexed into the City of Issaquah; and

WHEREAS, the Cities of Issaquah and Bellevue entered into an Interlocal Agreement in June 2014 in which both cities agreed to cooperatively work together and to negotiate in good faith terms regarding existing capital facilities, joint use facilities where appropriate and shared costs associated with the assumption of utilities by the City of Issaquah; and

WHEREAS, the Cities have completed their negotiations related to the assumption of the water and sanitary sewer utilities in the South Cove/Greenwood Point area within the City of Issaquah; and

WHEREAS, the Cities of Issaquah and Bellevue wish to enter into this agreement to set forth the terms for assumption of the water and sanitary sewer utilities in the South Cove/Greenwood Point area;

NOW, THEREFORE, the Cities of Issaquah and Bellevue agree as follows:

Section 1: The City of Bellevue agrees to:

A. Support the assumption of its water and sanitary sewer utilities within the South Cove/Greenwood Point area, as shown in Attachment A, by the City of Issaquah.

B. Transfer its responsibilities to the City of Issaquah associated with providing water and sanitary sewer service to the South Cove/Greenwood Point area, effective January 1, 2017 or at such time as the Issaquah's billing system has been upgraded and is fully operational, whichever date is later (the "Assumption Effective Date").

C. Transfer its water and sanitary sewer utility assets located within the South Cove/Greenwood Point area, including any necessary easements, to Issaquah at no cost by the Assumption Effective Date.

D. As of the Assumption Effective Date, wheel Cascade Water supply through Bellevue's water Utility to the South Cove/Greenwood Point Area under the terms of the Amendment to the existing Water Facilities Agreement between City of Bellevue and City of Issaquah, dated September 9, 2005.

E. Within 2 years of the Assumption Effective Date, coordinate with Issaquah on the installation of pressure reducing valve station along the 12-in water main at 4500 W Lake Sammamish Pkwy to improve fire flows and increase pressures in the South Cove/Greenwood Point area and the upstream water service area in Bellevue. Bellevue shall pay for fifty percent (50%) of the project cost of installing the PRV station, inclusive of the cost for designing and constructing the underground vault structure and lid, pressure reducing valve, and site preparation/restoration. Issaquah shall pay for one hundred percent (100%) of the cost for any telemetry systems to connect the PRV to Issaquah's supervisory control and data acquisition (SCADA) system.

F. As of the Assumption Effective Date, operate its systems such that the operating hydraulic grade line ("HGL") is maintained at a minimum of 248 feet (NAVD88) at the two interties at approximately the following locations:

4210 181ST AVE SE
4316 W LAKE SAMMAMISH PKWY SE

Within two years of the Assumption Effective Date, Bellevue shall increase the HGL in the water system west of the new Pressure Reducing Valve (PRV) station at 4500 W Lake Sammamish Parkway, such that the operating HGL is maintained at approximately 270 feet (NAVD88) at the two intertie locations.

If additional operational changes are being planned that could impact pressure or flows then Bellevue shall work with Issaquah to mitigate such changes to ensure proper service levels are maintained in the South Cove/Greenwood Point area, unless Issaquah's water system is hydraulically disconnected from Bellevue's system. If capital improvements are necessary to maintain the pressures and flows, the two agencies will work together in good faith to determine how the costs of such facilities will be paid.

G. Transfer to Issaquah within 15 days of the Assumption Effective Date, $93,370 from its Water Utility Capital Renewal and Replacement Fund and $157,574 from its Sanitary Sewer Utility Capital Renewal and Replacement Fund representing an equitable amount attributable to transferring the aging assets.

H. As of the Assumption Effective Date, provide drinking water supply at the interties that meet all local, state, and federal water quality standards for drinking water. If an issue of water quality arises that potentially affects the intertie locations, Bellevue will notify Issaquah's Operations Department at (425) 837 – 3470 and work with Issaquah for appropriate actions.

I. Transfer all utility billing information and maintenance records as of the Assumption Effective Date to Issaquah.

J. As of the Assumption Effective Date, water and sewer service to the Issaquah addresses below are Issaquah's responsibility but will remain connected to Bellevue's water system or downstream sanitary sewer system, unless Issaquah makes system modifications to route flows through Issaquah's system.

<u>Issaquah Addresses Which Flow into Bellevue's Sewer System</u>	<u>Issaquah Addresses Connected to Bellevue's Water System</u>
4233 182ND AVE SE, ISSAQUAH	18153 SE 41ST LN, ISSAQUAH
4261 182ND AVE SE, ISSAQUAH	
18126 SE 42ND PL, ISSAQUAH	
18131 SE 42ND PL, ISSAQUAH	
18135 SE 42ND PL, ISSAQUAH	
18136 SE 42ND PL, ISSAQUAH	
18139 SE 42ND PL, ISSAQUAH	
18144 SE 42ND PL, ISSAQUAH	
18145 SE 42ND PL, ISSAQUAH	
18151 SE 42ND PL, ISSAQUAH	
18156 SE 42ND PL, ISSAQUAH	
18160 SE 42ND PL, ISSAQUAH	
18217 SE 43RD CT, ISSAQUAH	
18220 SE 43RD CT, ISSAQUAH	
18221 SE 43RD PL, ISSAQUAH	
18223 SE 43RD CT, ISSAQUAH	
18224 SE 43RD PL, ISSAQUAH	
18226 SE 43RD CT, ISSAQUAH	
18227 SE 43RD PL, ISSAQUAH	
18229 SE 43RD CT, ISSAQUAH	
18230 SE 43RD PL, ISSAQUAH	
18232 SE 43RD CT, ISSAQUAH	

18233 SE 43RD PL, ISSAQUAH
18235 SE 43RD CT, ISSAQUAH
18236 SE 43RD PL, ISSAQUAH
18239 SE 43RD PL, ISSAQUAH
4230 181ST PL SE, ISSAQUAH
4234 181ST PL SE, ISSAQUAH
4240 181ST PL SE, ISSAQUAH
4241 181ST PL SE, ISSAQUAH
4248 181ST PL SE, ISSAQUAH
4249 181ST PL SE, ISSAQUAH
4256 181ST PL SE, ISSAQUAH
4257 181ST PL SE, ISSAQUAH
4263 181ST PL SE, ISSAQUAH
4264 181ST PL SE, ISSAQUAH
4266 182ND AVE SE, ISSAQUAH
4269 181ST PL SE, ISSAQUAH
4304 182ND PL SE, ISSAQUAH
4310 182ND AVE SE, ISSAQUAH
4313 182ND PL SE, ISSAQUAH
4321 182ND PL SE, ISSAQUAH
4326 182ND PL SE, ISSAQUAH
4329 182ND PL SE, ISSAQUAH
4320 W LAKE SAMMAMISH PKWY SE, ISSAQUAH (Includes 4316-4356)
4337 182ND PL SE, ISSAQUAH
4343 182ND PL SE, ISSAQUAH
4402 W LAKE SAMMAMISH PKWY SE, ISSAQUAH
4404 W LAKE SAMMAMISH PKWY SE, ISSAQUAH
4406 W LAKE SAMMAMISH PKWY SE, ISSAQUAH
4410 W LAKE SAMMAMISH PKWY SE, ISSAQUAH
4412 W LAKE SAMMAMISH PKWY SE, ISSAQUAH
4416 W LAKE SAMMAMISH PKWY SE, ISSAQUAH
4418 W LAKE SAMMAMISH PKWY SE, ISSAQUAH

Issaquah will read the meters and bill its water and sewer rates for these addresses. Issaquah recognizes that as these meters receive services from Bellevue but are in Issaquah's jurisdiction, that Issaquah will be responsible for the Cascade Water Alliance purchased water costs and/or for the King County Wastewater Treatment Division wastewater treatment costs, for these addresses.

Should Issaquah receive service-related complaints from these addresses it will notify Bellevue of the complaint and Bellevue will promptly investigate its system if warranted and coordinate with Issaquah for Bellevue's response, unless Issaquah makes system modifications to route the water and/or sewer flows through Issaquah's system.

Bellevue and Issaquah shall seek to connect new or redeveloped customers to their respective water and sewer systems, to the extent feasible. Where infeasible, Bellevue and Issaquah shall work cooperatively to provide water and sewer service through connections to the others' water and sewer systems.

K. By the Assumption Effective Date, install meters at the two intertie locations in accordance with Bellevue design and operation standards. The meters shall be capable of monitoring and recording flow in both directions. Issaquah shall pay for one hundred percent (100%) of the project cost for designing and installing the meter vaults and lids, the flow meters, communications equipment, and site preparation/restoration.

L. Continue billing and collection of Direct Facility Connection Charges and Capital Recovery Charges from properties located within the assumption area as applicable.

Section 2: The City of Issaquah agrees to:

A. Take over the responsibilities associated with providing water and sanitary sewer service to the South Cove/Greenwood area by the Assumption Effective Date.

B. Within 2 years of the Assumption Effective Date, install a pressure reducing valve (PRV) station along the 12-in water main at 4500 W Lake Sammamish Pkwy to improve fire flows and increase pressures in the South Cove/Greenwood Point area and the upstream water service area in Bellevue. Issaquah shall pay for fifty percent (50%) of the project cost of installing the PRV station, inclusive of the cost for designing and constructing the underground vault structure and lid, pressure reducing valve, and site preparation/restoration. Issaquah shall pay for one hundred percent (100%) of the cost for any telemetry systems to connect the PRV to Issaquah's supervisory control and data acquisition (SCADA) system.

C. As of the Assumption Effective Date, provide water and/or sewer services to the Bellevue addresses below that will be served by Issaquah's water system or Issaquah's downstream sanitary sewer system, unless Bellevue makes system modifications to route the flows through Bellevue's system.

<u>Addresses Connected to Issaquah's</u>	<u>Addresses Connected to Issaquah's</u>

Sewer System	Water System
18110 SE 41ST LN, BELLEVUE 18130 SE 41ST LN, BELLEVUE 18131 SE 41ST LN, BELLEVUE 4300 W LAKE SAMMAMISH PKWY SE, BELLEVUE	4300 W LAKE SAMMAMISH PKWY SE, BELLEVUE

Bellevue will read the meters and bill its water and sewer rates for these addresses. Bellevue recognizes that as these meters receive services from Issaquah but are in Bellevue's jurisdiction, that Bellevue will be responsible for the Cascade Water Alliance purchased water costs and for the King County Wastewater Treatment Division wastewater treatment costs for these addresses.

Should Bellevue receive complaints from these addresses, it will notify Issaquah of the complaint and Issaquah will promptly investigate its system if warranted and coordinate with Bellevue for Issaquah's response, unless Bellevue makes system modifications to route the water and/or sewer flows through Bellevue's system.

Bellevue and Issaquah shall seek to connect new or redeveloped customers to their respective water and sewer systems, to the extent feasible. Where infeasible, Bellevue and Issaquah shall work cooperatively to provide water and sewer service through connections to the others' water and sewer systems.

D. Assume responsibility for all project costs associated with future system modifications to separate Issaquah's water and sewer customers from Bellevue's water and sewer systems.

E. Coordinate with Bellevue on the installation of meters at the interties at the time which they are being installed. Issaquah shall pay for one hundred percent (100%) of the project cost for designing and installing the meter vaults and lids, flow meters, communications equipment, and site preparation/restoration. The meters shall be designed and installed by Bellevue.

F. Provide bi-monthly water consumption data to Bellevue until meters are installed at the interties, for purposes of determining the amount of Cascade Water supply wheeled through Bellevue's water Utility to the South Cove/Greenwood Point Area

G. If an issue of water quality arises that potentially affects the intertie locations, Issaquah will notify the Bellevue Operations Department at (425) 452 – 7840 and work with Bellevue for appropriate actions.

Section 3: Contracts

A. Any latecomers agreements or other outstanding contracts for properties or facilities within the assumption area shall be assigned to Issaquah on the Assumption Effective Date.

Section 4: Term and Termination

A. This Agreement shall remain in effect in perpetuity, unless otherwise terminated as provided herein.

B. Any party may terminate this Agreement prior to the Assumption Effective Date by providing thirty (30) days written notice to the other parties.

Section 5: Indemnification and Hold Harmless.

Each party to this Agreement agrees to protect, defend, indemnify and hold harmless the other party and their officers, employees and agents from any loss, claim, judgment, settlement or liability, including costs and attorney's fees, arising out of and to the extent caused by the negligent acts or omissions of the indemnifying party related to activities under this Agreement. For this purpose, each indemnifying party, by mutual negotiation, hereby waives, as respects all other non-indemnifying parties only, any immunity that would otherwise be available against such claims under the Industrial Insurance provisions of Title 51 RCW. In the event the any non-indemnifying party incurs any judgment, award, and/or cost arising therefrom including attorneys' fees to enforce the provisions of this Section, all such fees, expenses and costs shall be recoverable from the indemnifying party. This section shall survive the termination of this Agreement.

Section 6: General Provisions

A. Governing Law; Forum. The Agreement will be governed by the laws of Washington and its choice of law rules. Venue for any dispute arising out of this Agreement shall be in King County, Washington.

B. Severability. If any provision of the Agreement is held to be invalid or unenforceable for any reason, the remaining provisions will continue in full force without being impaired or invalidated in any way. The parties agree to replace any invalid provision with a valid provision that most closely approximates the intent and economic effect of the invalid provision.

C. Nonwaiver. Any failure to enforce strict performance of any provision of this Agreement will not constitute a waiver of the right to subsequently enforce such provision or any other provision of this Agreement.

D. No Assignment. Neither the Agreement nor any of the rights or obligations of any party arising under the Agreement may be assigned, without the other party's prior written consent. Subject to the foregoing, the Agreement will be binding upon, enforceable by, and inure to the benefit of, the parties and their successors and assigns.

E. Force Majeure. None of the parties shall be deemed in default hereunder and none shall be liable to the others if any party is substantially unable to perform its obligations hereunder by reason of any fire, earthquake, flood, tsunami, hurricane, epidemic, accident, explosion, strike, riot, civil disturbance, act of public enemy, embargo, war, military necessity or operations, act of God, any municipal county, state or national ordinance or law, any executive or judicial order, or similar event beyond such party's control.

F. Notices. All notices and other communications under the Agreement must be in writing, and must be given by registered or certified mail, postage prepaid, or delivered by hand to the party to whom the communication is to be given, at its address set forth below:

City of Bellevue:	Deputy Director Utilities Department 450 110th Ave NE Bellevue, WA 98004
City of Issaquah:	Director Public Works Engineering Department City Hall Northwest 1775 12th Ave NW P.O. Box 1307 Issaquah, WA 98027

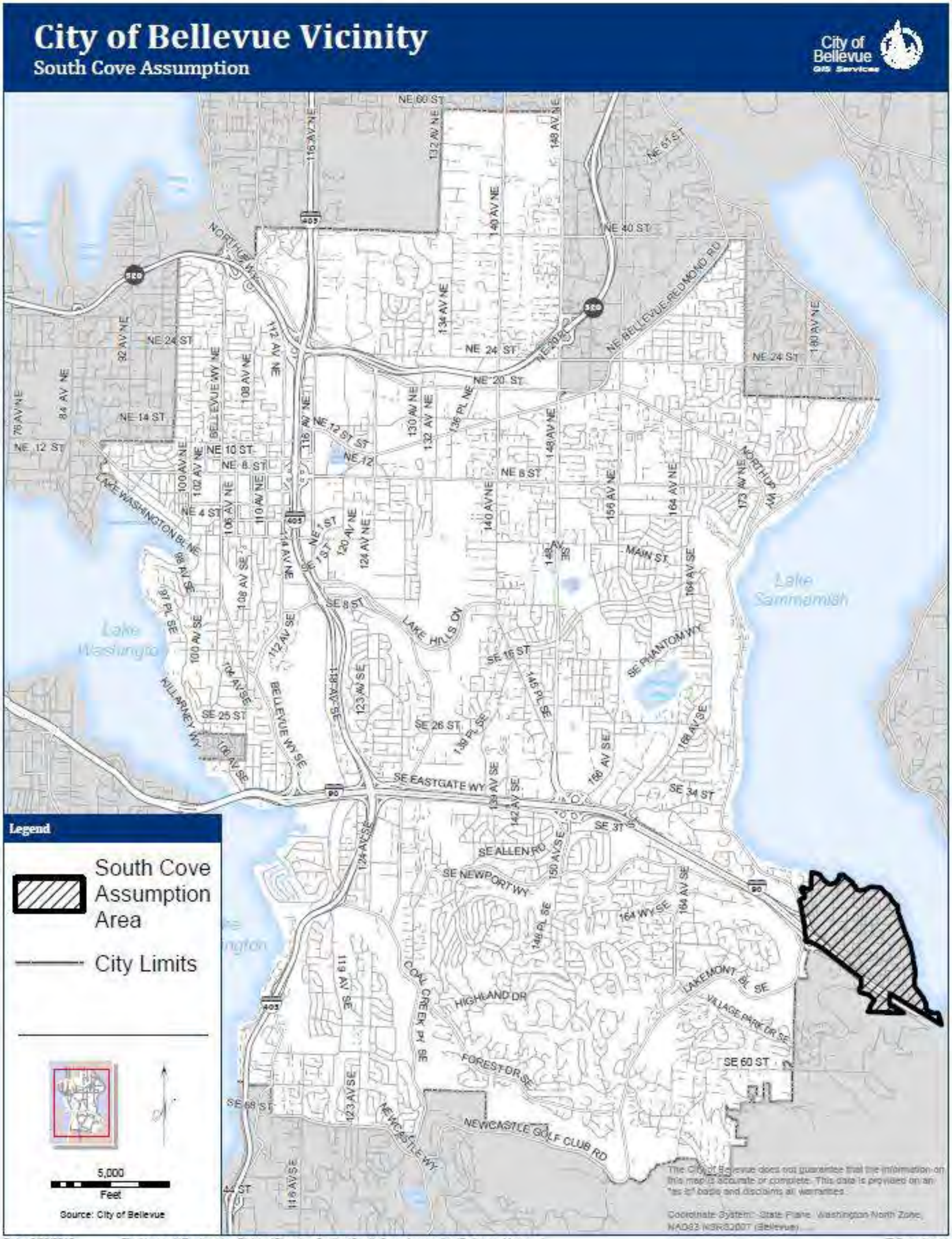
Any party may change its address specified in this paragraph by giving the other written notice in accordance with this paragraph.

G. Legal Fees. In any lawsuit between the parties with respect to the matters covered by the Agreement, the prevailing party will be entitled to receive its reasonable attorney's fees and costs incurred in the lawsuit, in addition to any other relief it may be awarded.

H. Counterparts. The Agreement may be signed in counterparts, each of which shall be deemed an original, and all of which, taken together, shall be deemed one and the same document.

Approved as to Form Bellevue Legal Counsel	CITY OF BELLEVUE (“Bellevue”)
By______________________ Its______________________ Dated____________________	By____ Its____ Dated______________________________________
Issaquah Legal Counsel By______________________ Its ______________________ Dated ____________________	CITY OF ISSAQUAH (“Issaquah”) By____ Its ____ Dated ______________________________________

ATTACHMENT A
ASSUMPTION AREA MAPS



Date: 6/22/2015 File Name: J:\Engineering Division\Planning Section\South Cove Assumption\Bellevue_Map.mxd IT Department

CITY OF ISSAQUAH

WATER AND SEWER ASSUMPTION

VICINITY MAP

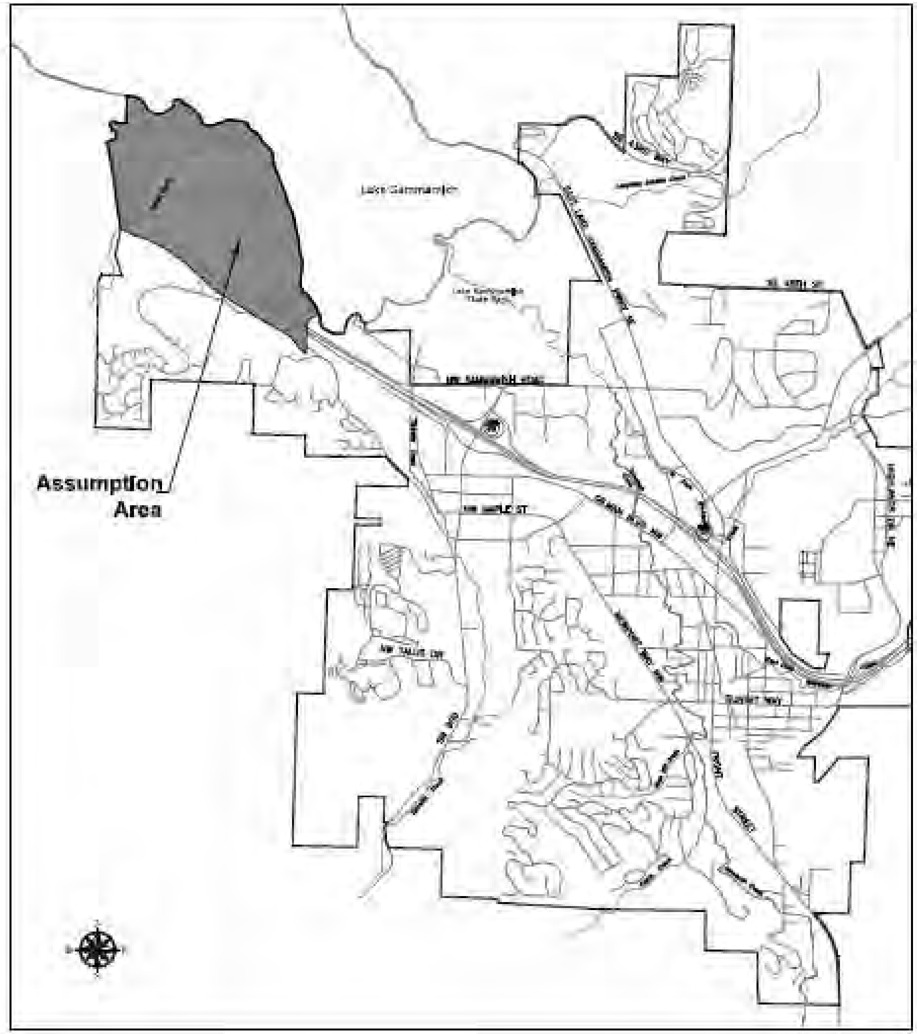
CITY OFFICIALS

MAYOR
FRED BUTLER

DIRECTOR OF PUBLIC WORKS
SHELDON LYNNE

CITY ATTORNEY
WAYNE TANAKA

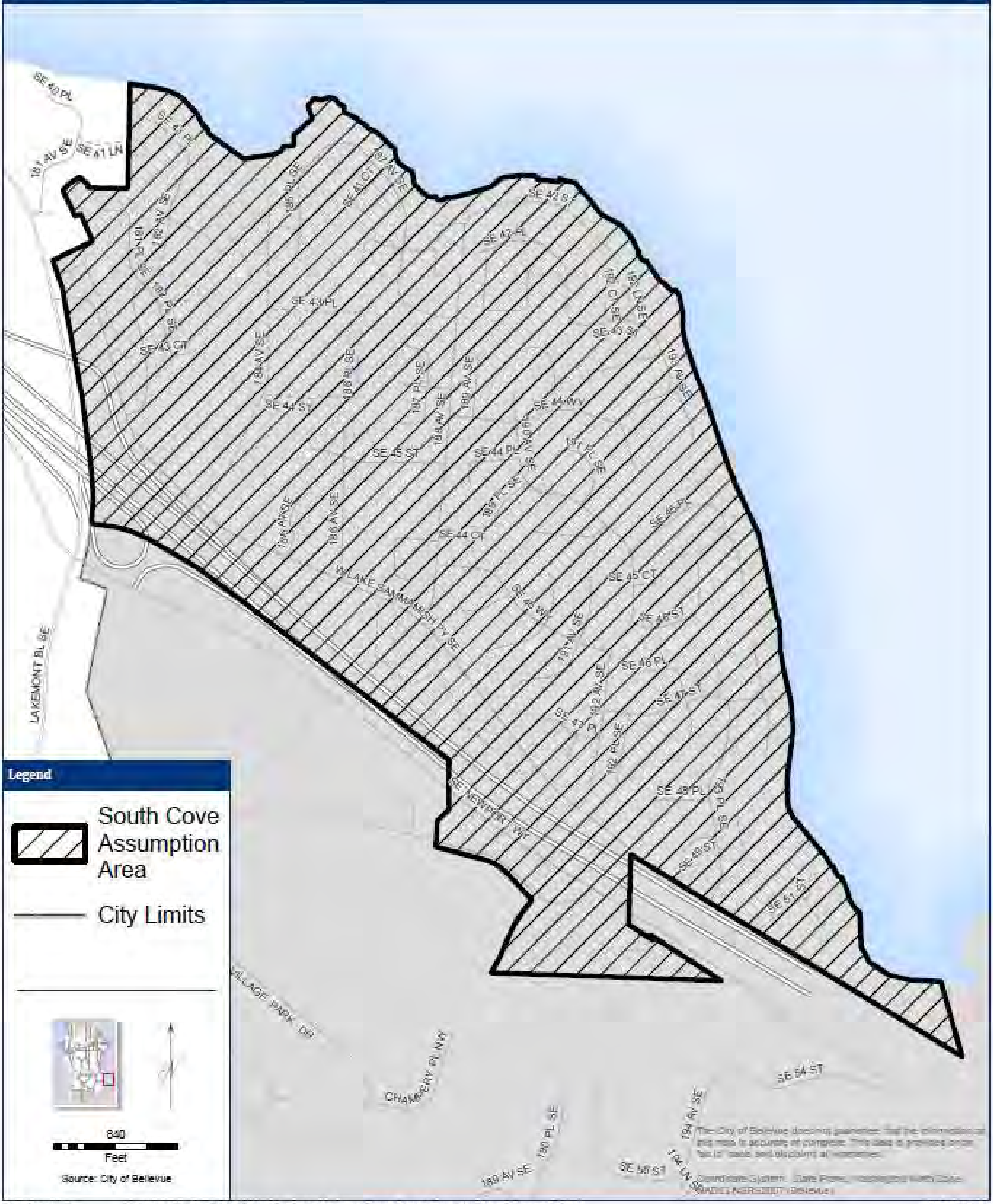
CITY COUNCIL MEMBERS
EILEEN BARBER
STACY GOODMAN
TOLA MARTS
NINA MILLIGAN
MARY LOU PAULY
JOSHUA SCHAER
PAUL WINTERSTEIN



South Cove Vicinity

South Cove Assumption

City of Bellevue
GIS Services



Date: 9/22/2015 File Name: J:\Engineering Division\Planning Section\South Cove Assumption\South_Cove_Map.mxd IT Department

Exhibit B: Legal Description

Legal Description: Water and Sewer Utility Assumption
Greenwood Point/South Cove

Triad Job # 12-138
March 25, 2015

That portion of Sections 18, 19 and 20, Township 24 North, Range 6 East, W.M., King County, Washington, described as follows:

Beginning at a point on the Southwesterly shoreline of Lake Sammamish, said point bears North 01°19'41" East from a point on the North line of Timber Lake Lane, as recorded in Volume 103 of Plats, Pages 16-18, a distance of 154.56 feet Westerly from the Northeast corner of Lot 30 of said plat, said point being on the Bellevue city limits as annexed under Ordinance No. 5277;
Thence along said Bellevue city limits the following courses:
Thence South 01°19'41" West to said point on the North line;
Thence North 88°59'22" West along the North line of Lots 31, 32 and 33 of said plat to the East line of Lot 34 of said plat;
Thence Northerly along said East line to the Southerly most corner of Lot 51 of said plat;
Thence Northwesterly along the Southwest line thereof to the Easterly most corner of Lot 50 of said plat;
Thence Southwesterly along the Southeast line thereof and the Southeast line of Lot 49 of said plat to the Northeast corner of Lot 48 of said plat;
Thence Southeasterly along the Northeast line thereof and the Northeast line of Lot 46 of said plat to the Northwest line of Tract E of said plat;
Thence Northeasterly along said Northwest line to the Northerly most comer of said Tract E;
Thence Southeasterly along the Northeast line thereof to the Easterly most comer of said Tract E;
Thence Southwesterly along the Southeast line thereof to the East margin of SR 901, as shown on SR 90 MP 7.71 to MP 11.73, Richards Road to Lake Sammamish, Right of Way and Limited Access Plan, sheets 10 and 11, dated June 12, 1969;
Thence Southerly along said East margin to an angle point 90.00 feet opposite SR 901 Station 102+00;
Thence Southerly along a line 90 feet Easterly of and parallel with the SR 901 Line to the Southerly limited access line of SR 90, as shown on said Right of Way and Limited Access Plan;
Thence, leaving said Ordinance No. 5277 and following Bellevue Ordinance No. 4789, Southeasterly along said limited access line to the Easterly Bellevue city limits in said Section 18 as described in said Ordinance No. 4789;
Thence South 11 15' 01" West 547.48 feet to a point on said city limits;
Thence South 09°57'07" West 159.87 feet;
Thence South 19 40' 53" East 519.68 feet to a point on the South line of said Section 18, said point being 595.00 feet Easterly of the Southwest corner of said Section 18, said point also being on the Issaquah city limits as annexed under Ordinance No. 1881;
Thence leaving said Bellevue city limits and following said Issaquah city limits the following courses:
Thence Easterly along said South line to its intersection with the Southwesterly margin of SE Newport Way;
Thence Southeasterly along said Southwesterly margin to its intersection with the East line of the West 99.00 feet of Government Lot 1 of said Section 19;
Thence, leaving said Ordinance No. 1881 and following Issaquah Ordinance No. 1880 Northerly along said East line to the Northeasterly margin of said SE Newport Way ;
Thence, leaving said Ordinance No. 1880 and following Issaquah Ordinance No. 1018 to the East line of said section;
Thence Northerly along said East line to its intersection with the Northerly margin of SR 90;
Thence North 58 32' 30" West along said Northerly margin 59.78 feet;
Thence North 59°27"00" East 75.58 feet;

triad

20300 Woodinville Snohomish Rd NE
Suite A | Woodinville, WA 98072
p: 425.415.2000
f: 425.486.5059
triadassociates.net

Thence North 20°57'00" East 117.14 feet;
Thence North 54°21'00" East 146.11 feet;
Thence North 73°01'30" East 157.79 feet to the shore of Lake Sammamish in Government Lot 6 of said Section 20;
Thence, leaving said Issaquah city limits, Northwesterly and Westerly along said Southwesterly shoreline of Lake Sammamish to the Point of Beginning;

TOGETHER with all adjacent shorelands;

EXCEPT that portion of the Southwest Quarter of Section 18, Township 24 North, Range 6 East, W.M. in King County, Washington described as follows:

Beginning at the intersection of the easterly limits of the City of Bellevue as described in City of Bellevue Ordinance 4789 with the southerly margin of SR 90 as shown on the SR 90 MP 7.71 to MP 11.73, Richard Roads to Lake Sammamish, Right of Way and Limited Access Plans, Sheets 9 and 10 of 25, dated June 12, 1969;
Thence along said easterly limits of the City of Bellevue the following courses and distances:
Thence South 11° 15' 01" West 547.48 feet to an angle point in said easterly limits;
Thence South 09°57'07" West 159.87 feet to an angle point in said easterly limits;
Thence South 19° 40' 53" East 519.68 feet to a point on the South line of said Section 18, said point being 595.00 feet Easterly of the Southwest corner of said Section 18, said point also being on the Issaquah city limits as annexed under Ordinance No. 1881;
Thence easterly along the south line of said of Section 18 to said southerly margin of SR 90;
Thence northwesterly along said margin to the Point of Beginning.

Note: The bearings shown herein were taken from the referenced documents and may not necessarily be on the same basis of bearing.

Note: This legal description was originally prepared for the City of Issaquah by Perteet Inc. and revised by the City of Issaquah to included changes requested on March 22, 2005 by the King County DOT Engineering Services Division. The legal description was revised again on March 25, 2015 to exclude a portion of the assumption area. The exception legal description was prepared by Triad. The legal description prepared by Perteet, Inc. was not verified by Triad.

BRADLEY T. FREEMAN
STATE OF WASHINGTON
REGISTERED PROFESSIONAL LAND SURVEYOR

3/25/15

triad

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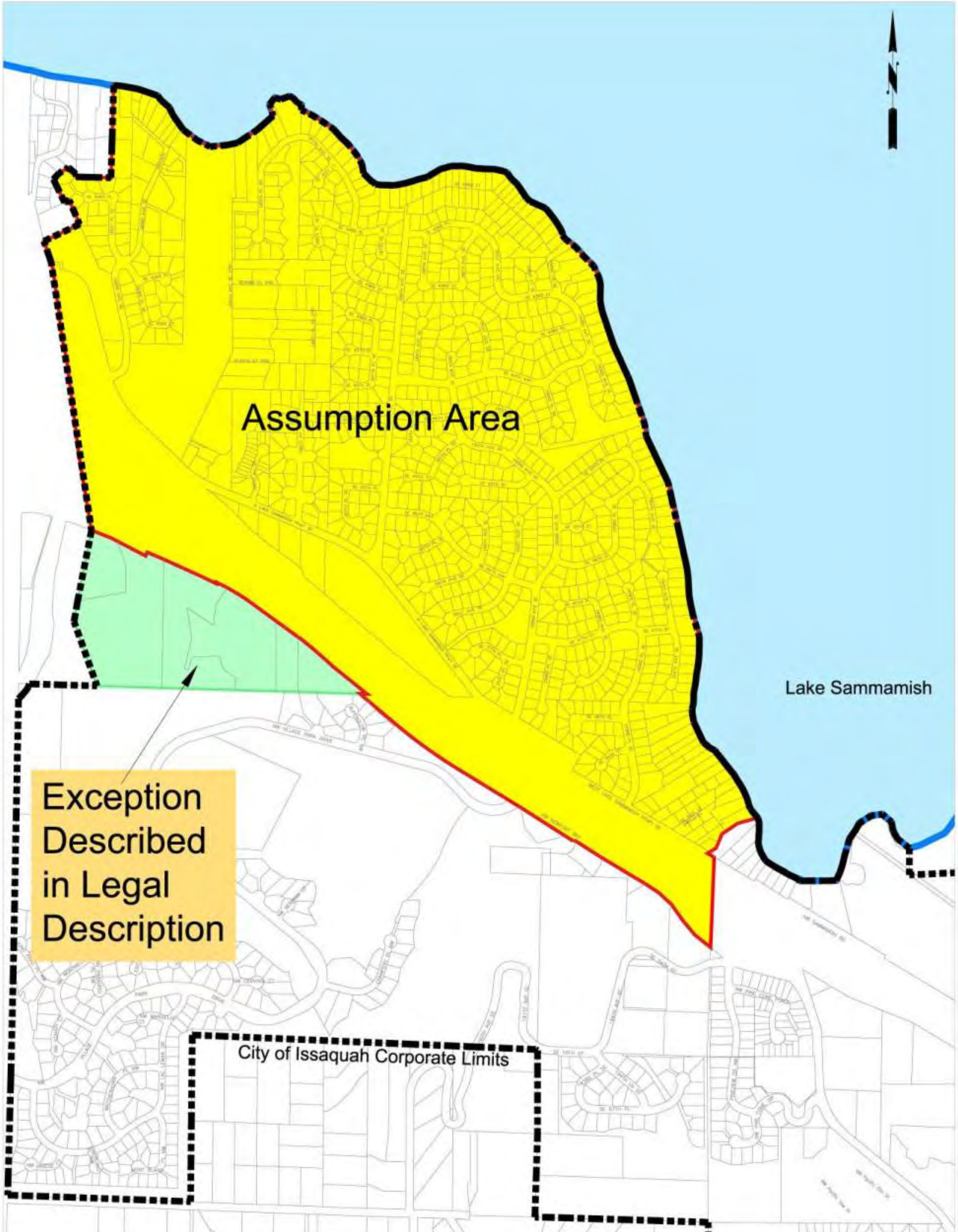

N
Assumption Area
Lake Sammamish
Exception
Described
in Legal
Description
City of Issaquah Corporate Limits

DISTRIBUTION SCHEDULE
City of Issaquah

❑ **FINAL STEP**
Original Filed in
Clerk's Records Room

DATE:

Resolution No. 2015-14

AB 6844

Subject: Accepting Interlocal Agreement between City of Bellevue and City of Issaquah as the Notice of Intent to petition for assumption of utilities for the area known as South Cove and Greenwood Point

08/03/2015	Date passed by City Council
08/03/2015	Signed by Mayor
08/03/2015	Signed by Council President
08/03/2015	Signed by City Clerk

Electronic copies of executed document distributed as follows:	**Date Completed:**
MRSC (per RCW 35A.39.010) – email notification	8-18-15
Code Publishing Website	n/a
Originating Department: Name, Dept	Sheldon Lynne, PWE
Other: None	n/a
Website Posting (iCompass)	8-19-15

Hard copies of executed document distributed as follows:

Other: none

Certified Copies: 0

Total **photocopies** needed 0

(Reviewed by City Clerk CC) (Date 8/18)

MCPW
Maria Portugal-Woodey, Support Services Specialist

8-19-15
Date

WATER FACILITIES AGREEMENT BETWEEN BELLEVUE AND CITY OF ISSAQUAH (2005)

RECEIVED
SEP 21 2005
PUBLIC WORKS ENG.

WATER FACILITIES AGREEMENT BETWEEN
CITY OF BELLEVUE
AND CITY OF ISSAQUAH

CR# 38205 DATE 09.19.05 Loc 05-739 PO 510799
Res 7212

THIS AGREEMENT is made by and between the City of Bellevue, a municipal corporation, in King County, Washington ("Bellevue"), and the City of Issaquah, a municipal corporation, in King County, Washington ("Issaquah") for the purposes set forth herein.

RECITALS

WHEREAS, the areas of Glacier Ridge (including Montreux) and Lakemont Triangle are within the City of Issaquah (shown on Exhibit A); and

WHEREAS, Issaquah currently serves these areas for water supply through two interties with Bellevue located at SE 42nd and SE Newport Way, and SE 60th and 180th Avenue SE; and

WHEREAS, Issaquah plans to serve a portion of Glacier Ridge with water supplied through a third, future intertie with Bellevue located near Cougar Mountain Drive and 180th Avenue SE; and

WHEREAS, in order to serve Glacier Ridge and Lakemont Triangle, Issaquah uses portions of Bellevue's transmission, distribution, pumping and storage facilities; and

WHEREAS, Issaquah and Bellevue are both members of Cascade Water Alliance and receive wholesale water supply from Cascade Water Alliance; and

WHEREAS, Cascade Water Alliance has provided service points of delivery to Issaquah along its transmission main located in Newport Way; and

WHEREAS, Issaquah needs portions of some of Bellevue's facilities (such as reservoirs, pump stations, and transmission mains) to supply water to Glacier Ridge (including Montreux) and Lakemont Triangle areas; and

WHEREAS, Bellevue has agreed to allow use of its system by Issaquah to deliver water supply to Issaquah's Glacier Ridge and Lakemont Triangle areas;

NOW, THEREFORE, for good and valuable consideration, the receipt and adequacy of which is acknowledged, Bellevue and Issaquah agree as follows:

1. This Agreement supercedes and replaces all other agreements for wholesale water supply service between Issaquah and Bellevue.

2. Bellevue shall allow Issaquah to use portions of its water utility facilities as defined in this Agreement for delivery of water supply to the City of Issaquah at the existing interties and one future intertie located at: 1.) SE 42nd and SE Newport Way and 2.) SE 60th and 180th Avenue SE and 3.) near Cougar Mountain Drive and 180th Avenue SE (future intertie).

3. This Agreement allows the use of Bellevue's system by Issaquah to allow delivery of water supply to a limited area of Issaquah's water service area. The number of Equivalent Residential Units (ERU's) to be served within Lakemont Triangle (through the Newport Way intertie) shall not exceed 400 (600 Multi-family units). The number of ERU's to be served within Glacier Ridge (through the SE 60th intertie) shall not exceed 700 ERU's total, with no more than 150 ERU's of the 700 total being supplied water through the future intertie on or near Cougar Mountain Drive. An ERU shall be defined as being equal to one for each single family detached dwelling and shall be based on a mutually agreeable formula for all other uses.

4. Bellevue shall provide a maximum fire flow of 2500 gallons per minute at the SE 60th and 180th Avenue SE connection and 2000 gallons per minute at the SE 42nd and SE Newport Way connection and 1500 gallons per minute at the future connection near Cougar Mountain Road and 180th Avenue SE. It is understood that the actual rate of flow at the point of use is dependent upon the hydraulic behavior of the distribution system between the connection points and the point of use and Bellevue therefore makes no representation with regard thereto.

5. Issaquah agrees to pay Bellevue its fair share of the capital costs of the existing facilities (previously constructed by Bellevue) included on Exhibit B. The cost of these existing facilities will be recovered as a connection fee of $1,098 for each ERU that is served by the Newport Way connection, $3,761 for each ERU that is served by the SE 60th connection, and $5,767 for each ERU that is served by the future Cougar Mountain Drive connection. These fee amounts are for all new connections made in 2005 and will be adjusted annually by an amount equal to the percent annual change in the Consumer Price Index for All Urban Consumers (CPI-U) for the Seattle Metropolitan Area. These fees will be collected by Issaquah and paid to Bellevue in the manner described in paragraph 9 of this Agreement.

6. The future facilities included on Exhibit B are to be provided in response to development activity in the area supplied by the future connection near Cougar Mountain Drive and 180th Avenue SE, hence the cost of constructing these facilities is Issaquah's responsibility and is dependent upon developer contributions and construction.

7. Bellevue shall own and maintain all facilities within its service area that are jointly used by Bellevue and Issaquah.

8. Issaquah shall own and maintain all facilities that are solely used for service to Issaquah, regardless of the location of the facilities. Bellevue shall not tap into any Issaquah water main without Issaquah's written approval. Such approval shall not be unreasonably withheld.

9. Issaquah agrees to pay Bellevue's applicable standard connection fees for each ERU that is served. These fees will be collected by Issaquah on a unit by unit basis at the time that water service is requested. An annual payment will be made to Bellevue representing the connection fees that were colleted during the preceding twelve month period. The annual payment shall be made on or near December 31st of each year that new connections are added. A letter report shall accompany the payment, which includes an accounting of the connections added during the year.

10. Issaquah shall read both the master meter located on SE 60th and the future master meter located on or near Cougar Mountain Drive monthly and shall report consumption to Cascade Water Alliance.

11. Issaquah shall sum the bi-monthly consumption on the retail meters in the Lakemont Triangle area and add 10% (to address water losses in the system) and report that as consumption to Cascade Water Alliance. The metering devices shall be periodically calibrated in accordance with manufacturer's specifications to guarantee accuracy. If, due to water quality considerations, Issaquah needs to periodically flush its main, Issaquah shall install a metered flushing station to record consumptions.

12. Issaquah shall pay Cascade Water Alliance for the wholesale water it receives through these interties.

13. Upon execution of this Agreement Issaquah shall pay Bellevue $24,000 for the use of its facilities listed in this Agreement for 2004 and $24,500 for 2005. For subsequent years, the previous year's payment shall be adjusted annually by an amount equal to the percent annual change in the Consumer Price Index for All Urban Consumers (CPI-U) for the Seattle Metropolitan Area, and the amount due shall be paid in equal monthly installments.

14. Whenever possible, Bellevue will notify Issaquah 4 years in advance of when the renewal or replacement of capital facilities necessary under this Agreement is anticipated. Issaquah's fair share contribution for construction capital shall be determined by the percentage share listed in Exhibit C for each facility under this Agreement.

15. Bellevue agrees that the delivery of water to the point of connections will meet the same standards of reliability, rate of flow, and quality that it provides to its retail customers.

16. Issaquah is currently studying the possibility of annexing the South Cove area in accordance with its adopted land use plan. Bellevue currently is providing water service to this area. At the time of annexation, Bellevue is interested in Issaquah taking the service responsibility for South Cove. Upon annexation, Bellevue and Issaquah agree to negotiate an amendment to this Agreement to create an additional supply intertie and to wheel water on behalf of Cascade Water Alliance to serve this area.

17. Cascade Water Alliance shall be made aware of any planned modifications to any of the connections and shall be approved by Cascade Water Alliance if, as part of the modifications, a new connection is planned on the Cascade Water Alliance system.

18. When Issaquah discontinues use of any part of Bellevue's facilities identified in this Agreement by providing supply from a different location then the annual costs paid to Bellevue will be renegotiated based upon the logic used to determine the costs identified in this Agreement.

19. In the event that Issaquah or Bellevue withdraws from Cascade Water Alliance or Cascade Water Alliance dissolves, Issaquah and Bellevue will renegotiate this Agreement for continued delivery of water as necessary.

20. **Dispute Resolution.** Each City shall designate representatives for the purposes of administering this Agreement and resolving disputes arising from this Agreement. Each City shall notify the other in writing of its designated representatives. Each City may change its designated representatives by written notice to the other.

    Disputes that cannot be resolved by the representatives designated herein shall be referred to the chief executive officer of each City for mediation and/or settlement. If the executive officers are unable to reach settlement, the cities agree to mediate in good faith before a mutually acceptable mediator, with costs of the mediation to be shared equally between the cities. In the event a settlement cannot be reached through mediation, either party may bring an action in King County Superior Court to enforce any provision of this Agreement.

21. **Liability/Hold Harmless.** Bellevue shall indemnify, defend, and hold harmless the City of Issaquah, its officers, agents and employees, from and against any and all claims, losses or liability, including attorneys' fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of Bellevue, its officers, agents and employees, in the performance of this Agreement. With respect to the performance of this Agreement and as to claims against Issaquah, its officers, agents and employees, Bellevue expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of Bellevue. This paragraph shall not apply to any damage resulting from the negligence of Issaquah, its agents, and employees. To the extent any of the damages referenced by this paragraph were caused by or resulted from the concurrent negligence of Issaquah, its agents or employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of Bellevue, its officers, agents, and employees.

Issaquah shall indemnify, defend, and hold harmless the City of Bellevue, its officers, agents and employees, from and against any and all claims, losses, or liability, including attorneys' fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of Issaquah, its officers, agents and employees, in the performance of this Agreement and as to claims against Bellevue, its officers, agents and employees, Issaquah expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of Issaquah. This paragraph shall not apply to any damage resulting from the negligence of Bellevue, its agents, and employees. To the extent any of the damages referenced by this paragraph were caused by or resulted from the concurrent negligence of Bellevue, its agents or employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of Issaquah, its officers, agents and employees.

22. **Effective Date.** This Agreement is effective upon the date of the last signature below.

Approved as to Form
Bellevue Legal Counsel

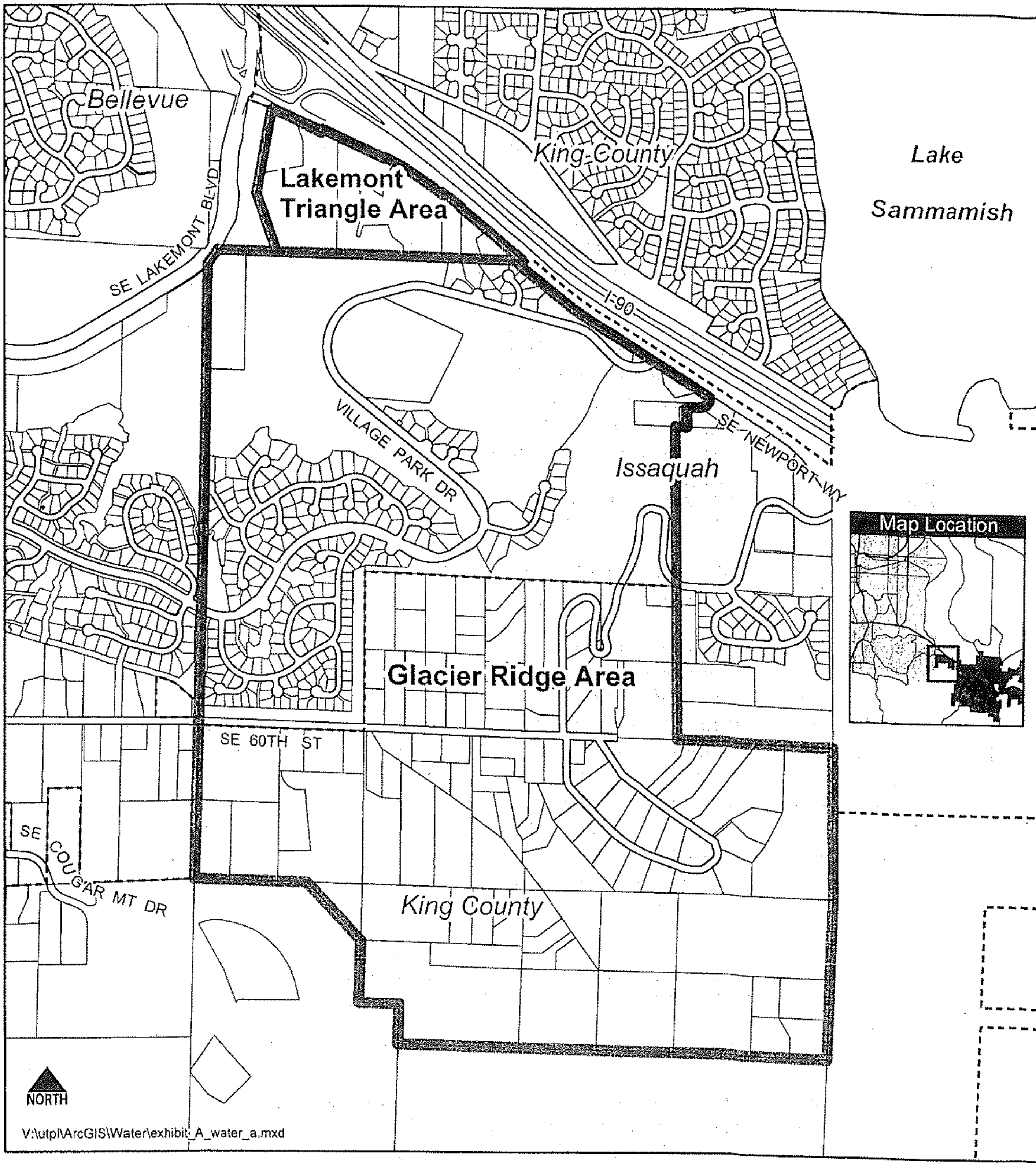
By *Patricia Cole*
Its *Assist. City Attorney*
Dated *6-13-05*

CITY OF BELLEVUE ("Bellevue")

By *[signature]*
Its *Deputy City Manager*
Dated *9/15/05*

Issaquah Legal Counsel
By *[signature]*
Its
Dated *9/6/05*

CITY OF ISSAQUAH ("Issaquah")
By *[signature]*
Its *Mayor*
Dated *9/6/05*



City of Bellevue
IT Department
GIS Services

Plot Date: 5/11/2005

Exhibit A

Glacier Ridge & Lakemont Triangle Areas of Issaquah

This map is a graphic representation derived from the City of Bellevue Geographic Information System. It was designed and intended for City of Bellevue staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map. Any reproduction or sale of this map, or portions thereof, is prohibited without express written authorization by the City of Bellevue.

NOTE: If you have specific questions concerning information contained on this map, please contact the sponsoring department as shown on this map.

EXHIBIT B

LIST OF FACILITIES NEEDED TO SUPPLY WATER TO THE NEWPORT WAY CONNECTION WITH ISSAQUAH

1. Parksite Reservoir (520 Elevation) – 2.0 MG
2. Newport Reservoir (520 Elevation) – 3.0 MG
3. 3 Regional Supply Inlet Stations (Eastgate, SE 28th, and 161st SE Inlets)
4. 3,000 lf of 24" Pipe (Located in Newport Way between 161st SE and 163rd SE; and in 163rd SE and 164th Way between Newport Way and the Newport Reservoir)
5. 7,500 lf of 16" Pipe (Located in 148th SE and under I-90 between the SE 28th Inlet and SE 36th; and in 161st SE and under I-90 between Newport Way and a point just north of Eastgate Way; and in an easement between Newport Way and the Parksite Reservoir)
6. 17,200 lf of 12" Pipe (Located in SE 28th and easements roughly paralleling I-90 between the SE 28th Inlet and 161st SE; and in Newport Way between 163rd SE and the Newport Way Issaquah Connection; and in Newport Way between 145th SE and 150th SE; and in 145th SE, SE 42nd Place, 146th SE, Eastgate Drive and 148th SE between Newport Way and SE 36th; and in 150th SE, SE 38th and SE 36th from Newport Way to 148th)

LIST OF FACILITIES NEEDED TO SUPPLY WATER TO THE SE 60TH CONNECTION WITH ISSAQUAH

1. Newport Pump Station (pumps from 520 Elevation to 850 Elevation)
2. 850 Elevation 12" Transmission Main (between the Newport Pump Station and the Cougar Mountain #1 Pump Station and Reservoir)
3. Cougar Mountain #1 Pump Station (pumps from 850 Elevation to 1150 Elevation)
4. 1150 Elevation 12" Transmission Main (between the Cougar Mountain #1 Pump Station and Reservoir to the Cougar Mountain #2 Pump Station and Reservoir)
5. Cougar Mountain #2 Reservoir (1150 Elevation) – 1.05 MG
6. 1150 Elevation Issaquah 12" Transmission Main (between the Cougar Mountain #2 Reservoir and the SE 60th Issaquah Connection)
7. 1150 Elevation Water Meter, Vault, Appurtenances (SE 60th Issaquah Connection)
8. Second Source of Supply Facilities for the SE 60th Issaquah Connection

LIST OF ADDITIONAL FACILITIES NEEDED TO SUPPLY WATER TO THE FUTURE COUGAR MOUNTAIN ROAD CONNECTION WITH ISSAQUAH

1. Cougar Mountain #2 Pump Station (pumps from 1150 Elevation to 1465 Elevation) - existing facility
2. 1465 Elevation 12" Transmission Main (between the Cougar Mountain #2 Pump Station and Reservoir and the Cougar Mountain #3 Pump Station and Reservoir) - existing facility
3. Cougar Mountain #3 and 3A Reservoirs (1465 Elevation Reservoirs) – 2.0 MG and 0.3 MG – existing facility
4. 1465 Elevation Issaquah Transmission Main (between the Cougar Mountain #3 Reservoir and the Cougar Mountain Drive Issaquah connection) – future facility
5. 1465 Elevation Water Meter, Vault, and Appurtenances (Cougar Mountain Drive Issaquah Connection) – future facility

Exhibit C

Bellevue/Issaquah Percentage Use of Joint Use Facilities

Based on the number of Equivalent Residential Units (ERU's) served

For the Area Identified in the 2/6/90 Lakemont Triangle Interlocal Agreement

Exhibit B of the 2/6/90 agreement identifies Bellevue regional facilities that provide water service to this area and estimates that 6372 ERU's in Bellevue are served by these facilities (Issaquah ERU not included).
The 2/6/90 agreement allows 600 MF Units to be served in Issaquah. 600 MF x 0.62 MF/SF = 372 ERU.
Therefore, the facilities identified in Exhibit B benefit each city by the following percentage breakdown:

6372 Bellevue ERU's served	94.48 % of Total ERU's
372 Issaquah ERU's served	5.52 % of Total ERU's
6744 TOTAL	

For the Area Identified in the 4/18/01 Glacier Ridge Interlocal Agreement

Number of ERU's served in each pressure zone

Bellevue	Issaquah	Pressure Zone	Data Source
1300 ERU	0 ERU	850 ft. HGL	1995 Newport P.S. Capacity Check Calculations
979 ERU	0 ERU	1000 ft. HGL	1999 Cougar Mt. Storage Requirement Calculations
1439 ERU	550 ERU	1150 ft. HGL	1999 Cougar Mt. Storage Requirement Calculations
555 ERU	0 ERU	1300 ft. HGL	1999 Cougar Mt. Storage Requirement Calculations
402 ERU	150 ERU	1465 ft. HGL	1999 Cougar Mt. Storage Requirement Calculations
169 ERU	0 ERU	1575 ft. HGL	1999 Cougar Mt. Storage Requirement Calculations

Newport Pump Station (520 zone to 850 zone)

4844 Bellevue ERU's served	87.37 % of Total ERU's
700 Issaquah ERU's served	12.63 % of Total ERU's
5544 TOTAL (850 through 1575 zones)	

850 Zone 16"/12" Transmission Main (Newport P.S. to Cougar Mt. #1 P.S. & Res.)

Approximate length of this pipe: 3,500 ft. of 16" 5,200 ft. of 12"

4844 Bellevue ERU's served	87.37 % of Total ERU's
700 Issaquah ERU's served	12.63 % of Total ERU's
5544 TOTAL (850 through 1575 zones)	

850 Zone to 1150 Zone Cougar Mt. #1 Pump Station

3544	Bellevue ERU's served	83.51 % of Total ERU's
700	Issaquah ERU's served	16.49 % of Total ERU's
4244	TOTAL (1000 through 1575 zones)	

1150 Zone Cougar Mt. #2 Reservoir (1.0 MG)

Actual storage required by this reservoir's direct service area is approx. 1.77 MG*.
0.30 MG of this storage is for fire flow (2500 gpm for 2 hrs.) and benefits each City equally.

3544	Bellevue ERU's served	83.51 % of Total ERU's
700	Issaquah ERU's served	16.49 % of Total ERU's
4244	TOTAL (1000 through 1575 zones)	

Percentage share of storage adjusted to account for fire storage being shared equally (50% each):

77.83 % Bellevue [(83.51% x 1.47 MG + 50% x 0.30 MG) / 1.77 MG]
22.17 % Bellevue [(16.49% x 1.47 MG + 50% x 0.30 MG) / 1.77 MG]

1150 Zone 12" Transmission Main (Cougar Mt. #1 P.S. to Cougar Mt. #2 P.S & Res.)

Approximate pipe length: 1,300 ft

3544	Bellevue ERU's served	83.51 % of Total ERU's
700	Issaquah ERU's served	16.49 % of Total ERU's
4244	TOTAL (1000 through 1575 zones)	

1150 Zone 12" Issaquah Transmission Main (1150 Reservoir to Issaquah Supply Meter)

Approximate pipe length: 4600 ft

Since this main also provides benefit to Bellevue customers, it will be considered to benefit each city equally.

50 % Bellevue
50 % Issaquah

1150 Zone second supply to Issaquah (required by this Interlocal agreement)

This additional supply is provided by the following facilities:

- 1465 Zone to 1300 Zone PRV (vault contains a 6" and a 2" PRV)
- Approximately 1500 ft. of pipe in the 1300 Zone
- 1300 Zone to 1150 Zone PRV (vault contains a 6" and a 2" PRV)
- Approximately 1800 ft. of pipe in the 1150 Zone

Since these facilities also provide benefit to Bellevue customers, they will be considered to benefit each city equally.

50 % Bellevue
50 % Issaquah

1150 Zone to 1465 Zone Cougar Mt. #2 Pump Station

1126 Bellevue ERU's served	88.24 % of Total ERU's
150 Issaquah ERU's served	11.76 % of Total ERU's
1276 TOTAL (1300 through 1575 zones)	

1465 Zone Cougar Mt. #3 Reservoirs (2.0 MG & 0.3 MG)
Actual storage required by this reservoir's direct service area is approx. 1.53 MG*.
0.18 MG of this storage is for fire flow (1500 gpm for 2 hrs.) and benefits each City equally.

1126 Bellevue ERU's served	88.24 % of Total ERU's
150 Issaquah ERU's served	11.76 % of Total ERU's
1276 TOTAL (1300 through 1575 zones)	

Percentage share of storage adjusted to account for fire storage being shared equally (50% each):

83.74 % Bellevue [(88.24% x 1.35 MG + 50% x 0.18 MG) / 1.53 MG]
16.26 % Bellevue [(11.76% x 1.35 MG + 50% x 0.18 MG) / 1.53 MG]

1465 Zone 12" Transmission Main (Cougar Mt. #2 P.S. to Cougar Mt. #3 P.S & Res.)
Approximate pipe length: 3,400 ft

1126 Bellevue ERU's served	88.24 % of Total ERU's
150 Issaquah ERU's served	11.76 % of Total ERU's
1276 TOTAL (1300 through 1575 zones)	

Future 1465 Zone 8" Issaquah Transmission Main (1465 Reservoir to Issaquah Supply Meter)
Approximate expected pipe length: 900 ft

Since this main is also expected to provide benefit to Bellevue customers,
it will be considered to benefit each city equally.

50 % Bellevue
50 % Issaquah

*** Note: Some of the storage required by the 1150 reservoir service area is located in the 1465 reservoirs.**

AMENDMENT TO WHOLESALE WATER SERVICE AGREEMENT FROM CITY OF BELLEVUE TO CITY OF ISSAQUAH SERVICE AREA (1999)

file - Regional water

AMENDMENT TO WHOLESALE WATER SERVICE AGREEMENT
FROM
CITY OF BELLEVUE
TO
CITY OF ISSAQUAH SERVICE AREA
(URBAN AREAS)

THIS AMENDMENT ("Amendment") is entered into by the CITY OF BELLEVUE ("Bellevue") and the CITY OF ISSAQUAH ("Issaquah") to amend their existing agreements for wholesale water service from Bellevue to Issaquah on the terms specified herein.

RECITALS

WHEREAS, Bellevue and Issaquah have an existing Wholesale Service Water Agreement for Glacier Ridge/Montreux dated August 30, 1989, attached as Exhibit A ("Montreux Agreement"), and for the Lakemont Triangle area dated April 17, 1990, attached as Exhibit B ("Lakemont Triangle Agreement");

WHEREAS, Bellevue and Issaquah wish to continue their mutual efforts for utility service and support regional solutions for water service by extending regional water supply to the urban areas within Issaquah;

WHEREAS, the respective Bellevue and Issaquah City Councils have reviewed and approved extension of water service to meet Issaquah's growth needs and to modify the current interlocal agreements, with the concurrence of the City of Seattle; and

WHEREAS, Seattle has approved the provisions of Bellevue's wholesale water service to Issaquah as reflected in Exhibit D;

AGREEMENT

NOW, THEREFORE, for good and valuable consideration, the receipt and adequacy of which is acknowledged, Bellevue and Issaquah agree as follows:

1. Bellevue Wholesale Distribution. Bellevue shall provide wholesale water service to Issaquah as follows:

1.1 Glacier Ridge/Montreux. Water shall continue to be provided as set forth in the Montreux Agreement, Exhibit A.

1.2 Lakemont Triangle. Water shall continue to be provided as set forth in the Lakemont Triangle Agreement, Exhibit B, except after completion of the Issaquah Regional Facilities described below, Issaquah may connect the Lakemont Triangle service area to the Issaquah Regional Facilities at a connection point mutually approved by the parties.

1.3 Regional Facilities for Urban Areas. Water shall be provided to Issaquah for Issaquah's retail distribution and sale in accordance with the following terms of this Amendment.

2. Description of Regional Facility Extension. The extension of the wholesale water distribution system under this Amendment shall consist generally of the following (collectively "Issaquah's Regional Facilities"):

2.1 Supply Amount. Water supply in the quantity up to 1.7 MGD for average annual daily demand and 4.2 MGD for peak day demand shall be provided by Bellevue via its Water Purveyor Contract with Seattle until the expiration of that purveyor contract (i.e. December 31, 2011).

2.2 Distribution Route; Meter. Issaquah's Regional Facilities shall connect to Bellevue's existing 24-inch line along Newport Way east of Bellevue's Eastgate Inlet. Issaquah shall install a master meter meeting the standards in Exhibit C at a mutually approved location in order to measure the wholesale quantity of water conveyed to the Issaquah Regional Facilities. Issaquah shall own the master meter and it shall be capable of readings from remote locations by Bellevue and Seattle. As of the date of this Amendment, the Issaquah Regional Facilities shall consist of the pipes and other capital facilities generally described on Exhibit C. Issaquah may install additional meters and may modify or add components as part of the Regional Facilities so long as the system operates consistent with this Amendment, including the operating standards in Exhibit C. Bellevue shall approve the location, type and make of master meter. The master meter shall be calibrated as recommended by the manufacturer but not less than every three years.

2.3 Operating Standards. The parties shall meet the operating standards set forth in Exhibit C.

2.4 Reliability. Bellevue's wholesale service to Issaquah shall, to the extent feasible, have the same continuity of service that Bellevue provides its own customers.

2.5 Water Quality. Each party will be responsible for complying with applicable state and federal water quality standards as to their respective local water systems. The parties acknowledge that water quality issues may arise in the future due to changes in law or operational conditions. The parties agree to coordinate and to work together in good faith to identify and implement equitable and cost-effective solutions to any such matters. Each party shall meet the standards as set by Bellevue's agreement with Seattle or a future agreement between Bellevue, Issaquah, CWA or other regional water supplier.

3. Seattle Purveyor Contract. Seattle has approved this amendment to wholesale water service to Issaquah pursuant to the existing Water Purveyor Contract between the City of Seattle and Bellevue, Section II.B, Resale to Other Parties. Issaquah agrees for its Regional Facilities to abide by the terms and conditions imposed by the Seattle Water Department under its water purveyor contract with Bellevue, including but not limited to shortage sharing, hydraulic gradient, demand charges, cross-connection controls, regional conservation programs, water quality testing, and other applicable standards, and those terms and conditions are incorporated herein by reference as if fully set forth. Issaquah will participate in Seattle's 1% conservation initiative as to the water received from the regional system.

4. No Purveyor Status. This Amendment does not convey purveyor status or water supply rights from the City of Seattle to Issaquah. Issaquah shall not be permitted to sell water outside Issaquah's direct service area (as it may be amended from time to time) without permission from both Bellevue and Seattle, including sales of surface water purchased under this Amendment as well as current Issaquah ground water supplies which, if sold, would result in increased demands for wholesale water under this Amendment. For service within its service area, Issaquah may install additional pipes and facilities connecting to or served by the Regional Facilities, which are not defined as the "Regional Facilities" under this Amendment and do not require approval from Seattle and Bellevue so long as those additions are consistent with the operating obligations and standards for the Regional Facilities set forth in this Amendment. Water supplied under this Amendment shall not be used to supply new golf courses within Issaquah's service area either directly or through substitution from existing Issaquah sources.

5. Responsibility for Permitting, Construction and Operation. As between Bellevue and Issaquah, Issaquah shall be solely responsible for the design, engineering, permitting, and construction of all facilities necessary to provide water under this Amendment. Issaquah shall be the lead agency for SEPA. The parties acknowledge Issaquah may enter into separate agreements with responsible private developers or entities to finance and construct the Issaquah Regional Facilities, which upon completion shall be conveyed to and owned by Issaquah. Bellevue shall not have any responsibility for construction or maintenance of the Issaquah Regional Facilities.

6. Rates; Billing. Based on the metering performed under Section 2.2 of this Amendment, Bellevue shall bill Issaquah for water deliveries on a monthly basis. Bellevue's billings to Issaquah shall be composed of two elements:

6.1 Seattle component: billings for water supply based on the following multipliers of Seattle's New Water Rates to Bellevue for the water supplied to Issaquah: (a) 1.00 times the New Water Rate for the winter period; and (b) 1.52 times the New Water Rate for the summer period; and

6.2 Bellevue component: a charge of $0.07 per CCF for Bellevue's facilities and administrative overhead. Bellevue may adjust the charge annually based on normal inflation without further review and every two years or more based on an acceptable study of administrative and operation costs. Bellevue will pay the Seattle component (Section 6.1) to the Seattle Public Utilities and retain the Bellevue component (Section 6.2) to compensate for Bellevue's costs.

Issaquah shall also reimburse Bellevue for any costs that Bellevue incurs associated with increased capital improvements, operations or maintenance as a result of supplying Issaquah water under thisAmendment. An example would be the cost associated with a new pump station at 163rd and Newport Way which may be required to meet the minimum hydraulic gradeline specified under Exhibit C.

7. Additional Purveyor Connections to Issaquah Regional Facilities. Issaquah will not unreasonably restrict access to the Issaquah Regional Facilities by other water purveyors in the region, in the form of an interlocal agreement between Issaquah and the connecting purveyor, subject to (a) approval by Seattle and Bellevue by separate agreement with such connecting purveyor, (b) the connecting purveyor's payment to Issaquah, if Issaquah requests, of a fair share contribution of the costs of Issaquah's Regional Facilities and payment of charges for Issaquah's operational and wheeling expenses, (c) no adverse impact on Issaquah's water service in its service area (*e.g.* including but not limited to reduction in pressure), and (d) consistency with adopted GMA plans for issues related solely to water supply and transmission services.

8. Cascade Water Alliance. After the expiration date of Bellevue's Water Purveyor Contract with Seattle on December 31, 2011, water supply to Issaquah will be subject to future agreement between Bellevue, Issaquah and the Cascade Water Alliance ("CWA") or other regional purveyor or sooner if CWA forms prior to December 31, 2011. Upon execution of a wholesale agreement between the CWA and Seattle and upon Bellevue's joinder in the CWA, Issaquah is required to join the CWA to continue to receive wholesale water under this Amendment. Potential transfer of ownership or capacity rights of Issaquah's Regional Facilities from Issaquah to the CWA would be subject to future agreement between Issaquah and the CWA.

9. Cooperation. Bellevue and Issaquah shall cooperate to implement this Amendment.

10. Dispute Resolution. Each City shall designate representatives for the purposes of administering this Amendment and resolving disputes arising from this Amendment. Each City shall notify the other in writing of its designated representatives. Each City may change its designated representatives by written notice to the other.

Disputes that cannot be resolved by the representatives designated herein shall be referred to the chief executive officer of each City for mediation and/or settlement. If such dispute is not resolved within sixty (60) days, either City, or both of them, may file a demand for arbitration, in which event the issue shall be submitted to an arbitrator acceptable to both parties and the matter shall be arbitrated pursuant to the rules and procedures of the American Arbitration Association. The decision of the arbitrator shall be final and binding on both Cities.

11. Liability/Hold Harmless. Bellevue shall indemnify, defend, and hold harmless the City of Issaquah, its officers, agents and employees, from and against any and all claims, losses or liability, including attorneys' fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of Bellevue, its officers, agents and employees, in the performance of this Amendment. With respect to the performance of this Amendment and as to claims against Issaquah, its officers, agents and employees, Bellevue expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of Bellevue. This paragraph shall not apply to any damage resulting from the negligence of Issaquah, its agents, and employees. To the extent any of the damages referenced by this paragraph were caused by or resulted from the concurrent negligence of Issaquah, its agents or employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of Bellevue, its officers, agents, and employees.

Issaquah shall indemnify, defend, and hold harmless the City of Bellevue, its officers, agents and employees, from and against any and all claims, losses, or liability, including attorneys' fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of Issaquah, its officers, agents and employees, in the performance of this Amendment and as to claims against Bellevue, its officers, agents and employees, Issaquah expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of Issaquah. This paragraph shall not apply to any damage resulting from the negligence of Bellevue, its agents, and employees. To the extent any of the damages referenced by this paragraph were caused by or resulted from the concurrent negligence of Bellevue, its agents or employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of Issaquah, its officers, agents and employees.

12. Effective Date. This Amendment is effective upon the date of the last signature below. Notwithstanding any other provision of this Amendment, Issaquah may elect (by delivery of a letter to Bellevue) not to extend and construct the Regional Facilities, in which event Sections 2 through 11 of this Amendment shall not be effective.

13. No Other Changes. Except as expressly amended in this Amendment, there are no changes to the Montreux Agreement (Exhibit A) and the Lakemont Triange Agreement (Exhibit B), which remain in effect in accordance with their terms.

CITY OF BELLEVUE

By: Linda M. Barton

Its: Deputy City Manager

Dated: 4-20-99

Approved as to form:

By: [signature]
City Attorney

CITY OF ISSAQUAH

By: Ava Frisinger

Its: Mayor

Dated: 4/2/99

Approved as to form:

By: Wayne Tanaka
City Attorney

Attest:
CITY CLERK
by: Linda Ruehle

EXHIBITS:

A Montreux Wholesale Agreement
B Lakemont Triangle Wholesale Agreement
C Description of Regional Facilities and Operational Standards.
D Letter from Seattle Public Utilities to Bellevue

EXHIBIT A

MONTREUX WHOLESALE AGREEMENT

ORIGINAL

AGREEMENT FOR WHOLESALE WATER SERVICE
FROM
CITY OF BELLEVUE
TO
CITY OF ISSAQUAH SERVICE AREA
(GLACIER RIDGE)

WHEREAS: A sphere of influence agreement has been reached between the City of Bellevue (Bellevue) and the City of Issaquah (Issaquah) that outlines the limits of a future boundary between the Cities, and

WHEREAS: It is desirable that the Cities future water service boundaries correspond with the Cities future corporate limits, and

WHEREAS: Bellevue has now or will in the future be extending water system facilities to serve areas adjacent to, or in close proximity of, its side of the sphere of influence boundary, and

WHEREAS: Bellevue water facilities now exist or will be constructed with a hydraulic elevation that would be capable of providing adequate service pressures to certain areas within Issaquah's service area [(shown on Exhibit 1 and labeled as Glacier Ridge (GR)], and

WHEREAS: Issaquah water facilities are currently a greater distance from the GR service area, and

WHEREAS: An analysis of water service options for Issaquah to serve the GR area, which was conducted by CH2M Hill for Issaquah, concluded that the least cost alternative for water service would be through a wholesale/retail agreement between Bellevue and Issaquah, and

WHEREAS: It is desirable to provide water service to the public in the least costly manner, consistent with jurisdictional boundaries, and

WHEREAS: It is recognized that water service to the GR area will not solve Issaquah's long term water needs and that other solutions will be needed to serve future growth demands.

NOW, THEREFORE be it agreed by the Cities of Bellevue and Issaquah that:

1. Bellevue agrees to provide wholesale water service to Issaquah for the GR area only for retail distribution and sale in accordance with the terms of this agreement.

2. This agreement addresses the provision of wholesale water service to a limited area of Issaquah's water service area. It is not the intent of this agreement to address facilities that would be capable of serving any additional portion of Issaquah's water service area. Such facilities would require a separate agreement.

3. The number of Equivalent Residential Units (ERU's) to be served within the area shall not exceed 700 unless it is mutually agreed that additional ERU's may be served. An ERU shall be defined as being equal to one for each single family detached dwelling, and shall be based upon a mutually agreeable formula for all other uses.

4. Bellevue shall supply water from its 1,150 operating zone, hence the maximum service elevation from this operating zone (without repumping) is approximately 1,050 feet above sea level. Bellevue shall provide a maximum fire flow rate of 2,500 gpm measured at the point of interconnection. It is understood that the actual rate of flow at the point of use is dependent upon the hydraulic behavior of the distribution system between the connection point and the point of use and Bellevue therefore makes no representation with regard thereto.

5. Bellevue agrees that the wholesale service it provides to Issaquah will meet the same standards of reliability, rate of flow and quality, that it provides to its retail service customers. To enhance system reliability, a second (emergency) connection point shall be developed by Bellevue and Issaquah prior to serving over 350 ERU's.

6. The Water Purveyor Contract between the City of Seattle and the City of Bellevue, Section II.B. Resale to Other Parties, requires written consent from Seattle prior to the execution of this Agreement.

Issaquah agrees, for the GR service area, to abide by the standard terms and conditions that are imposed by the Seattle Water Department as well as those imposed by Bellevue, including but not limited to cross-connection controls, water quality testing, water conservation and other applicable standards and those terms and conditions are hereby incorporated by reference herein as if set forth in full. This Agreement does not convey purveyor status or water supply rights from the City of Seattle to Issaquah.

7. Bellevue and Issaquah agree that the water system improvements needed to serve the area are to be provided in response to development activity, hence the construction of the facilities included on Exhibit 2 is dependent upon developer contributions and construction. Issaquah's fair share of the capital cost of facilities to serve the area shall be provided from developer cash contributions and/or developer facility construction directly to or in conjunction with the Developer(s) constructing the improvements included on Exhibit 2.

8. The basis for determining Issaquah's fair share of the capital cost of facilities shall be mutually accepted engineering standards related to sizing of storage, pumping, distribution and transmission facilities as listed on Exhibit 2.

9. Bellevue shall construct, own and maintain all facilities within its service area, that are jointly used by Bellevue and Issaquah through Developer Extension requirements. Bellevue is not obligated to provide these or additional facilities for this purpose at Bellevue's cost.

10. Issaquah shall construct, own and maintain all facilities that are solely used for service to Issaquah, regardless of the location of the facilities through Developer Extension requirements.

11. Issaquah agrees to pay Bellevue's applicable standard connection fees for each ERU that is served. These fees will be collected by Issaquah on a unit by unit basis at the time that water service is requested. An annual payment will be made to Bellevue representing the connection fees that were collected during the preceding twelve month period. The annual payment shall be made on or near December 31st of each year that new connections are added. A letter report shall accompany the payment, which includes an accounting of the connections added during the year.

12. All water supplied to the GR area by Bellevue shall be metered in a manner that is approved by Bellevue. The metering device(s) shall be owned by Bellevue and be periodically calibrated in accordance with manufacturer's specifications to guarantee accuracy.

13. Bellevue will record the water consumption on a bi-monthly schedule and submit a bill to Issaquah for water consumption. The water shall be charged at Bellevue's standard residential water rate. This rate includes charges for maintenance and operation of the jointly used facilities in perpetuity and will not be subject to additional charges for maintenance and operation.

14. Bellevue agrees to obtain all necessary approvals and permits for serving and constructing the jointly used facilities.

15. Issaquah agrees to obtain all necessary approvals and permits for construction of the facilities that will solely serve Issaquah.

16. The City of Issaquah may exercise the right of ownership for its fair share of facilities necessary to serve the area, but will require the consummation of a separate agreement which would address payments, water rates, maintenance and operations, ultimate replacement and other applicable terms and conditions.

17. Dispute Resolution. Each City shall designate representatives for the purposes of administering this Agreement and resolving disputes arising from this Agreement. Each City shall notify the other in writing of its designated representatives. Each City may change its designated representatives on notice to the other.

Disputes that cannot be resolved by the representatives designated herein shall be referred to the chief executive officer of each City for mediation and/or settlement. If not resolved by them within sixty (60) days, either City, or both of them, may file a demand for arbitration, in which event the issue shall be submitted to an arbitrator acceptable to both parties and the matter shall be arbitrated pursuant to the rules and procedures of the American Arbitration Association. The decision of the arbitrator shall be final and binding on both Cities.

18. Liability/Hold Harmless. Bellevue shall indemnify, defend, and hold harmless the City of Issaquah, its officers, agents and employees, from and against any and all claims, losses, or liability, including attorneys fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of Bellevue, its officers, agents and employees, in the performance of this agreement. With respect to the performance of this agreement and as to claims against Issaquah, its officers, agents and employees, Bellevue expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of Bellevue. This paragraph shall not apply to any damage resulting from the negligence of Issaquah, its agents, and employees. To the extent any of the damages referenced by this paragraph were caused by or resulted from the concurrent negligence of Issaquah, its agents or employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of Bellevue, its officers, agents, and employees.

Issaquah, shall indemnify, defend, and hold harmless the City of Bellevue, its officers, agents and employees, from and against any and all claims, losses, or liability, including attorneys fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of Issaquah, its officers, agents and employees, in the performance of this agreement. With respect to the performance of this agreement and as to claims against Bellevue, its officers, agents and employees, Issaquah expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of Issaquah. This paragraph shall not apply to any damage resulting from the negligence of Bellevue, its agents, and employees. To the extent any of the damages referenced by this paragraph were caused by or resulted from the concurrent negligence of Bellevue, its agents or employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of Issaquah, its officers, agents, and employees.

19. Additional Terms and Conditions: The City of Bellevue agrees to provide water to the City of Issaquah under this agreement subject to the following additional terms and conditions:

1. The proposed area to be served by Issaquah with water provided under this agreement shall be physically contiguous to the incorporated limits of the City of Bellevue.

2. A notice of intent to annex the property described in Exhibit 3 hereto, the High Park property, shall be filed by the owners thereof and accepted by the Bellevue City Council within 15 days of approval of this agreement by the Bellevue City Council.

3. Annexation of the High Park property to the City of Bellevue shall be completed within 180 days of acceptance by the Bellevue City Council of the notice of intent to annex the High Park property.

If any of the above conditions are not met, this agreement shall terminate and be of no further force or effect.

HEREBY AGREED TO AND ACCEPTED BY this the 30th day of August, 1989.

CITY OF BELLEVUE

Pam Bissonnette

____

Approved as to form:

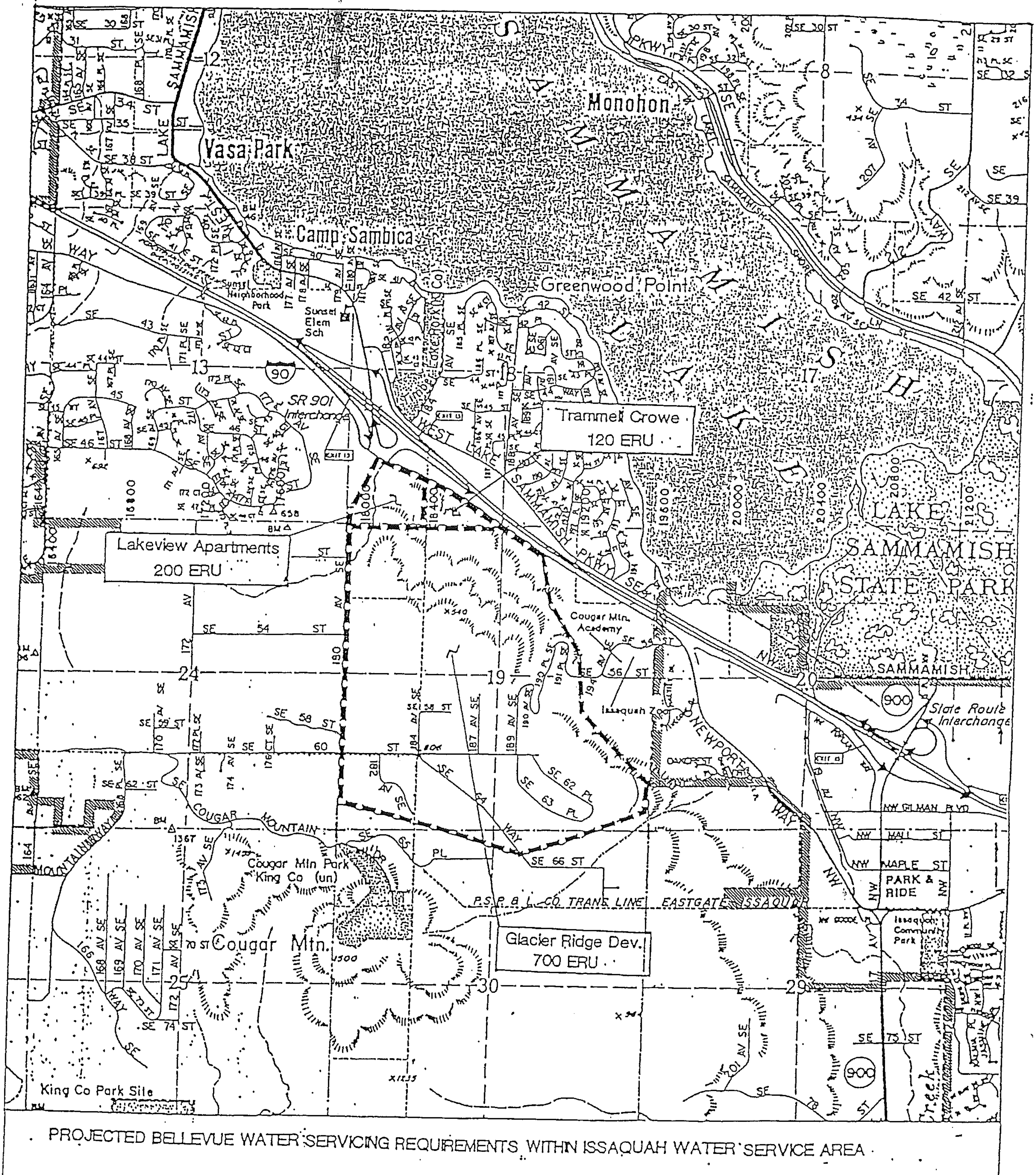
____
Assistant City Attorney

CITY OF ISSAQUAH

A J Culver

____

____
City Attorney



PROJECTED BELLEVUE WATER SERVICING REQUIREMENTS WITHIN ISSAQUAH WATER SERVICE AREA

April 19, 1989

EXHIBIT 1

EXHIBIT 2

LIST OF FACILITIES

1. Newport Pump Station Upgrade
2. 850 Pressure - 12" Transmission Main
3. 850 EL to 1150 EL Pump Station
4. 1150 Elevation 12" Transmission Main
5. 1150 Elevation Reservoir - 1.05 MG
6. 1150 Elevation - Issaquah 12" Transmission Main
7. Water Meter, Vault and Appurtenances

City of Bellevue • Post Office Box 90012 • Bellevue, WA • 98009 9013
Planning Department

Notice of Intent to Petition for Annexation

ANNEXATION High Park FILE NO. ANN 86-5

ASSESSED VALUE TOTAL AREA 448 acres

DECLARATION

I/We, the undersigned being the owners of real property within the area described which lies outside the corporate limits of the City of Bellevue, Washington, but contiguous thereto, having a value in excess of 10% of the total value of the said described area according to the assessed valuation for general taxation purposes, do hereby declare our intention to circulate a petition for annexation to the City of Bellevue. It is acknowledged that this petition may consist of multiple documents filed independently.

AUTHORIZATION

Name and signatures of all persons having interest in real property in the subject area whose consent is required by virtue of such interest to authorize the filing of this notice are attached hereto.

Exhibit 3

CITY OF BELLEVUE
STANDARD PETITION FORM

WARNING: Every person who signs this petition with any other than his true name, or who knowingly signs more than one of these petitions, or signs a petition seeking an election when he is not a legal voter, or signs a petition when he is not otherwise qualified to sign or who makes herein any false statement, shall be guilty of a misdemeanor.

1. NAME (print) East-West Partners SIGNATURE C. L. Madison
ADDRESS 1300 114th Ave S.E. Su. 108 Bellevue, Wa 98004 DATE 7/17/89
PROPERTY DESCRIPTION See Exhibit 1
(Section and tax lot number or subdivision and lot number)

2. NAME (print) ______ SIGNATURE ______
ADDRESS ______ DATE ______
PROPERTY DESCRIPTION ______
(Section and tax lot number or subdivision and lot number)

3. NAME (print) ______ SIGNATURE ______
ADDRESS ______ DATE ______
PROPERTY DESCRIPTION ______
(Section and tax lot number or subdivision and lot number)

4. NAME (print) ______ SIGNATURE ______
ADDRESS ______ DATE ______
PROPERTY DESCRIPTION ______
(Section and tax lot number or subdivision and lot number)

5. NAME (print) ______ SIGNATURE ______
ADDRESS ______ DATE ______
PROPERTY DESCRIPTION ______
(Section and tax lot number or subdivision and lot number)

6. NAME (print) ______ SIGNATURE ______
ADDRESS ______ DATE ______
PROPERTY DESCRIPTION ______
(Section and tax lot number or subdivision and lot number)

7. NAME (print) ______ SIGNATURE ______
ADDRESS ______ DATE ______
PROPERTY DESCRIPTION ______
(Section and tax lot number or subdivision and lot number)

Legal Description

PARCEL 1:

THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, EXCEPT THE SOUTHEAST QUARTER THEREOF.

PARCEL 2:

THE NORTH 2-1/2 ACRES OF THE EAST 400 FEET OF THE WEST 800 FEET OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON.

PARCEL 3:

BEGINNING AT A POINT 800 FEET EAST OF THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, AND RUNNING THENCE SOUTH 385 FEET; THENCE EAST 660 FEET; THENCE NORTH 385 FEET; THENCE WEST 660 FEET TO THE POINT OF BEGINNING; EXCEPT THAT PORTION THEREOF CONVEYED TO KING COUNTY, WASHINGTON FOR ROAD BY DEED RECORDED UNDER AUDITOR'S FILE NO. 1617973 AND EXCEPT THE PORTION THEREOF DEEDED TO KING COUNTY FOR ROAD BY DEED RECORDED UNDER AUDITOR'S FILE NO. 4678886.

PARCEL 4:

THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON.

PARCEL 5:

THAT PORTION OF THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF SAID NORTHEAST QUARTER OF THE SOUTHWEST QUARTER AND RUNNING THENCE EASTERLY ALONG THE SOUTHERLY LINE THEREOF, 140 FEET, MORE OR LESS, TO THE WESTERLY LINE OF THE PETER JOHNSON COUNTY ROAD NO. 1712; THENCE IN A NORTHERLY DIRECTION ALONG THE WESTERLY LINE OF SAID ROAD TO A POINT 60 FEET NORTH OF SAID SOUTHERLY LINE OF THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER; THENCE WESTERLY ON A LINE PARALLEL TO AND 60 FEET DISTANT FROM SAID SOUTHERLY LINE 140 FEET, MORE OR LESS, TO THE WEST LINE OF SAID NORTHEAST QUARTER OF THE SOUTHWEST QUARTER; THENCE SOUTH, ALONG SAID WEST LINE TO THE POINT OF BEGINNING.

PARCEL 6:

THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON; EXCEPT THE SOUTHEAST QUARTER OF SAID NORTHEAST QUARTER OF SOUTHWEST QUARTER; AND EXCEPT THAT PORTION THEREOF DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF SAID SUBDIVISION; THENCE EAST 140 FEET TO THE WEST LINE OF THE COUNTY ROAD; THENCE NORTH ALONG SAID LINE 60 FEET; THENCE WEST 140 FEET TO THE WEST LINE OF SAID NORTHEAST QUARTER OF THE SOUTHWEST QUARTER; THENCE SOUTH 60 FEET TO THE POINT OF BEGINNING; AND EXCEPT COUNTY ROAD NO. 1712, AND EXCEPT THAT PORTION PLATTED AS COUGAR GLEN, ACCORDING TO THE PLAT RECORDED IN VOLUME 105 OF PLATS, PAGE 78, IN KING COUNTY, WASHINGTON.

PARCEL 7:

THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON.

PARCEL 8:

THE WEST 3/4THS OF THE NORTH HALF OF THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SAID SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON.

PARCEL 9:

THAT PORTION OF THE EAST HALF OF THE EAST HALF OF THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, LYING NORTHEASTERLY OF THE CENTERLINE OF A PRIVATE ROADWAY 60 FEET WIDE; THE CENTERLINE OF WHICH BEGINS ON THE EAST LINE OF SAID SUBDIVISION 635 FEET NORTH OF THE SOUTHEAST CORNER THEREOF AND RUNS THENCE NORTH 77°21' WEST 45.5 FEET; THENCE NORTH 76°42' WEST 105.3 FEET; THENCE NORTH 73°05' WEST 94.3 FEET; THENCE NORTH 74°16' WEST 80.7 FEET; THENCE NORTH 56°40' WEST 12 FEET, MORE OR LESS TO THE WEST LINE OF SAID SUBDIVISION.

PARCEL 10:

THAT PORTION OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, LYING NORTHEASTERLY OF A LINE COMMENCING AT A POINT WHICH IS 126.5 FEET NORTH OF THE SOUTHEAST CORNER OF SAID SUBDIVISION; THENCE NORTH 45°49' WEST 68.6 FEET; THENCE NORTH 44°04' WEST 44.5 FEET; THENCE NORTH 52°37' WEST 38.4 FEET; THENCE NORTH 53°49' WEST 43 FEET; THENCE NORTH 47°31' WEST 44.2 FEET; THENCE NORTH 57°04' WEST 44.6 FEET; THENCE NORTH 69°29' WEST 41.9 FEET; THENCE NORTH 72°34' WEST 50.1 FEET; THENCE NORTH 78°24' WEST 60.6 FEET; THENCE NORTH 75°20' WEST 100.57 FEET; THENCE NORTH 78°32' WEST 120.8 FEET; THENCE NORTH 73°03' WEST 95.7 FEET; THENCE NORTH 80°22' WEST 97.9 FEET; THENCE NORTH 72°03' WEST 96.8 FEET; THENCE NORTH 74°11' WEST 99.8 FEET; THENCE NORTH 75°12' WEST 95.8 FEET; THENCE NORTH 76°24' WEST 104.5 FEET; THENCE NORTH 77°56' WEST 104.7 FEET; THENCE NORTH 77°21' WEST 57.5 FEET, MORE OR LESS, TO THE WEST LINE OF SAID SUBDIVISION.

PARCEL 11:

THE EAST 60 FEET OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER, EXCEPT THE SOUTH 30 FEET FOR ROAD; ALSO THE EAST 60 FEET OF THE EAST HALF OF THE WEST HALF OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER; EXCEPT THE SOUTH 30 FEET FOR ROAD, SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, AND EXCEPT FROM BOTH OF SAID 60 FOOT STRIPS, THAT PORTION LYING NORTHEASTERLY OF A LINE BEGINNING AT A POINT WHICH IS 126.5 FEET NORTH OF THE SOUTHEAST CORNER OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER; THENCE NORTH 45°49' WEST 68.6 FEET; THENCE NORTH 44°04' WEST 44.5 FEET; THENCE NORTH 52°37' WEST 38.4 FEET; THENCE NORTH 53°49' WEST 43 FEET; THENCE NORTH 47°31' WEST 44.2 FEET; THENCE NORTH 57°04' WEST 44.6 FEET; THENCE NORTH 69°29' WEST 41.9 FEET; THENCE NORTH 72°34' WEST 50.1 FEET; THENCE NORTH 78°24' WEST 60.6 FEET; THENCE NORTH 75°20' WEST 100.57 FEET; THENCE NORTH 78°32' WEST 120.8 FEET; THENCE NORTH 73°03' WEST 95.7 FEET; THENCE NORTH 80°22' WEST 97.9 FEET; THENCE NORTH 72°03' WEST 96.8 FEET; THENCE NORTH 74°11' WEST 99.8 FEET; THENCE NORTH 75°12' WEST 95.8 FEET; THENCE NORTH 76°24' WEST 104.5 FEET; THENCE NORTH 77°56' WEST 104.7 FEET; THENCE NORTH 77°21' WEST 57.5 FEET, MORE OR LESS, TO THE WEST LINE OF SAID SUBDIVISION.

PARCEL 12:

ALL OF THE NEW CASTLE 5 ACRE TRACTS, ACCORDING TO THE PLAT RECORDED IN VOLUME 8 OF PLATS, PAGE 56, IN KING COUNTY, WASHINGTON, EXCEPT TRACTS 26, 28, 29, 31 AND 32, AND EXCEPT THAT PORTION CONVEYED TO KING COUNTY FOR LAKEMONT BOULEVARD BY DEED RECORDED UNDER AUDITOR'S FILE NOS. 5821501, 7112290243 AND 7112290248.

PARCEL 13:

THE WEST 330 FEET OF THE NORTH 990 FEET OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 19, TOWNSHIP 24 NORTH, RANGE 6 EAST, W.M., IN KING COUNTY, WASHINGTON, EXCEPT PORTION CONVEYED TO KING COUNTY FOR LAKEMONT BLVD. UNDER AUDITOR'S FILE NO. 7112290303.

PARCEL 14:

THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 13, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON; EXCEPT THAT PORTION PLATTED AS EASTMONT HOME TRACTS, ACCORDING TO THE PLAT RECORDED IN VOLUME 57 OF PLATS, PAGES 90 AND 91, IN KING COUNTY, WASHINGTON; AND EXCEPT THAT PORTION PLATTED AS VUEMONT VISTA NO. 1, ACCORDING TO THE PLAT RECORDED IN VOLUME 121 OF PLATS, PAGES 52 THRU 55, INCLUSIVE, IN KING COUNTY, WASHINGTON.

PARCEL 15:

THAT PORTION OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH. RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, LYING NORTHERLY OF THE NORTHERLY MARGIN OF LAKEMONT BOULEVARD AS CONVEYED TO KING COUNTY BY AUDITOR'S FILE NO. 7110080297;

ALSO, THE NORTH 30 FEET OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, EXCEPT THE WEST 30 FEET OF SAID NORTHWEST QUARTER OF THE NORTHWEST QUARTER.

PARCEL 16:

THAT PORTION OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 24, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, LYING SOUTHERLY OF SOUTHERLY MARGIN OF LAKEMONT BOULEVARD AS CONVEYED TO KING COUNTY BY INSTRUMENT RECORDED UNDER AUDITOR'S FILE NO. 7110080297.

PARCEL 17:

TRACT 26, NEW CASTLE 5 ACRE TRACTS, ACCORDING TO THE PLAT RECORDED IN VOLUME 8 OF PLATS, PAGE 56, IN KING COUNTY, WASHINGTON.

EXHIBIT B

LAKEMONT TRIANGLE WHOLESALE AGREEMENT

ORIGINAL

AGREEMENT FOR WHOLESALE SANITARY SEWER AND WATER SERVICE

FROM
CITY OF BELLEVUE

TO
CITY OF ISSAQUAH SERVICE AREA

LAKEMONT TRIANGLE

WHEREAS: A sphere of influence agreement has been reached between the City of Bellevue (Bellevue) and the City of Issaquah (Issaquah) that outlines the limits of a future boundary between the Cities, and

WHEREAS: It is desirable that the Cities' future sanitary sewer and water service boundaries correspond with the Cities' future corporate limits, and

WHEREAS: Bellevue sewer and water facilities now exist and may be logically extended to provide adequate service to certain areas within Issaquah's service area (shown on Exhibit C and labeled as Lakemont Triangle), and

WHEREAS: Issaquah sanitary sewer and water facilities are currently a greater distance from the Lakemont Triangle service area, and

WHEREAS: An analysis of sanitary sewer and water service options for Issaquah to serve the Lakemont Triangle service area, concluded that the least cost alternative for sanitary sewer and water service would be through an agreement for joint use of sanitary sewer facilities and a wholesale water service agreement between Bellevue and Issaquah, and

WHEREAS: It is desirable to provide sanitary sewer and water service to the public in the least costly manner, consistent with jurisdictional boundaries, and

WHEREAS: It is recognized that water service to the Lakemont Triangle service area will not solve Issaquah's long term water needs and that other solutions will be needed to serve future growth demands.

AGREEMENT FOR WHOLESALE SANITARY SEWER & WATER SERVICE FROM CITY OF BELLEVUE TO CITY OF ISSAQUAH - LAKEMONT TRIANGLE

NOW, THEREFORE be it agreed by the Cities of Bellevue and Issaquah that:

1. This Agreement addresses the provision of wholesale sanitary sewer and water service to a limited area of Issaquah's service area. It is not the intent of this Agreement to address facilities that would be capable of serving any additional portion of Issaquah's service area. Such facilities would require a separate agreement.

2. Bellevue agrees to provide wholesale sanitary sewer and water service to Issaquah for the Lakemont Triangle service area only for sanitary sewer conveyance and for retail water distribution and sale in accordance with the terms of this Agreement.

3. The number of Multi-Family Units to be served within the area shall not exceed 600 unless it is mutually agreed that additional units may be served.

4. Bellevue shall supply water from a 12" diameter main on Newport Way at 17300 block. This 12" main will be new constuction by the City of Issaquah, and shall be extended from an existing 12" main located at approximately SE 42nd Place and SE Newport Way, west of the Lakemont Triangle. The estimated total length of new main will be 6350 feet. Issaquah shall be responsible for obtaining all necessary permits associated with the new 12" main. By executing this interlocal agreement, Bellevue agrees to endorse Issaquah's efforts to obtain the permits.

Ownership of the new water line from the point of connection to the existing Bellevue 12" main, shall be Issaquah's including that portion of the new main which will be within Bellevue jurisdictional boundaries. Bellevue shall not tap into Issaquah's 12" main without Issaquah's written approval. Such approval shall not be unreasonably withheld.

5. Bellevue shall provide a maximum fire flow of 2000 GPM measured at the intersection of Newport Way and 180th Ave. It is understood that the actual rate of flow at the point of use is dependent upon the hydraulic behavior of the distribution system between the connection point and the point of use and Bellevue therefore makes no representation with regard thereto.

6. Bellevue agrees that the wholesale water service it provides to Issaquah will meet the same standards of reliability, rate of flow and quality, that it provides to its retail service customers.

7. The Water Purveyor Contract between the City of Seattle and the City of Bellevue, Section II.B. Resale to Other Parties, requires written consent from Seattle prior to the execution of this Agreement.

Issaquah agrees, for the Lakemont Triangle service area, to abide by the standard terms and conditions that are imposed by the Seattle Water Department as well as those imposed by Bellevue, including but not limited to cross-connection controls, water quality testing, water conservation and other applicable standards and those terms and conditions are hereby incorporated by reference herein as if set forth in full. This Agreement does not convey purveyor status or water supply rights from the City of Seattle to Issaquah.

8. The basis for determining Issaquah's fair share of the water capital cost of facilities shall be mutually accepted engineering standards and cost estimates related to sizing of storage, pumping, distribution and transmission facilities as listed on Exhibit B.

9. All water supplied to the Lakemont Triangle service area by Bellevue shall be metered by individual service meters to all water users. The metering device(s) shall be owned by Issaquah and be periodically calibrated in accordance with manufacturer's specifications to quarantee accuracy. If, due to water quality, Issaquah needs to periodically flush its main, Issaquah shall install a metered flushing station to record consumptions.

10. Issaquah shall read the individual meters on a bi-monthly schedule. Issaquah shall submit a payment to Bellevue for water consumption. The water shall be charged at Bellevue's standard residential water rate.

11. Bellevue agrees to allow Issaquah to connect the Issaquah sewer main serving the Lakemont Triangle area, into an existing Bellevue sewer facility in the vicinity of SE Newport Way and Lakemont Blvd. (future). (See Exhibit C.)

12. Issaquah agrees to pay Bellevue for their fair share of the sewer facilities on West Lake Sammamish which must be upgraded to serve both the Lakemont Triangle area and proposed Bellevue needs. The basis for determining the fair share computations shall be mutually accepted engineering standards related to sizing of the sewage facilities. (See Exhibit A) Upgrading of existing sewer facilities will include approximately 6000 L.F. of sewer trunk at an estimated cost of $1,500,000.00 (1989 dollars).

Upgrading by Bellevue of the sewer facilities to meet additional capacity demands resulting from proposed Lakemont Triangle Development, and payment by Issaquah for its associated costs are conditional upon a signed commitment from the Developers to Issaquah. A signed commitment from the Developer will be required by Issaquah prior to building permit approval, which will include the portion for which the Developer must contribute toward the sanitary sewer upgrade. Failure by Developers to provide a signed commitment in a timely manner prior to finalization of plans to upgrade the Bellevue sewer, will result in the reduction of the sewer upgrade by Bellevue, shall release Issaquah from all monetary responsibility for that portion of the upgrade costs and Issaquah would not be able to connect to Bellevue's sewer facilities.

13. Bellevue shall construct, own and maintain all sanitary sewer facilities within its service area that are jointly used by Bellevue and Issaquah.

14. Bellevue agrees to bill and Issaquah agrees to pay a monthly user fee of $.87 per Multi-Family Unit per month for sewage conveyance capacity, after construction. This rate includes charges for maintenance and operation of the jointly used facilities in perpetuity and will not be subject to additional charges for maintenance and operation.

15. Bellevue and Issaquah agree that the sanitary sewer and water system improvements needed to serve the area are to be provided in response to development activity, hence the construction of the facilities is dependent upon Developer contributions and construction. Isssaquah's fair share of the capital cost of facilities to serve the area shall be provided from Developer cash contributions and/or Developer facility construction.

16. Issaquah shall construct, own and maintain all sanitary sewer and water facilities that are solely used for service to Issaquah, regardless of the location of the facilities.

17. Issaquah agrees to pay Bellevue's applicable general facilities fees for each Multi-Family Unit that is served. These fees will be collected by Issaquah on a unit by unit basis at the time that service is granted under Building Permit approval. An annual payment will be made to Bellevue representing the connection fees that were collected during the preceding twelve month period. The annual payment shall be made on or near December 31st of each year that new connections are added. A letter report shall accompany the payment, which include an accounting of the connections added during the year.

18. Bellevue agrees to obtain all necessary approvals and permits for serving and constructing the jointly used facilities.

19. Issaquah agrees to obtain all necessary approvals and permits for construction of the facilities that will solely serve Issaquah.

20. Dispute Resolution. Each City shall designate representatives for the purposes of administering this Agreement and resolving disputes arising from this Agreement. Each city shall notify the other in writing of its designated representatives. Each City may change its designated representatives on notice to the other.

Disputes that cannot be resolved by the representatives designated herein shall be referred to the Chief Executive Officer of each City for mediation and/or settlement. If not resolved by them within sixty (60) days, either City, or both of them, may file a demand for arbitration, in which event the issue shall be submitted to an arbitrator acceptable to both parties and the matter shall be arbitrated pursuant to the rules and procedures of the American Arbitration Association. The decision of the arbitrator shall be final and binding on both Cities.

21. Liability/Hold Harmless. Bellevue shall indemnify, defend, and hold harmless the City of Issaquah, its officers, agents and employees, from and against any and all claims, losses, or liability, including attorneys fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of Bellevue, its officers, agents and employees, in the performance of this Agreement. With respect to the performance of this Agreement and as to claims against Issaquah, its officers, agents and employees, Bellevue expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of Bellevue. This paragraph shall not apply to any damage resulting from the negligence of Issaquah, its agents and employees. To the extent any of the damages referenced by this paragraph were caused by or resulted from the concurrent negligence of Issaquah, its agents or employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of Bellevue, its officers, agents and employees.

Issaquah shall indemnify, defend and hold harmless the City of Bellevue, its officers, agents and employees, from and against any and all claims, losses, or liability, including attorneys fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of Issaquah, its officers, agents and employees, in the performance of this Agreement. With respect to the performance of this Agreement and as to claims against Bellevue, its officers, agents and employees, Issaquah expressly waives its immunity under Title 51 of the

Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of Issaquah. This paragraph shall not apply to any damage resulting from the negligence of Bellevue, its agents and employees. To the extent any of the damages referenced by this paragraph were caused by or resulted from the concurrent negligence of Bellevue, its agents or employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of Issaquah, its officers, agents and employees.

HEREBY AGREED TO AND ACCEPTED BY this the 19th day of April, 1990.

CITY OF BELLEVUE

Pam Bissonnette

____

Approved as to form:

Assistant City Attorney

52:50

CITY OF ISSAQUAH

Rowan C. Hinds

Mayor

Wayne Tanaka 3/14/90.
City Attorney

EXHIBIT A

COST ALLOCATION FOR SOUTH VASA PARK SEWER TRUNK

Issaquah will serve 600 Multi-Family Units (360 Equiv. Single Family Units) via a sewer pump station. Normally peak flow from 600 MF Units would be approximately 200 gpm, it is anticipated that the pump station will be sized for around 275 gpm, which is equivalent to 825 MF or 495 SF Units. For flow demand and determining Issaquah's share of the trunk costs, 495 Equiv. SF Units is being used for Issaquah. The total number of projected equivalent single family units in the South Vasa Trunk is 2009, including Issaquah.

1) Cost for constructing new trunk.

The estimated project cost is $1,567,000. Therefore, the cost per Equiv. SF Unit is $1,567,000/2009 = $780. **

2) Replacement and M&O costs.

Replacement cost = $1,560,000
Anticipated life of trunk = 75 years
Replacement cost per year = $1,560,000/75 = $20,800
Assume annual M&O cost = $1000

Total annual cost = $21,800

Issaquah's share = 495/2009 = 25%

Issaquah's cost per year = .25($21,800) = $5,450

Cost per MF unit per month = $5,450/600 SF units/12 months
= $0.75 per month

3) Additional cost for admin., insurance, liability, etc.
+15% = $0.12

TOTAL MONTHLY CHARGE PER MF UNIT PER MONTH = $0.87

** This is in 1989 dollars, interest will be added to the cost for connection made in future years.

EXHIBIT B

COST OF
SOUTH 520 ZONE REGIONAL FACITITIES

1) Estimated ultimate equivalent single family units

Ultimate Max. day demand (MDD) = 4.9 MGD
(1985 Water Comp. Plan, pg. 3-12)

Avg. Day Demand per capita = 80 gpcd
3.1 persons per SF unit
ADD per equiv. SF unit = 80 gpcd X 3.1 = 248 gpd
MDD = ADD X 2.4
MDD for equiv. SF = 248 gpd X 2.4 = 769 gpd
(All from 1986 Water Comp. Plan Amend., pg. 11 & 12)

Estimated ultimate SF units in South 520 Zone =
4,900,000 MGD / 769 gpd = 6372

2) Estimated replacement cost of existing regional facilities:

2MG Steel Reservoir	= $ 800,000	
3MG Concrete Reservoir	= $1,300,000	
*2 Supply Inlet Stations	= $1,350,000	(60% = $810,000)
*8500 lf - 24" Pipe	= $1,490,000	(60% = $894,000)
*9400 lf - 16" Pipe	= $1,175,000	(60% = $705,000)
*17200 lf - 12" Pipe	= $1,720,000	(60% = $1032,000)
TOTAL	= $5,541,000	

* These facilities provide service to other areas, therefore, only 60% will be allocated to the South 520 Zone.

Estimated depreciation of the facilities:
Reservoirs
age 13 years - expected useful life 100yrs
depreciation = 13/100 = 13%

Inlets - new no depreciation

Pipe
avg age 16 years - expected life 75yrs
depreciation = 16/75 = 21%

Depreciation value
Reservoirs = $2,100,000 X .13 = $273,000
Pipes = $3,441,000 X .21 = $722,000

TOTAL FACILITIES REPLACEMENT COSTS MINUS DEPRECIATION
$5,541,000 - $995,000 = $4,546,000

ESTIMATED COST PER EQUIVALENT SF UNIT = $4,546,000 / 6372
= $715

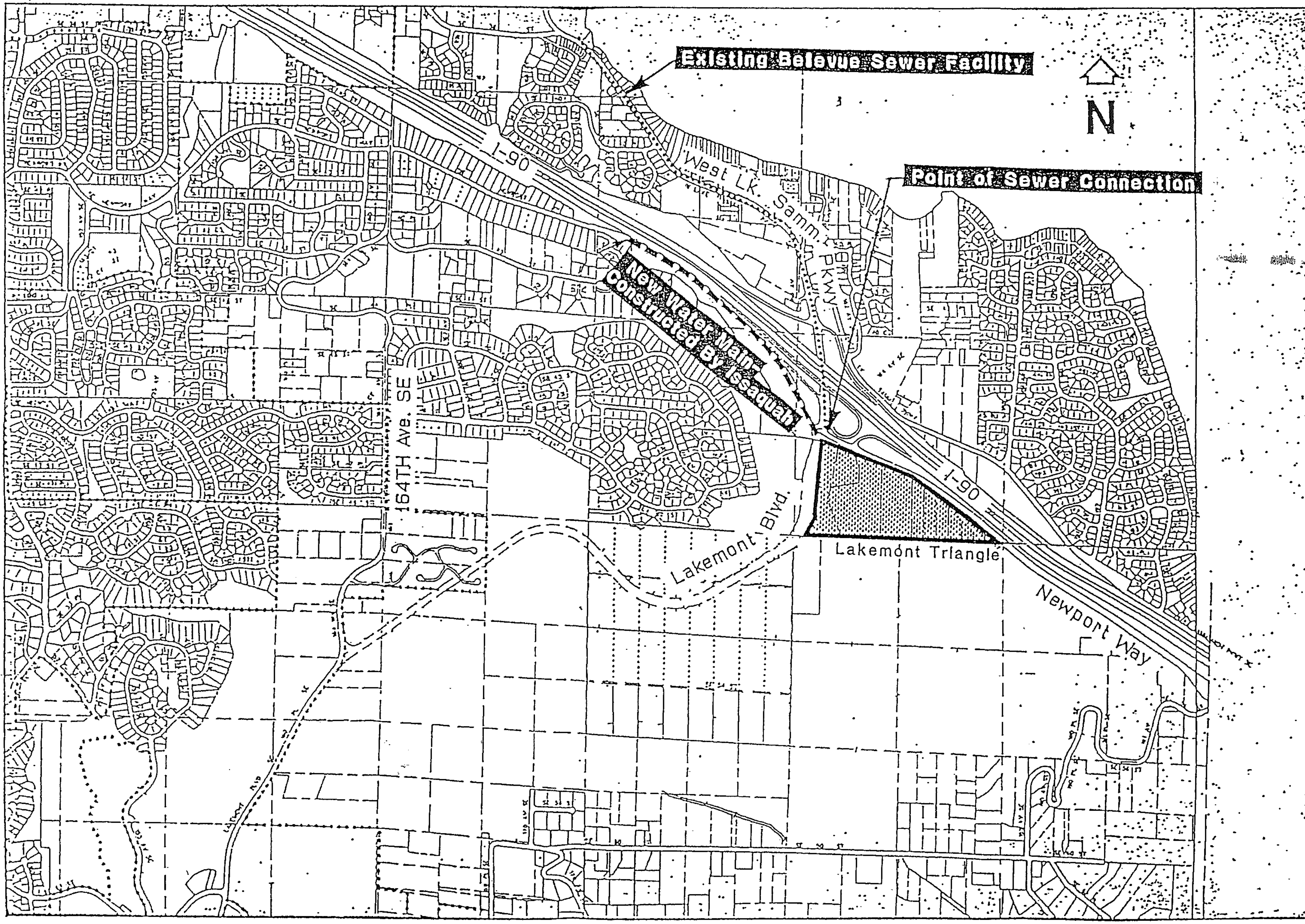

Existing Belevue Sewer Facility
N
Point of Sewer Connection
I-90
West LK. Samm. PKWY
New Water Main Constructed By Issaquah
164TH Ave. SE
Lakemont Blvd.
Lakemont Triangle
Newport Way

Exhibit C

EXHIBIT C

DESCRIPTION OF REGIONAL FACILITIES AND OPERATIONAL STANDARDS

GENERAL DESCRIPTION:

The "Issaquah Regional Facilities" include the following:

- Water pipelines, valves, fittings, thrust restraint, and surface restoration from a point of connection on 163rd and Newport Way to a point of connection at the Holly Street Pump Station and the future First Ave Pump Station.

- Flow metering facilities at the point of connection on 163rd and Newport Way, at the Holly Street Pump Station, and at the First Ave Pump Station.

- Pressure control facilities (including pressure stabilization, pressure reducing and pressure increasing) at the point of connection at the Holly Street Pump Station and at the future First Ave Pump Station.

- Flushing facilities that are not yet located, but that will be adjacent to the pipeline somewhere between 163rd and Newport Way and the Holly Street Pump Station.

Flow control facilities located at the Holly Street Pump Station and the future First Ave Pump Station and automatic control and telemetry facilities necessary to comply ~~with the~~ demand metering charge provisions of this contract.

The "Generalized Bellevue System Improvements," include the following. The generalized improvements to Bellevue's Water Utility System listed below may be constructed as part of the facilities necessary to provide water to Issaquah under this Agreement.

- Approximately 300 feet of 16-inch diameter watermain.

- Pressure reducing valve station.

- Pump station.

- Zone disconnect.

- Meter improvements at the Eastgate Inlet.

OPERATIONAL STANDARDS:

Minimum Hydraulic Gradient: A minimum hydraulic gradeline of 520 feet will be maintained at the point of connection with the Bellevue Water System at 163rd and Newport Way. The datum for this elevation will be the overflow elevation in the Newport Reservoir (520'). This minimum hydraulic gradeline will be accomplished either by Seattle operational change(s) or by Issaquah constructing a pump station at 163rd and Newport Way which after construction will be owned and operated by Bellevue.

Maximum Flowrate: Seattle will not be obligated to sell to Bellevue nor will Bellevue be obligated to sell to Issaquah volumes of water which exceed the Qa or Qi as specified in Section 2.1 of this Amendment. These flow rates may be exceeded during emergencies if supply is available from Bellevue and Seattle.

Demand Charge Compliance: Bellevue is obligated to maintain demand metered flowrates in accordance with their Purveyor Contract with Seattle (Appendix III-H). Issaquah will operate the aggregate of the Issaquah meters within the same "Demand Charge" operating limitations. The limitations are summarized below:

The "Demand Factor" for the aggregate of the Issaquah Water Meters is determined by dividing the greatest "fifteen minute average flowrate" by the "twenty-four hour average flowrate" of the same day. A "day" for the purposes of this calculation commences at nine a.m. and ends at nine a.m. the following calendar day. The fifteen-minute average flowrate is the average rate of flow over a fifteen-minute period. The fifteen-minute period starts on the hour and ends fifteen minutes later and then at subsequent fifteen-minute intervals. The twenty-four hour average flow is the average flowrate from 9:00 a.m. to 8:59 a.m. the following day.

The ten maximum flow days for the aggregate of the Issaquah meters will be used to determine the average demand factor for demand charge compliance. The average demand factor is the average of the demand factors of the ten maximum flow days for the aggregate of the Issaquah meters.

Issaquah will be responsible for a demand charge when the average demand factor exceeds 1.3.

Issaquah will pay demand charge fees if Issaquah exceeds the 1.3 demand charge threshold and if Seattle imposes demand charge fees on Bellevue. If Issaquah exceeds the demand charge threshold (1.3) but Bellevue is not charged or does not exceed the threshold because of lower flowrates in their own meters, Issaquah will not pay a demand charge. If both Bellevue and Issaquah exceed the demand charge threshold, Issaquah will pay its fair share of the charge using the demand charge computation methods in the Bellevue Purveyor Agreement.

Issaquah will set it's flowrate by 8:00 a.m. each day and communicate the flowrate setpoint to Bellevue.

EXHIBIT D

LETTER FROM SEATTLE PUBLIC UTILITIES TO BELLEVUE

City of Seattle
Paul Schell, Mayor

Seattle Public Utilities
Diana Gale, Director

March 10, 1999

Mr. Lloyd Warren
Utility Director
City of Bellevue
P.O. Box 90012
Bellevue, WA. 98009-9012

RE: Amendment of wholesale water service agreement between Bellevue and Issaquah

Dear Mr. Warren:

I have received the final version of the amendment to the Wholesale Water Service Agreement from the City of Bellevue to the City of Issaquah. Based on the content therein and on the premise that this amended agreement will be adopted by both the City of Issaquah and the City of Bellevue in its current form, I hereby approve of this amended agreement. Thank you for the work you and your staff have contributed to the timely resolution of Issaquah's water supply needs.

Sincerely,

Diana Gale

Diana Gale
Director

CASCADE JOINT MUNICIPAL UTILITY SERVICES AGREEMENT (2012)

CITY OF ISSAQUAH
Department of Public Works/Engineering
PO Box 1307 / Issaquah, WA 98027
(425) 837-3400 Fax (425) 837-3409

Memorandum

To: Elaine Kraft
Cascade Water Alliance

From: Darcey Strand
Shared Service

Date: July 10, 2012

Re: CWA Joint Municipal Utility Services Agreement

Elaine, the signed contract is attached. Sorry for the delay in process. We hope to receive a copy of the recorded document on completion of the process.

Thanks again.

2012-285

Contract Routing No.

Signature Routing Form

YES	NO	REQUIRED (If "No" provide explanation)
☐	☐	BUSINESS LICENSE PRINTOUT w/City (*if sole proprietor or partnership see box below–must have DOR form*)
☐	☐	DEPARTMENT OF RETIREMENT (DOR) FORM –
☐	☐	BOND & RETAINAGE – REQUIRED ON ALL PUB
☐	☐	CERTIFICATE OF INSURANCE & ADDITIONAL INS
☐	☐	PUBLIC WORKS SPECIFIC- LARGE OR SMALL JOBS (b
☐	☐	ARCHITECT/ENGINEER SERVICES – Shared Procu
☐	☐	W-9 FORM (original to AP, no need to keep copy in clerk's files)
☐	☐	CC'd to Finance (bill of sale, right of way, deeds, property transfer, new construction, loaned items, donations, art work, etc.)

Please return ORIGINAL countersigned or recorded et to Clerk's for official files as soon as you receive it.

APPROVALS (*routing order–pass to next person*)

On form	RISK MANAGEMENT (*LOG IN*)
N/A	CITY ATTORNEY
N/A	PAYROLL –if req- ATTACH DOR form
ORB 7/3/12	FINANCE DIRECTOR
7/3/12	MAYOR
7/10/12	CITY CLERK (*LOG OUT*)

RECORDING

w/ KING COUNTY ☒ YES ☐ NO DATE:

INTERLOCALS / WEB ☐ YES ☒ NO DATE:

DISTRIBUTION (w/DATES)

CITY CLERK FILES ______

CONTRACTING PARTY C/O DEPT ______

ORIGINATING DEPT ______

n/a ☐ For SWR projects, written call-around documentation ... 5 for $35-199k) – **OR** - a copy of the Shared Procurement Portal "advertisement for bid" and subsequent results ***must be attached*** – *along with* copy of Shared Procurement Portal website showing contractor listed on Roster.

n/a ☐ For formal bids, bid summary and copy of bid announcement, and bond/retainage - ***must be attached.***

PWE CONTRACT # N/A **This is an agreement to:** ☐ Receive Funds ☐ Disburse Funds ■ Other

PWE Project Number(s) / Name(s) with Amounts: n/a

Contracting Entity: Cascade Water Alliance

Date Original Contract Signed By Contracting Party 4-10-12 **Number of Original Document(s) provided:** 2

Contact Person at Above Entity: Chuck Clark **Phone:** 425-453-1555

Official Title of Doc Attached (*not dept name for it*): CWA Joint Municipal Utility Service Agreement

Summary Purpose of Document: This document ratifies the March 28, 2012 amendments to the CWA Joint Municipal Utility Service Agreement.

Effective Date(s) of Document: From: 6-4-12 **To:** Withdrawal **Change Order/Addendum #** n/a

Originating Department: Public Works Engineering **Staff Person:** Sheldon Lynne **Phone** 3426

- **Total *City* Funding for this Contract** (*even if zero*): $ 0
- **Total *Non-City* Funding for this Contract** (*even if zero*): $ 0
- **Total Overall *Project* Budget** (for entire project - not just City portion or this single contract total): $ 0

Agenda Bill #/Date Approved (if City Council authorization needed – do not submit before approval) #16396 6/4/12

Cost Accounting Review: Geri Hogan **Date:** 6/27/12 Commit Authority Reqd ■ Mayor ☐ Dir

Originating Dept Director Approval: (*Signature*) Sheldon Lynne

DATE ACTUALLY SENT INTEROFFICE from Department for contract processing: 6/28/12

S:\CONTRACT & AGREEMENT PROCESSING\Forms\AGREEMENT PROCESSING FORM_PWE Version Only_rev 8-11.doc

CITY OF ISSAQUAH
Christine Eggers
City Clerk
P.O. Box 1307
Issaquah, WA 98027-1307
Phone: (425) 837-3000
Fax: (425) 837-3009

NOA 12-22

NOTICE OF ACTION
ISSAQUAH CITY COUNCIL

June 26, 2012

TO: Cascade Water Alliance
520 112th Ave. NE Suite 400
Bellevue, WA 98004

RE: Ratification of Cascade Water Alliance Joint Municipal Utility Service Agreement

AGENDA BILL NO: AB 6396

DATE OF ACTION: June 4, 2012

ACTION TAKEN: Council ratified the March 28, 2012 Cascade Water Alliance Joint Municipal Utility Services Agreement and authorized the Mayor to execute the agreement.

ATTACHMENTS: Agreement

Deanne Meinberg
Deanne Meinberg, Deputy City Clerk

cc: Sheldon Lynne, Public Works Director
File

After recording, return to:

Van Ness Feldman GordonDerr
2025 First Avenue, Suite 500
Seattle, Washington 98121
(206) 382-9540

WASHINGTON STATE RECORDER'S Cover Sheet (RCW 65.04)

DOCUMENT TITLE(S) (or transactions contained therein):

CASCADE WATER ALLIANCE JOINT MUNICIPAL UTILITY SERVICES AGREEMENT

REFERENCE NUMBER(S) OF DOCUMENTS ASSIGNED OR RELEASED:

N/A

☐ Additional reference #s on page ___ of document(s)

GRANTOR(S) (Last name first, then first name and initials)

CASCADE WATER ALLIANCE/MEMBERS OF CASCADE WATER ALLIANCE

☐ Additional names on page ___ of document

GRANTEE(S) (Last name first, then first name and initials)

CASCADE WATER ALLIANCE/MEMBERS OF CASCADE WATER ALLIANCE

☐ Additional names on page ___ of document

LEGAL DESCRIPTION (abbreviated: i.e., lot, block, plat or section, township, range)

N/A

☐ Additional legal is on page ___ of document

ASSESSOR'S PROPERTY TAX PARCEL/ACCOUNT NUMBER

N/A

☐ Assessor Tax # not yet assigned

Cascade Water Alliance
Joint Municipal Utility Services Agreement
March 28, 2012

TABLE OF CONTENTS

CASCADE WATER ALLIANCE

JOINT MUNICIPAL UTILITY SERVICES AGREEMENT

RECITALS

A. WHEREAS, the Members of Cascade Water Alliance ("Cascade") entered into an Interlocal Contract ("**Interlocal Contract**"), effective April 1, 1999, and amended and restated on December 15, 2004, and on October 26, 2011. Under the Interlocal Contract, Cascade was created as a public body and an instrumentality of its Members, which exercised essential governmental functions on its Members' behalf as authorized by the Interlocal Cooperation Act (Chapter 39.34 RCW), and has been functioning as a watershed management partnership, as authorized by RCW 39.34.200. Cascade was incorporated as a public nonprofit corporation in the manner set forth in the Nonprofit Miscellaneous and Mutual Corporations Act (Chapter 24.06 RCW).

B. WHEREAS, Section 3.3 of the Interlocal Contract provides that Cascade may be converted into a separate municipal corporation if and as permitted by law, and that upon the creation of such a separate municipal corporation, all Cascade rights and obligations and all Member rights and obligations shall transfer to that new municipal corporation. Section 10.4 of the Interlocal Contact provides that "upon a 65 percent Dual Majority Vote (ratified within 120 days by 65 percent), as measured by Dual Majority Vote of the Members' legislative authorities, all assets, liabilities, and obligations of Cascade may be transferred to any successor entity (including, without limitation, a joint operating agency or other municipal corporation, as permitted under state law), and all obligations of Members and parties contracting with Cascade become obligations to the successor entity." Cascade's Board resolutions also reserved Cascade's right to convert into a municipal corporation.

C. WHEREAS, the Washington Legislature enacted the Joint Municipal Utilities Services Act, (Chapter 258, Laws of 2011), codified as Chapter 39.106 RCW ("the Act"), which provides in RCW 39.106.080 for the conversion of existing an intergovernmental entity formed under the Interlocal Cooperation Act (Chapter 39.34 RCW) into a joint municipal utility services authority under the Act, if:

- The public agencies that are parties to an existing interlocal agreement would otherwise be eligible to form an authority to provide the relevant utility services;
- Those public agencies amend, restate, or replace that interlocal agreement so that it materially complies with the requirements of RCW 39.106.050;
- The amended, restated, or replacement agreement is filed with the Washington state secretary of state consistent with RCW 39.106.030; and
- The amended, restated, or replacement agreement expressly provides that all rights and obligations of the entity formerly existing under Chapter 39.34 RCW or other applicable law will thereafter be the obligations of the new authority created under Chapter 39.106 RCW.

D. WHEREAS, under the Act, upon compliance with the requirements set forth in Recital C above, the new joint municipal utility services authority shall be a successor of the former intergovernmental entity for all purposes, and all rights and obligations of the former entity shall transfer to the new joint municipal utility services authority. Those obligations shall be treated as having been incurred, entered into, or issued by the new joint municipal utility services authority, and those obligations shall remain in full force and effect and shall continue to be enforceable in accordance with their terms.

E. WHEREAS, in accordance with Sections 3.3 and 10.4 of the Interlocal Contract, Cascade's Members (who are all public agencies that are parties to an existing interlocal agreement) are otherwise eligible to form a joint municipal utility services authority under the Act to provide the relevant utility services.

F. WHEREAS, Cascade's Members intend to amend and restate the Interlocal Contract in compliance with the Act in order to convert Cascade into a joint municipal utility services authority.

G. WHEREAS, Cascade's Members intend to transfer all Cascade rights, assets, liabilities, and obligations to the joint municipal utility services authority, to be created as provided herein.

H. WHEREAS, Cascade's Members intend that, as a joint municipal utility services authority, it will constitute a municipal corporation and will no longer function as a watershed management partnership.

NOW, THEREFORE, it is agreed by Cascade Members as follows:

ARTICLE 1. Agreement.

Effective upon approval by 65 % Dual Majority Vote of the Board (as ratified within one hundred and twenty (120) days of such Dual Majority Vote by 65% Dual Majority of the Members' legislative authorities) the Interlocal Contract is hereby amended and restated as provided herein under the authority of the Act and shall be known as the Cascade Water Alliance Joint Municipal Utility Services Agreement.

ARTICLE 2. Definitions.

"Act" means the Joint Municipal Utilities Services Act, codified as Chapter 39.106 RCW, or as hereafter amended.

"Agreement" means this Joint Municipal Utilities Services Agreement.

"Asset Transfer Agreement" means an agreement between Cascade and a Member by which the Member transfers title to Water Supply Assets to Cascade, with or without monetary consideration, to be operated and maintained as part of the Cascade Water Supply System.

"Authority" means a joint municipal utility services authority formed under the Act and the successor in interest to Cascade as an interlocal agency.

"Authorized Issuer" means either: (a) Cascade (or a successor entity); or (b) a Member or other entity authorized to issue Bonds for the benefit of Cascade approved by Resolution of the Board.

"Board" means the Board of Directors of Cascade.

"Bonds" means short-term or long-term bonds, notes, warrants, certificates of indebtedness, or other obligations issued by, or on behalf of Cascade.

"ByLaws" means the ByLaws of Cascade, as adopted and amended by the Board.

"Cascade" means Cascade Water Alliance, a joint municipal utilities services authority.

"Cascade ERUs" ("CERUs") means equivalent residential units, calculated according to the Regional Capital Facilities Charge Methodology.

"Cascade Supply Date" means the date, established by a Resolution of the Board for each Member upon which Cascade undertakes a Supply Commitment.

"Demand Share" means either a Member's current share of water provided through the Supply System, or estimated share of water to be provided through the Supply System, whether Full Supply or Interruptible Supply, expressed in millions of gallons per day. Demand Share is calculated according to the Rate Calculation Methodology.

"Dual Majority Vote" means Board approval of a proposal on the basis of a simple majority of all Members, allowing one vote per Member, together with a simple majority of all Members on the basis of each Member's Weighted Vote. A "simple majority" means a majority of all Members of Cascade, not just the Members present and voting.

"65% Dual Majority Vote" means Board approval of a proposal on the basis of a 65% supermajority of all Members, allowing one vote per Member, together with 65% supermajority of all Members on the basis of each Member's Weighted Vote. A "supermajority" means 65% of all Members of Cascade, not just the Members present and voting.

"Gross Cascade Revenue" means all of the earnings and revenues received by Cascade from any source whatsoever including but not limited to: (a) Member Charges; (b) revenues from the sale, lease or furnishing of commodities, services, properties or facilities; (c) the receipt of earnings from the investment of money in any maintenance fund or similar fund; and (d) withdrawals from any rate reserve or rate stabilization fund or account.

However, Gross Cascade Revenue shall not include: (a) principal proceeds of Bonds or any other borrowings, or earnings or proceeds from any investments in a trust, defeasance or escrow fund created to defease or refund obligations relating to the Water Supply System (until commingled with other earnings and revenues included in Gross Cascade Revenue) or held in a special account for the purpose of paying a rebate to the United States Government under the Code; (b) taxes and other income and revenue which may not legally be pledged for revenue bond debt service; (c) improvement district assessments; (d) federal or state grants allocated to capital projects; (e) payments under Bond Insurance or other credit enhancement policy or device; (f) insurance or condemnation proceeds used for the replacement of capital projects or equipment; (g) earnings in any construction fund or bond redemption fund; (h) deposits to any rate reserve or rate stabilization fund or account; or (i) any revenues generated by any Independent Supply except those amounts that are payable to Cascade pursuant to this Agreement or another agreement.

"Independent Supply" or **"Independent Supplies"** means a Member's Water Supply Assets that are not part of the Supply System.

"Joint Municipal Utilities Services Act" or **"Act"** means Chapter 39.106 RCW, or as hereafter amended.

"Member" or **"Members"** means one or more member agencies of Cascade.

"Member Charges" means all payments that Cascade Members are required by this Agreement to make to Cascade, including but not limited to all Rates and Charges, RCFCs, dues, assessments and other payments from Members.

"Net Cascade Revenue" means Gross Cascade Revenue less Operations and Maintenance Costs.

"Non-Member" means any person or agency that is not a party to this Agreement.

"Operations and Maintenance Costs" or **"O&M Costs"** means all expenses incurred by Cascade to operate and maintain the Supply System in good repair, working order and condition, including without limitation, payments made to any other public or private entity for water or other utility service. Except as approved by the Board, Operations and Maintenance Costs shall not include any depreciation, capital additions or capital replacements to the Supply System.

"Rates and Charges" means the rates and charges (not including RCFCs) chargeable to each Member using the Rate Calculation Methodology plus any late payment or other charge that may be due.

"Rate Calculation Methodology" means the method of setting Rates and Charges adopted by the Board in accordance with Section 7.5

"Regional Capital Facilities Charges" (**"RCFCs"**) means the charges to each Member for new CERUs connected to that Member's water distribution system.

"Regional Capital Facilities Charge Methodology" (**"RCFC Methodology"**) means the method of determining the RCFCs adopted by the Board in accordance with Section 5.5.

"Satellite Systems" means water supply facilities identified as such by the Board, including but not limited to facilities that serve a portion of a Member's customers but that are not part of the Member's main water system.

"Shortage Management Plan" means the plan adopted by the Board in accordance with Section 7.3.1.

"Supply Commitment" means the obligation undertaken by Cascade, established by Resolution of the Board to supply water to a Member. With respect to Members, that obligation shall be characterized as **"Full Supply Commitment,"** or an **"Interruptible Supply Commitment"** defined as follows:

"Full Supply Commitment" or **"Full Supply"** for any or all of a Member's water needs means that those needs, as projected in the Cascade Water Supply Plan and as agreed to by that Member, shall be met from the Supply System, net of Independent Supply and subject to the other limitations established in this Agreement, on an equal parity with all other Full Supply Commitments, and with a guaranteed priority no lower than for any other Supply Commitment made by Cascade; provided that no Member is guaranteed any given amount of supply or capacity.

"Interruptible Supply Commitment" or **"Interruptible Supply"** means a supply of all or part of a Member's water needs from the Supply System on an as-available basis on a lower priority than any Full Supply Commitment.

The Supply Commitment for a Member shall be defined by this Agreement, the terms and conditions of membership, and the Supply Commitment resolution.

"Supply System" or "Water Supply System" means the Water Supply Assets owned or controlled by Cascade.

"Water Supply Assets" means tangible and intangible assets usable in connection with the provision of water supply, including without limitation, real property, physical facilities (e.g., dams, wells, treatment plants, pump stations, reservoirs, and transmission lines), water rights, capacity and/or contractual rights in facilities or resources owned by other entities, and investments in conservation programs and facilities.

"Watershed Management Plan" means any Watershed Management Plan that existed on the effective date of the Authority which shall be considered a plan of the Authority.

"Water Supply Plan" or "Cascade's Water Supply Plan" means the Cascade's Regional Water Supply Plan adopted by the Board as provided in Section 8.1.

"Weighted Vote" means a vote in which each Member's vote is counted according to the Member's Demand Share, but no Member shall have a Weighted Vote of less than one.

ARTICLE 3. Formation of Entity; Purpose and Powers.

Section 3.1 Formation. Effective on the date of filing of this Agreement with the Washington state secretary of state, Cascade shall be a joint municipal utility services authority formed under the Act; and is the successor for all purposes to the former Cascade created under the Interlocal Contract as an intergovernmental entity existing under the laws of Chapter 39.34 RCW; and is no longer functioning as a watershed management partnership. All rights and obligations of the former intergovernmental entity are transferred to Cascade, the new Authority, which obligations shall be treated as having been incurred, entered into, or issued by Cascade, the successor, and those obligations (including without limitation, outstanding Bonds issued by the former Cascade) shall remain in full force and effect and shall continue to be enforceable in accordance with their terms.

Cascade Water Alliance, as a joint municipal utility services authority, is a municipal corporation.

Section 3.2 **Membership.** Subject to restrictions on future Cascade water rights, or to limitations upon place of use of water supply imposed by contract or permit, any city, town, county, water-sewer district, public utility district, other special purpose district, municipal corporation, or other unit of local government of this or another state that provides utility services, and any Indian tribe recognized as such by the United States government (or as may be allowed by amendments to the Act) may be admitted as a member of Cascade. The decision to admit new Members rests with the sole discretion of the Board, which shall determine whether to extend a membership offer taking into consideration the audit findings (as described in this Section 3.2), Cascade water resources, and any other factors the Board deems advisable.

When an entity that is eligible for membership under the Act, applies for membership, Cascade shall conduct a water supply audit according to the methodology and within the period determined by the Board. Audit results shall be provided to the Board and to the applicant.

If a membership offer is extended, it shall address the nature of the Water Supply Assets being transferred or retained and the "value" of those assets in terms of the calculation of an applicant's Demand Share, RCFCs and other matters relating to the rights and obligations of the applicant and Cascade, which must be recorded in the form that the Board determines and which will constitute, along with this Agreement, the conditions under which an applicant becomes a Member of Cascade. An applicant for membership shall be admitted by adoption of a Resolution of the Board accepting the application for membership and incorporating the terms and conditions of membership.

Each membership application must be accompanied by a nonrefundable application fee based on the estimated cost of the audit and other costs related to the admission of a new Member or a request for new supply. The Board shall set the application fee for each applicant based on the estimated cost of processing the application, including the cost of the audit.

As a condition of membership, each new Member admitted to Cascade shall, in addition to any other applicable fees, rates, charges or assessments, pay to Cascade the membership fee, as established by the Board.

If an applicant's planning process or plans are materially out of compliance with the requirements of applicable state law, the Board may condition an offer of membership upon the applicant's compliance with that state law.

Section 3.3 **Purposes.** Cascade's purposes include those related to water resources, or any other utility service as allowed under the Act, as authorized by a unanimous vote of the Board, and do not include the provision of other general services to the public, and are to:

a. provide a safe, reliable and high quality drinking water supply to meet the current and projected demands of Cascade Members, and for non-Members as determined by Cascade, and to carry out this task in a coordinated, cost-effective, and environmentally sensitive manner;

b. develop, contract for, manage, acquire, own, maintain and operate Water Supply Assets, including without limitation, surface water supplies, groundwater supplies, reclaimed water supplies, and other water supply resources as determined by the Board;

c. purchase and provide water supply, transmission services, treatment facilities and other related services;

d. provide conservation programs to promote the wise and efficient use of resources;

e. carry out emergency water supply and shortage management programs for its Members when demands exceed available supply;

f. coordinate and plan cooperatively with other regional or local water utilities and other entities to maximize supply availability and to minimize system costs;

g. develop a Water Supply Plan addressing the needs of Cascade and its Members and Cascade itself and develop a regional water supply plan with other water providers as Cascade may find convenient or necessary to meet regional, state and federal planning requirements, and to take a leadership role in developing and coordinating those supply plans;

h. share costs and risks among Members commensurate with benefits received; and

i. carry out, or to further other water supply purposes that the Members determine, consistent with the provisions of this Agreement.

Section 3.4 **Powers.** To further its purposes, Cascade has the full power and authority to exercise all powers authorized or permitted under the Act and any other laws that are now, or in the future may be, applicable or available to Cascade and to engage in all activities incidental or conducive to fulfill the purposes set forth in Section 3.3 of this Agreement, including but not limited to the authority to:

a. acquire, construct, receive, own, manage, lease and sell real property, personal property, intangible property and other Water Supply Assets;

b. operate and maintain facilities;

c. enter into contracts;

d. administer personnel matters in a manner generally consistent with the laws applicable to a code city (population over 20,000), to the extent applicable and with discretion left to the Authority, to the fullest extent otherwise permitted by law, related to the appointment, removal and/or compensation of officers, the establishment and/or administration of employee health and welfare benefit programs, and/or the establishment and/or administration of civil service/merit systems, retirement benefits/systems, and/or pension benefits/systems;

e. sue and be sued;

f. exercise all powers of eminent domain granted under Chapter 8.12 RCW and other applicable statutes (e.g. Chapter 8.25) , now or as hereafter amended;

g. impose, alter, regulate, control and collect rates, charges, and assessments;

h. purchase and sell water and services within and outside the geographical boundaries of its Members;

i. borrow money (through its Members or other entities at their individual discretion or as authorized by the Act and this Agreement now or as hereafter amended), or enter into other financing arrangements;

j. lend money or provide services or facilities to any Member, other governmental water utilities, or governmental service providers;

k. invest its funds;

l. establish policies, guidelines, rules or regulations by either ByLaws or resolution to carry out its powers and responsibilities;

m. purchase insurance, including participation in pooled insurance and self-insurance programs, and indemnify its Members, its Board of Directors and Alternate Board Members, officers and employees in accordance with law;

n. exercise all other powers within the authority of, and that may be exercised individually by all of its Members with respect to water supply, conservation, reuse, treatment and transmission, or any of the other purposes set forth in Section 3.3;

o. exercise, without limitation, all other corporate powers that Cascade may exercise under the law relating to its formation and that are not inconsistent with this Agreement or the Act or other applicable law;

p. for the purposes of contracting and public works, exercise all powers of a code city (population over 20,000) under RCW 35A.40.200 - 35A.40.210, now or as hereafter amended;

q. for disposal of surplus property, exercise all powers granted under RCW 35A.11.010, now or as hereafter amended, to code cities;

r. in the event Cascade charges connection charges or Rates and Charges for services supplied or available to its customers' property on a retail basis, exercise all powers granted under RCW 57.08.081, now or as hereafter amended, for the establishment of liens; and

s. for purposes of a Cascade code of ethics, exercise all powers of a municipal corporation and observe the requirements under Chapter 42.23 RCW, now or as hereafter amended.

ARTICLE 4. Organization Structure; Board.

Section 4.1 Composition, ByLaws and Meetings. Cascade is governed by a Board of Directors consisting of one individual representative appointed by Resolution by each of the Member's legislative authority. Members may similarly appoint Alternate Board Members. Each Board Member and each Alternate Board Member must be an elected official of the Member.

The Board shall adopt ByLaws consistent with this Agreement that specify, among other matters, the month of Cascade's Annual Meeting, Board powers and duties and those of the Executive Committee, Standing Committees, Officers and employees.

The Board shall meet as required by the ByLaws, but not less than quarterly.

Section 4.2 Powers of the Board. The Board has the power to take all actions on Cascade's behalf in accordance with voting provisions set forth in Section 4.3. The Board may delegate or assign to the Executive Committee or to specific Cascade Officers or employees any action that is not expressly reserved to the Board under this Agreement.

Section 4.3 Voting. All Board actions must be approved by Dual Majority Vote of all Members, except where this Agreement requires either a 65% Dual Majority Vote, as provided in Sections 4.7, 5.5, 7.3, and 7.5; or ratification by the Members' legislative authority, as provided in Sections 9.3 and 9.4 and Article 10. The Board may act by voice votes, as set forth in the ByLaws. Any Member may require a recorded tabulation of votes either before or immediately after a voice vote is taken. Although voting is, in part, based on Weighted Vote, the Members expressly agree that there is only one class of voting membership, and voting occurs within that single class.

Any Member that has been declared to be in default of its obligations under this Agreement by the Board shall lose its right to vote until the Board has declared the default to be cured.

Section 4.4 Officers and Committees. Cascade Officers shall include a Chair, a Vice Chair, a Secretary, and a Treasurer. The Chair serves as the chair of the Board (and may be known as the "President", if the ByLaws so designate) and performs those duties set forth in the ByLaws.

The Vice Chair shall perform the duties of the Chair in the Chair's absence and shall perform other duties as set forth in the ByLaws. The Secretary shall be responsible for Cascade records and perform other duties as set forth in the ByLaws. The Treasurer shall be responsible for Cascade accounts and financial records and perform other duties as set forth in the ByLaws.

Consistent with the provisions of this Agreement, the Board may, in the ByLaws, establish additional Officers and set forth their duties.

The Board may create and appoint Members to Standing Committees and special committees as it deems appropriate. Committee Members need not be elected officials or employees of Members, but Standing Committee Chairs must be Board Members or Alternate Board Members.

Section 4.5 Executive Committee. The Chair, Vice Chair, Secretary, and Treasurer shall constitute Cascade's Executive Committee. The Chair (or acting Chair) shall vote on matters before the Executive Committee only if necessary to break a tie. The Executive Committee's duties and responsibilities are set forth in the ByLaws. The Executive Committee shall not have the power to:

a. approve any contract for a term longer than three (3) years;

b. approve any contract involving expenditure by, or revenue to Cascade in excess of such amounts and under such circumstances as set forth in the ByLaws;

c. retain or dismiss the chief executive officer or determine the chief executive officer's compensation; or

d. take any actions expressly reserved to the Board by this Agreement or the ByLaws.

The Executive Committee shall have the authority, if necessary, to avoid default on any Bond, to withdraw from any capital reserve fund or rate stabilization fund, an amount equal to the amount necessary to avoid a default and to authorize payment of that amount to avoid default.

Section 4.6 Staff, Consultants and Contractors. Cascade staff shall consist of a chief executive officer and other positions established by resolution of the Board. The Board shall appoint, designate the title of, and establish the compensation range of the chief executive officer. The Board shall hire auditors for Cascade. The chief executive officer may hire all other staff and consultants, and those appointments may be subject to ratification by the Board or the Executive Committee if the ByLaws so provide. The Board may also provide that administrative, professional or technical services be performed by contract.

Section 4.7 Budget; Dues; Financial Management. The Board shall approve a budget for each fiscal year, determining Cascade's revenues and expenditures no later than sixty (60) days before the beginning of the fiscal year in which that budget will be in effect. The budget shall be developed and approved according to a schedule established by the ByLaws. The budget must identify the levels of Member Charges on which revenue projections are based. The Board may amend the budget.

Each Member shall pay dues to defray part or all of Cascade's administrative costs based on the number of CERUs served by its water system, regardless of water usage or capacity, and regardless of whether those units are served by the Supply System or by Independent Supply. Total administrative dues collected from all Members may not exceed nine percent (9%) of Cascade's revenue requirement. This limit may be amended in the budget by a 65% Dual Majority Vote of the Board. The Board may establish minimum dues per Member and may provide that less than all of a Member's CERUs be taken into account in establishing dues.

All Cascade books and records shall be open to inspection by the Washington State Auditor.

The Board shall approve, by Resolution, the treasurer of Cascade, which may be the treasurer or chief finance officer of any Member, or the treasurer of any Washington county in which any Member is located; or, if the total number of utility customers of all of the Members of Cascade is greater than two thousand five hundred (2,500), the treasurer may be an officer or employee of Cascade (or as may be allowed by amendments to the Act).

ARTICLE 5. Asset Development and Supply Commitment.

Section 5.1 Property Acquisition, Ownership and Disposition. Cascade may construct, purchase, rent, lease, manage, contract for, or otherwise acquire and dispose of Water Supply Assets and other assets. Cascade may control and manage both the assets it owns and the assets that are owned by Members that have transferred control and management of those assets to Cascade. This Agreement does not vest in Cascade any authority with respect to Members' other facilities or assets, such as Water Supply Assets retained by Members as Independent Supply.

Subject to Cascade's agreement, a Member may transfer to Cascade its title to, or operational control and management of Water Supply Assets. Water Supply Assets may also be fully retained by Members as Independent Supply, subject to the provisions of Article 6. At the discretion of the Board, Cascade may accept title to, or operational control and management of Water Supply Assets offered by Members or accept supply assets that constitute all or part of a Member's Satellite System(s). The Board may accept supply assets subject to the terms and conditions arranged between Cascade and the Member, based on the result of the audit process and mutual needs.

Cascade may enter into Asset Transfer Agreements which shall provide for the terms and conditions of: (a) Cascade's operation of the transferred Water Supply Asset with respect to the Member transferring the asset; (b) Cascade's operation, maintenance and replacement of the Water Supply Asset as part of the Supply System; (c) return or disposition of the Water Supply Asset if Cascade terminates its existence or the Member withdraws; (d) continuation of service (if appropriate) to Members or former Members by the Member receiving the Water Supply Asset at reasonable rates and charges or payment to Cascade of the cost of replacing the Water Supply Asset; and (e) such other conditions as the Board and the Member agree upon.

Subject to Cascade's agreement, a Member that transfers title or operation, control and/or management to Cascade of any Water Supply Asset shall be deemed to also transfer, assign and/or convey the franchises, if any, associated with that Water Supply Asset.

Members shall not be deemed to hold legal ownership rights in any Water Supply Assets owned by Cascade whether those Water Supply Assets have been developed by, purchased by, or transferred to Cascade, and regardless of the accounting treatment of RCFC payments and other payments made to Cascade.

Section 5.2 Supply Commitment

Section 5.2.1 Commitment to Members.. Beginning on the Cascade Supply Date, Cascade shall provide a Supply Commitment to each Member. Cascade shall provide a Full Supply Commitment to a Member that joins with Water Supply Assets sufficient to provide for its needs during the following fifteen (15) years (whether or not those Water Supply Assets are transferred to Cascade or retained as Independent Supply.)

Any Full Supply Commitment shall be subject to water shortages, to Cascade's ability to implement the Water Supply Plan, and to the portion of the Member's needs that can be served by the audited capacity of its Independent Supply. If the needed supply is not available, the shortage shall be shared by all the Members in accordance with Cascade's Shortage Management Plan, except as otherwise provided in Section 5.5. Cascade shall be obligated to provide water supply to the entire service area of each Member (as that service area is defined in terms under which the Member is admitted or as in the

Member's adopted and approved Water System Plan as of the Effective Date of this Agreement), whether or not some of that service area is within the Member's current jurisdictional boundaries and/or within the current urban growth boundary. Cascade is not obligated to provide water supply to service area expansions in or outside the urban growth boundary, unless Cascade agrees to such expanded service area. Cascade is not obligated to provide increased water supply to any Member if it is determined that the Member's planning process or plans are materially out of compliance with the requirements of applicable state law.

A Member that joins with Water Supply Assets insufficient to provide for its needs for fifteen (15) years receives the Full Supply it desires only if, when, and to the extent it is available within reliability standards determined by Cascade's system reliability methodology. If sufficient Full Supply is not available within reliability standards determined by Cascade's system reliability methodology, the Member receives partial Full or Interruptible Supply, and Full Supply must be provided within fifteen (15) years. Cascade shall then undertake to include in Cascade's Water Supply Plan, and to acquire the facilities or other assets necessary in the Board's determination to provide for the identified deficit. If Cascade fails to develop sufficient assets to timely provide the increased Full Supply, the commitment becomes a Full Supply Commitment at the end of that fifteen-(15) year period, and any shortage shall be shared by all Members in accordance with Cascade's Shortage Management Plan.

If multiple Members request new Full Supply, requests must be honored in the order received (i.e., in the order in which application is made accompanied by the application fee). With respect to new Members, requests for Full Supply "vest" no earlier than the date that membership is effective. In cases of conflict or ambiguity, the Board may determine the order of requests.

Section 5.2.2 Additional Rules for Members Retaining Independent Supply. Members are not required to share shortages resulting from the loss of all or part of Independent Supply, although Cascade may make Interruptible Supply available to a Member that loses Independent Supply at prices that are consistent with the price of Interruptible Supply being made available to others at that time. Cascade may at any time and at its cost and expense carry out audits of a Member's Independent Supply.

A Member requesting an additional Full Supply Commitment due to loss of Independent Supply shall make that request by Resolution of the requesting Member's legislative authority. When and as determined by the Board, the Member shall pay an amount equal to the RCFCs allocable to the number of CERUs that can be served by the replacement supply provided or to be provided by Cascade. Cascade shall then include the supply in its Water Supply Plan, and provide the supply when it becomes available, but in any event within fifteen (15) years. If, within fifteen (15) years the supply is not available, Cascade's commitment becomes a Full Supply Commitment and any shortage with respect to that supply must be shared by all the Members in accordance with the Shortage Management Plan, except as otherwise provided in Section 7.3.

Section 5.3 Financing of Assets. The acquisition of new capital facilities and other Water Supply Assets may be financed using RCFCs, transfers or Water Supply Assets, Rates and Charges, the issuance of revenue Bonds and such other sources as the Board may deem appropriate.

Section 5.3.1 Issuance of Bonds. An Authorized Issuer may issue Bonds payable from and secured solely by all or a portion of Net Cascade Revenue, evidencing indebtedness up to an amount approved by Resolution for the Board in order to provide financing or refinancing to acquire, construct, receive, own, manage, lease or sell real property, personal property, intangible property and other Water Supply Assets, to establish debt service reserves, to provide for capitalized interest and to pay the costs of issuance of, and other costs related to the issuance of the Bonds. Such Bonds shall be payable solely from all or a portion of the Net Cascade Revenue or (if the Authorized Issuer is other than Cascade) from payments to be made by Cascade out of all or a portion of Net Cascade Revenue, and such Bonds shall not pledge the full faith and credit or taxing power or, except as expressly provided by contract, the revenue, assets or funds of any Member.

Members serving as Authorized Issuers may conduct the financing through "separate systems" permitted by their applicable bond resolutions, or in some other appropriate manner, and Cascade may compensate those Members for all costs associated with the financing. Bond-related documents of Authorized Issuers other than Cascade must expressly permit the Bonds to be refunded or prepaid without penalty prior to their stated maturity, on and after such dates as are approved by the Authorized Issuer and the Board, to allow for a transfer of the obligation to Cascade or to Cascade's successor entity, including without limitation, a joint operating agency or similar entity, as may be permitted by law.

Section 5.3.2 Pledge of Revenues. For as long as any Bonds payable from Net Cascade Revenue (or any portion thereof) are outstanding, Cascade irrevocably pledges to establish, maintain and collect all Member Charges in amounts sufficient to pay when due the principal of and interest on the Bonds (and, if the Authorized Issuer is other than Cascade, in addition to the foregoing pledge, to pledge to make timely payments to that Authorized Issuer for the payment of principal of and interest on the Bonds), together with amounts sufficient to satisfy all debt service reserve requirements, debt service coverage requirements, and other covenants with respect to the Bonds.

Each Member hereby irrevocably covenants that it shall establish, maintain and collect rates, fees or other charges for water and other services, facilities and commodities related to the water supply it receives from Cascade and/or its water utility at levels adequate to provide revenues sufficient to enable the Member to: (a) make the payment required to be made under this Agreement; and (b) pay or provide for payment of all other charges and obligations payable from or constituting a charge or lien upon such revenues. Each Member hereby acknowledges that this covenant and its covenant in Section 7.9 of this Agreement may be relied upon by Bond owners, consistent with this Agreement.

Each Member shall pay the Member Charges imposed on it whether or not the Water Supply Assets to be financed through the issuance of Bonds are completed, operable or operating, and notwithstanding the suspension, interruption, interference, reduction or curtailment in the operation of any Water Supply Assets for any reason whatsoever, in whole or in part. Member Charges shall not be subject to any reduction, whether by offset or otherwise, and shall not be conditioned upon the performance or nonperformance of any Member, or of any entity under this or any other agreement or instrument. However, credits against future RCFCs and Rates and Charges described in Sections 5.5 and 7.5, respectively, for development or addition of excess capacity that is either transferred to Cascade or retained as Independent Supply, shall not be considered "offsets" or "reductions" for the purposes of this Section.

If, in connection with the issuance of obligations, any Member establishes a new lien position on revenues relating to its water utility, that Member shall covenant in the relevant documents that the amounts to be paid to Cascade as Member Charges shall be treated either: (a) as part of that Member's internal operation and maintenance costs payable prior to debt service on those obligations; and/or (b) for any portion of those Member Charges that is allocable to capital costs, as a contract resource obligation payable prior to debt service on those obligations. If any Member has existing outstanding revenue obligations relating to its water utility, it shall include substantially similar "springing covenants" in the documents relating to any new parity obligations.

Section 5.3.3 Continuing Disclosure. To meet the requirements of United States Securities and Exchange Commission ("SEC") Rule 15c2-12(b)(5) (the "Rule") as applicable to a participating underwriter for any Bonds and any obligation of each Member as an "Obligated Person" under the Rule, Cascade and each Member agree to make an appropriate written undertaking, respectively, for the benefit of holders of the Bonds consistent with the requirements of the Rule.

Section 5.3.4 Preservation of Tax Exemption for Interest on the Bonds. Each Member covenants that it will take all actions necessary to prevent interest on tax-exempt Bonds from being included in gross income for federal income tax purposes, and it will neither take any action nor make or permit any use of proceeds of tax-exempt Bonds or other funds treated as proceeds of those Bonds at any time during the term of those Bonds that will cause interest on those Bonds to be included in gross income for federal income tax purposes.

Section 5.3.5 Additional Certificates. Each Member further agrees to provide such certificates or verifications as are reasonably requested by an Authorized Issuer in connection with the issuance of Bonds under this Section.

Section 5.4 Supply System-Development. Cascade must provide for Supply System development to meet the needs of additional water customers of Members, subject to consistency with applicable state law, Cascade's Water Supply Plan, orderly asset development, reasonable cost and financing capacity. The Board shall establish a water supply development process, including criteria governing the evaluation of new projects, and that process must promote equality of costs and services (other than direct local services), regardless of geographic location. The results of the water supply planning process must be reflected in Cascade's Water Supply Plan. The Board shall have the authority to undertake new projects identified in Cascade's Water Supply Plan for the expansion of Water Supply Assets and regional transmission system extensions to meet Members' projected needs. To reduce costs, Cascade may, to the extent that the Board deems advisable, enter into agreements with Members to wheel water through their existing systems. When facilities are constructed that are used partially by Cascade for wheeling water and partially by Members or other entities for their purposes, the Board may determine an appropriate Cascade contribution to the cost of those facilities. Existing arrangements among Members (and between Members and Non-Members), in place when a Member joins Cascade, remain unaffected except as otherwise agreed between Cascade and the other entities concerned.

Section 5.5 Regional Capital Facilities Charges. To allocate growth costs to those Members that require capacity increases, each Member shall pay to Cascade an RCFC for each new CERU connected to its water distribution system. Growth in water usage by existing CERUs is not subject to RCFCs unless that growth constitutes a CERU increase as provided in the RCFC Methodology. Members with a supply deficit must pay an RCFC commensurate with that deficit. To the extent that a Member transfers to Cascade or retains an Independent Supply water supply in excess of its needs, it receives a corresponding credit against future RCFCs.

A new Member with adequate supply shall commence paying RCFCs fifteen (15) years prior to the date that its Water Supply Assets are projected to be insufficient to provide for its needs as determined by the Board (taking into consideration the results of the Water Supply Audit).

A Member that joins with Water Supply Assets that are projected to be insufficient to provide for its needs for fifteen (15) years shall immediately pay RCFCs for the number of CERUs representing the deficit as determined by the Board.

RCFCs shall be calculated according to the RCFC Methodology, which shall define the analytical steps required to calculate the RCFCs according to the average unit cost of past construction of the existing system plus the Supply System improvements planned at the time of the calculation. The methodology shall provide for an annual escalator, recalculation and update not less frequently than every fifth year, and a methodology for determining CERUs. The RCFCs shall be imposed on the Member for each new CERU of that Member in accordance with the terms of this Agreement. Amendments to the RCFC Methodology shall require a 65% Dual Majority Vote.

If a Member owns Water Supply Assets or transfers Water Supply Assets to Cascade under Section 5.1, to the extent the audited capacity of those assets exceeds the Member's needs, that Member shall receive a credit against future RCFCs. If a Member seeks to transfer assets substantially in excess of its foreseeable needs, Cascade may negotiate appropriate compensation arrangements for the transfer.

Members that develop new Independent Supply that is approved by the Board in accordance with Article 6, similarly receive a credit effective when the Independent Supply is placed in service as determined by the Board.

A Member that accepts ownership of a Satellite System that Cascade agrees to serve shall pay an RCFC for the amount of supply needed to serve that system in excess of its rated capacity.

Members that experience a net reduction in the number of CERUs served shall receive a CERU-for-CERU credit against future RCFCs.

RCFC credits may not be transferred among Members without Board approval.

Members shall not be required to pass RCFCs to their customers as capital facilities charges, but may provide for the payment of RCFCs in whatever manner they deem appropriate.

For Members joining with an unmet net supply need, Cascade may, under circumstances determined by the Board, require the prepayment of RCFCs allocable to the full amount of the requested supply, e.g., when funds are needed to begin the construction of facilities immediately.

Section 5.6 Transfer Upon Mergers, Consolidations and Assumptions. If: (a) two or more Members merge or consolidate; (b) a Member or a Non-Member assumes jurisdiction of part or all of a Member; or (c) a Member assumes jurisdiction of part or all of a Non-Member, the jurisdictions' water supply rights from and obligations to Cascade shall be transferred or assumed under applicable law and consistent with the requirements of this Agreement and the obligations of Cascade.

ARTICLE 6. New Independent Supply.

Members may not bring new Water Supply Assets on-line as Independent Supply without Board approval. That approval may be granted or denied following an evaluation process, based on whether the Board determines that development of the proposed Independent Supply will benefit or be adverse to the interests of the Members as a whole. Recognizing that in certain circumstances the acquisition of additional Independent Supply might benefit (or cause no material harm to) the Members, new supplies under one (1) MGD may be approved by the Board regardless of the provisions of the Water Supply Plan and without a formal evaluation process. New supplies in amounts greater than one (1) MGD must be described in and be consistent with the Water Supply Plan.

Members that have invested in the development of new Independent Supply assets may offer to sell their interest in such assets to Cascade. Cascade may, in its sole discretion and subject to mutually agreeable terms and conditions, purchase the Member's interest in such Independent Supply asset by reimbursing or otherwise compensating the Member for its investment in the project to the extent that investment has been capitalized. Once Cascade has purchased a Member's interest in a project, the project will be considered a Water Supply Asset of Cascade and will be incorporated into the Water Supply Plan.

ARTICLE 7. Asset Management.

Section 7.1 Supply System Management. Cascade is responsible for managing, on behalf of all Members, the Supply System. Cascade is not responsible for managing Independent Supply unless it has expressly agreed to do so. Supply System management responsibilities shall be governed by Cascade's system management plan adopted by the Board. Cascade's system management plan concerns, without limitation, matters such as daily system operations and maintenance, interface with other supply providers, contractual obligations, water quality, billing, management and administration. Cascade may delegate and/or contract out its Supply System responsibilities.

Cascade must manage the Supply System in compliance with applicable laws, regulation, and Cascade's minimum service standards.

Section 7.2 Conservation. Cascade shall develop and carry out, and Members must participate in, water conservation programs that are uniform among Members. The Board shall develop and implement a Cascade conservation management plan that provides a mandatory base conservation program that functions to reduce both average and peak demands and may establish a charge or assessment to fund development and implementation of the program. Members may implement additional conservation programs. The Board may adopt wholesale charges in addition to normal Demand Share charges to encourage resource conservation. The Board may also provide or contribute to additional local conservation programs that are not offered to all Members, and these local programs may be locally funded or funded by Cascade. Members that fail to comply with base programs as set forth in Cascade's conservation management plan may be required to assume a disproportionate reduction in water supply or to pay penalty charges, or both.

Section 7.3 Shortages and Emergency.

Section 7.3.1 Shortages. Members must respond to water shortages in a collective, shared fashion under a Cascade Shortage Management Plan adopted by the Board. Resources must be shared in a manner that reduces the risk of severe shortages to each Member. Cascade's Shortage Management Plan may include without limitation, a definition and classification of shortages, a shortage contingency plan including mandatory programmatic actions among all Members in the event of shortages, allocation of authority for determining and responding to shortages, and a communications and outreach program for the public. Members shall not be required to implement Cascade's Shortage Management Plan in areas not served by the Supply System.

In the event of shortages, Cascade shall reduce or halt Interruptible Supply before invoking the Shortage Management Plan with respect to all Members with a Full Supply Commitment. However, the Board may, by 65% Dual Majority Vote, continue service in the amounts it deems appropriate to one or more Members receiving Interruptible Supply.

The Board may require that Members failing to comply with mandatory shortage management programs implemented under Cascade's Shortage Management Plan assume a disproportionate reduction in supply or pay penalty charges, or both.

In the event of a Cascade-wide water shortage, Members with Independent Supply may, without penalty, decline to participate in the shortage management program for that shortage by foregoing all supply from Cascade for the duration of the emergency or shortage.

To avoid shortages resulting from emergencies or the inability to develop sufficient supplies, the Board may, by 65% Dual Majority Vote, establish moratoria on connections or additional commitments for future water services by the Members. A moratorium may be discontinued by a Dual Majority Vote of the Board.

Section 7.3.2. Emergency. The Board shall include in Cascade's Shortage Management Plan policies and procedures for addressing short-term disruptions of water supply, transmission or water quality, and it may delegate to the chief executive officer authority to address such disruptions according to such policies and procedures.

Section 7.4 Water Quality.

In addition to agreements under 5.1 of this Agreement,-Cascade shall be responsible for water quality that meets or exceeds all federal or state requirements at the point of delivery from Cascade to the Member, consistent with applicable laws and regulations. Cascade assumes source water quality responsibility and liability with respect to Water Supply Assets under its ownership or control (including water wheeled to a Member through another Member's facilities). Cascade is also responsible for preparing and carrying out water quality activities compatible with the water quality requirements of regional water suppliers integrated with Cascade's system (e.g., Tacoma, Everett, and Seattle).

Cascade may, in its sole discretion, determine and adjust the appropriate method and level of treatment of water that it supplies, so long as that water meets applicable state and federal requirements. If water that it supplies meets those requirements, Cascade shall not be obligated to adjust the method or level of treatment so that the water can be more readily blended with a Member's Independent Supply or more readily transmitted through a Member's internal system. Each Member shall remain responsible for water quality within its respective distribution system, assuming that adequate water supply quality is provided by Cascade at the point of delivery from Cascade.

Each Member shall be responsible for all costs related to making water supplied by Cascade compatible with that Member's internal system, including but not limited to, costs of additional treatment.

Section 7.5 Water Supply Rates and Charges. The Board shall set Rates and Charges according to a Rate Calculation Methodology adopted from time to time by the Board. The Rate Calculation Methodology for Members' Supply Commitment shall provide for the definition and calculation of Demand Shares and for a uniform pricing structure with a commodity charge and fixed charges allocated by Demand Share.

Cascade may sell water to a Non-Member under terms and conditions established by a 65% Dual Majority Vote of the Board. Revenue received from the sale of water to Non-Members shall be used to offset or reduce Rates and Charges to Members to the extent practicable, except that such revenue need not be treated as reducing or offsetting those amounts that are necessary for the payment of debt service on Bonds and for the provision of reserve and coverage requirements for the Bonds.

A Member shall be assigned a Demand Share based on the Board's best estimate of capacity to be used by that Member. The Demand Share shall be established based on an audit of that Member's past three (3) years of water use. After three (3) years as a Member, the baseline demand and capacity obligation for that Member shall be fixed based on actual experience as a Member. A specific Demand Share may be set by the Board to account for circumstances, such as (by way of example and not by limitation) costs of extending the Supply System to a Member, or when Independent Supplies affect regional demand patterns. When water supply from Cascade is wheeled through a Member to another Member, Cascade may presume that the first Member receiving the water is the "User" for calculation of Demand Shares unless the Members concerned instruct Cascade to use a different allocation. Rate credits for Water Supply Asset transfers are not deducted in the calculation of Demand Shares but are applied to reduce what a Member would otherwise pay.

The Board must set Member Charges at levels it determines to be sufficient, together with other available revenue sources, to provide adequately for Operation and Maintenance Costs, Bond debt service, coverage and other covenants, replacement and renewal of facilities, reserve, and other costs that the Board deems appropriate. The Board may provide that a Member's failure to participate in the planning process may result in penalty charges.

A Member that has transferred Water Supply Assets shall receive a credit, determined when those assets are audited and transferred, based on the useful life of those facilities and on the Member's use of the water produced by those assets or an amount of water equivalent to the amount of supply from them.

The Board may implement wholesale charges (additional to Demand Share-based charges and variable commodity charges) to reduce extreme peak use (e.g., "peaking-off of the pipe").

Water Rates and Charges must be the same for all Members receiving the same class of service (subject to credits, surcharges and penalty charges).

Section 7.6 Franchises and Easements. Except to the extent otherwise required by state law, each Member shall provide franchises and rights of way on, under or across that Member's streets or other property, to Cascade and to other Members for Water Supply Assets, without charging any fees, rent or charges other than the customary and usual right-of-way permit and inspection fees.

Section 7.7 Sales of Water to Non-Members. Unless approved by the Board, a Member shall not sell water supplied by Cascade, nor shall a Member sell Independent Supply offset by water supplied by Cascade to a Non-Member. Notwithstanding the foregoing, any Member may sell water supplied by Cascade to a Non-Member to the extent required by a contract in effect as of the date the Member joins Cascade.

Section 7.8 Payment Procedures; Default; Step-Up Provisions.

Section 7.8.1 Invoice and Payment.

(a) Cascade shall provide each Member with periodic invoices showing the Member Charges payable by that Member for the billing period and the due date. Invoices shall be provided monthly or on other such periodic schedule as determined by the Board, but no more frequently than monthly nor less frequently than once every six months. The Board will determine a due date for all invoices.

(b) Payment of any and all invoices shall be due and payable on or before the due date, and shall be made by wire transfer or such other means as are agreed to by Cascade and the Member. If a treasurer, trustee, fiscal agent or escrow agent is appointed in connection with the issuance of Bonds, Cascade may require, and specify on the invoice, that certain amounts be provided directly to that person or entity, and the Member shall pay those amounts in the manner and to the person so specified.

(c) If full payment of any invoice is not received on or before the due date, such payment shall be considered past due and a late payment charge shall accrue for each day that the invoice remains unpaid. The late payment charge shall equal the product of the unpaid amount and an interest rate established by the Board. Late payment charges shall continue to accumulate until the unpaid amount of the invoice and all late payment charges are paid in full. Further, if an invoice or any portion thereof remains unpaid for more than sixty (60) days after the due date, Cascade may pursue any legally available remedy at law or equity for the unpaid amount, including without limitation, specific performance and collection of the late payment charge. Cascade's right to enforce payments in this regard may be assigned to a treasurer, trustee, credit enhancement provider or other entity. Furthermore, upon written notice, Cascade may reduce or suspend delivery of water until the invoice and late payment charges are paid.

(d) If any Member disputes all or any portion of an invoice, it shall notify Cascade immediately upon receipt. If Cascade does not concur, the Member shall remit payment of the invoice in full, accompanied by written notice to Cascade indicating the portions of the invoice that the Member disputes and the reasons for the dispute. The Member and Cascade shall make a good faith effort to resolve such dispute. If the Member fails to remit payment of the invoice in full pending resolution of the dispute, the prevailing party in an action relating to the collection of that invoice shall be entitled to reasonable attorney fees and costs.

Section 7.8.2 Default and Step-Up.

(a) If any Member fails to make any payment in full for more than fifty (50) days past the due date, Cascade shall make written demand upon that Member to make payment in full within ten (10) days of the date that the written demand is sent by Cascade. If the failure to pay is not cured within the ten (10) day period, the Member shall be deemed to be in default.

(b) Upon an event of default as described in subsection 7.8.2(a), the other Members shall pay Cascade (in addition to Member Charges otherwise due) the defaulting Member's Member Charges in proportion to each remaining Members' Demand Share in accordance with a schedule established by Resolution of the Board.

(c) The payment of a proportionate share of the existing defaulted Member's Member Charges by Members shall not relieve the defaulting Member of its liability for those payments. Cascade shall have a right of recovery from the defaulting Member on behalf of each Member. Cascade may commence such suits, actions or proceedings at law or in equity, including but not limited to, suits for specific performance, as may be necessary or appropriate to enforce the obligations of this Agreement against any defaulting Member. Cascade's right to enforce payments in this regard may be assigned to a treasurer, trustee, credit enhancement provider or other entity. Amounts recovered by Cascade as payment of amounts due shall be passed through to each Member in proportion to the share that each assumed, in cash or in credit, against future Member Charges as the Board shall determine.

(d) The prevailing party in any such suit, action or proceeding, shall be entitled to recover its reasonable attorney fees and costs.

ARTICLE 8. Planning.

Section 8.1 Water Supply Plan. Cascade must plan for its Members' water supply needs. That planning shall be compatible with the equivalent planning responsibilities of other wholesale water providers and with state, county and city planning responsibilities under state law. The Board must adopt, and may from time to time amend, a Water Supply Plan that must be based on no less than a twenty- (20) year planning horizon. Cascade shall coordinate its planning effort with local and regional utilities and other appropriate agencies and work to encourage cooperative region-wide planning and coordination.

Each Member shall actively participate in Cascade's water supply planning and shall provide to Cascade accurate data regarding its facilities and operations together with good faith estimates of future needs and a description of any involvement in the development of new Independent Supplies. Each Member's water comprehensive or system plan shall be consistent with any plans adopted by Cascade, and shall be consistent with applicable requirements of state law and comprehensive plans.

Section 8.2 Watershed Management Plan. Upon the effective date of formation of the Authority under Article 3 of this Agreement, Cascade will no longer be a Watershed Partnership under RCW 39.34; and any Watershed Management Plans existing on the effective date shall become the plans of the Authority. Nothing herein shall limit Cascade's powers to adopt Watershed Management Plans or to enter into interlocal agreements thereafter.

Section 8.3 System Reliability Methodology. Cascade shall develop and adopt a system reliability methodology for planning, operation, and management purposes.

ARTICLE 9. Duration and Dissolution; Withdrawal.

Section 9.1 Duration. Except as provided in Section 9.3, Cascade shall remain in existence for the longer of the following: (a) the period it holds any assets; (b) the period during which Bonds are outstanding; or (c) the period it continues to include Members.

Section 9.2 Withdrawals. A Member may notify Cascade of its intent to withdraw by delivery to Cascade of a Resolution of its legislative authority expressing such intent. Upon receipt of such Resolution, the Member shall lose its right to vote and the Board shall determine (a) the withdrawing Member's allocable share of the cost of the then-existing obligations of Cascade; and (b) the withdrawing Member's obligations to Cascade. "Then-existing obligations of Cascade" means obligations or costs incurred by Cascade as of the date the Member's withdrawal notice is received, including but not limited to, Bond obligations, contract obligations, and cash financed capital projects; provided that a withdrawing Member's allocable share shall in no event include an obligation for future expenses for which Cascade has not incurred a legal obligation; and provided further, that to the extent the Member's obligation (with respect to such costs) is re-paid over time, the Member shall be entitled to a credit for supply abandoned by the Member and is otherwise used by Cascade. A "withdrawing Member's obligation to Cascade" includes but is not limited to, the Member's share of fixed operating costs, any other expenses contained in Cascade's adopted budget for that year, and any assessments or other similar charges lawfully imposed by Cascade. For purposes of the preceding sentence, "fixed operating costs" shall be determined in the year of withdrawal, and the Member's obligation with respect to such costs shall be limited only to that amount required to pay for supply abandoned by the Member and not otherwise used by Cascade.

The allocable share of cost or obligations shall be determined by the Board, taking into consideration as deemed applicable by the Board: (a) the ratio of the Member's Demand Share to total Member demand; (b) the ratio of the Member's contribution to Cascade revenue to total Cascade revenue including RCFCs; (c) the cost or a portion of the cost of capital projects or facilities specially benefiting the Member; and (d) and any other factor the Board deems appropriate to consider. The Member's withdrawal shall be effective on payment of such allocable share or provision for arrangements to pay such allocable share that are satisfactory to the Board. Until the effective date of withdrawal, the Member shall continue to comply with all applicable provisions of this Agreement.

Upon withdrawal, except as provided in an Asset Transfer Agreement, the withdrawing Member shall have no right to, or interest in any Water Supply Assets owned by Cascade. The withdrawing Member shall be deemed to have abandoned any and all rights to service, to the use of Cascade Water Supply Assets or other rights with respect to Cascade (except as otherwise expressly provided in this Agreement).

Notwithstanding the provisions of this Section 9.2, Cascade will, upon the withdrawal of a Member that has transferred operational control and management of (but not title to) an Independent Supply Asset to Cascade under Section 5.1, return operational control of such asset to the withdrawing Member. Return of operational control and management will be subject to: (a) continued use by Cascade, to the extent and for such time as the Board deems such use necessary for Cascade to continue providing service to its Members; and (b) payment or provision for payment of any Cascade costs, including but not limited to, those associated with the withdrawing Member's Independent Supply Asset.

The Board may establish additional generally applicable conditions and requirements for withdrawal.

Section 9.3 Disincorporation. Cascade may vote by a 65% Dual Majority Vote (as ratified within one hundred and twenty (120) days of such Dual Majority Vote by 65% Dual Majority of the Members' legislative authorities), to disincorporate. Upon disincorporation except as provided in an Asset Transfer Agreement, Cascade's assets initially shall be held by its then current Members as tenants in common. Each Member's ownership interest must be based on that Member's Demand Share as of the time of the dissolution. Cascade's liabilities (including Bonds and other contractual obligations) initially shall be distributed based on Members Demand Shares as of the time of the disincorporation. Assets and liabilities must be distributed in accordance with agreement or contract, under a voluntary mediation process, or by a court of law. A court may appoint an arbitrator or special master. Distribution shall be based on the best interests of efficient and economic water supply in the entire area served by the Members, subject to a rebuttable presumption that Water Supply Assets will be returned to the Member that originally transferred them to Cascade. That presumption may be overcome by a showing that another asset distribution is in the best interests of efficient and economic water supply. The proceeds of any sale of assets must be distributed among the then current Members based on the Demand Shares at the time of disincorporation.

Section 9.4 Successor Entity. Notwithstanding the provisions of Section 9.3, upon a 65% Dual Majority Vote of the Board (as ratified within one hundred and twenty (120) days of such Dual Majority Vote by 65% Dual Majority of the Members' legislative authorities), all assets, liabilities, and obligations of Cascade may be transferred to any successor entity (including without limitation, a joint operating agency or other municipal corporation, as permitted under state law), and all obligations of Members and parties contracting with Cascade become obligations to the successor entity.

ARTICLE 10. Amendments.

Amendments to this Agreement shall be effective upon approval by 65% Dual Majority Vote of the Board (as ratified within one hundred and twenty (120) days by 65% Dual Majority of the Members' legislative authorities).

ARTICLE 11. Applicable Law and Venue.

This Agreement is governed by the laws of the state of Washington. The venue for any legal action arising from a dispute under this Agreement is the Superior Court for King County.

ARTICLE 12. No Third Party Beneficiaries.

There are no third party beneficiaries to this Agreement except for the rights of Bond owners as provided in Section 5.3.2, no person or entity other than an agency signatory to this Agreement shall have any rights hereunder or any authority to enforce its provisions, and any such rights or enforcement must be consistent with and subject to the terms of this Agreement.

ARTICLE 13. Severability.

If any provision of this Agreement or its application is held by a court of competent jurisdiction to be illegal, invalid, or void, the validity of the remaining provisions of this Agreement or its application to other entities or circumstances shall not be affected. The remaining provisions continue in full force and effect, and the parties' rights and obligations must be construed and enforced as if the Agreement did not contain the particular invalid provision. But if the invalid provision or its application is found by a court of competent jurisdiction to be substantive and to render performance of the remaining provisions unworkable and infeasible, is found to seriously affect the consideration, and is inseparably connected to the remainder of the Agreement, the entire Agreement is deemed void.

ARTICLE 14. Entire Agreement.

This Agreement constitutes the entire and exclusive agreement between the parties relating to the specific matters covered in this Agreement. All prior or contemporaneous verbal or written agreements, understandings, representations or practices relative to the foregoing are superseded, revoked and rendered ineffective for any purpose. This Agreement may be altered, amended or revoked only as set forth in Article 10. No verbal agreement or implied covenant may be held to vary the terms of this Agreement, any statute, law, or custom to the contrary notwithstanding.

CASCADE WATER ALLIANCE

By: John Marchione
John Marchione

Title. Title Chair Date: April 10, 2012.

Attest: Chuck Clarke
Chuck Clarke

Title: Chief Executive Officer Date: April 10, 2012

Authorized by: Resolution No. 2012-06

Date: 3-28-2012

ARTICLE 15. **Execution**

This Agreement may be executed in one or more counterparts.

SIGNATORY AGENCY

CITY OF BELLEVUE

By: ____

Title ________________________ Date: ___________, 2012

Attest: ____

Title: ________________________ Date: ___________, 2012

Authorized by (Resolution or Ordinance): ____________________

Date: ____, 2012

SIGNATORY AGENCY

CITY OF ISSAQUAH

By: Ava Frisinger

Title Mayor Date: 7.3, 2012

Attest: ______________________

Title: ______________ Date: __________, 2012

Authorized by (Resolution or Ordinance): AB 6396

Date: June 4, 2012

SIGNATORY AGENCY

CITY OF KIRKLAND

By: ______________________________________

Title ____________________ Date: __________, 2012

Attest: ______________________________________

Title: ____________________ Date: __________, 2012

Authorized by (Resolution or Ordinance): ________________

Date: ____________________________________, 2012

SIGNATORY AGENCY

CITY OF REDMOND

By: ______________________________

Title ______________ Date: __________, 2012

Attest: ______________________________

Title: ______________ Date: __________, 2012

Authorized by (Resolution or Ordinance): ______________

Date: ______________________________, 2012

SIGNATORY AGENCY

CITY OF TUKWILA

By: ____

Title ________________________ Date: ___________, 2012

Attest: ____

Title: ________________________ Date: ___________, 2012

Authorized by (Resolution or Ordinance): ________________

Date: ____, 2012

SIGNATORY AGENCY

COVINGTON WATER DISTRICT

By: ______________________________

Title ________________ Date: __________, 2012

Attest: ______________________________

Title: ________________ Date: __________, 2012

Authorized by (Resolution or Ordinance): ______________

Date: ______________________________, 2012

SIGNATORY AGENCY

SAMMAMISH PLATEAU WATER & SEWER DISTRICT

By: ______________________________________

Title ____________________ Date: __________, 2012

Attest: ______________________________________

Title: ____________________ Date: __________, 2012

Authorized by (Resolution or Ordinance): ______________

Date: ______________________________________, 2012

SIGNATORY AGENCY

SKYWAY W&S DISTRICT

By: ____

Title ______________________ Date: __________, 2012

Attest: ____

Title: ______________________ Date: __________, 2012

Authorized by (Resolution or Ordinance): __________________

Date: ____, 2012

CITY OF ISSAQUAH

CITY COUNCIL AGENDA BILL

UPDATED AB 6396
June 4, 2012
Consent Calendar

RATIFICATION OF CASCADE WATER ALLIANCE JOINT MUNICIPAL UTILITY SERVICE AGREEMENT

Proposed Council Action:
Ratify Agreement; Authorize Execution

DEPARTMENT OF	Public Works Engineering, (Sheldon Lynne)
COUNCIL COMMITTEE LIAISON	n/a
OTHER COUNCIL MEETINGS	May 7, 2012
EXHIBITS	A. Joint Municipality Service Agreement (JMUSA) ~~B. Table Showing Changes to Current Agreement~~ ~~C. Table of Policy Changes~~ ~~D. History of JMUSA Legislation~~ ~~E. Cascade Resolution 2012-16~~ *(Exhibits A-E were previously distributed.)*

Comp Plan Policy Nos.	
Consistent	n/a
Explanation Provided	
Other Policies	

Expenditure Required
$
Amount Budgeted
$

SUMMARY STATEMENT

This agenda bill requests Council consideration to ratify and authorize the Mayor to execute the Cascade Water Alliance Joint Municipal Utility Services Agreement with Cascade Water Alliance (Cascade). Cascade is a nonprofit corporation composed of 8 municipal corporations and special purpose districts for the purpose of providing water supply to meet the growing demands of its members. On March 28, 2012, Cascade Board unanimously passed Resolution 2012-06 (Exhibit E) adopting the Cascade March 28, 2012 Amended and Restated Interlocal Contract in the form known as "Cascade Water Alliance Joint Municipal Utility Services Agreement" (Exhibit A). The Interlocal Contract requires any changes to it to be voted on and passed by a 65% Dual Majority vote at the Cascade Board and ratified by 65% of the member legislative bodies.

In 2010 and 2011 Cascade worked with the Legislature, Departments of Health and Ecology, and more than 30 other local government organizations to develop the Joint Municipal Utility Service Act. The State was trying to solve challenges faced by local utility agencies desiring to organize into regional organizations including, but not limited to, certainty related to their ability to jointly exercise authority and/or the ambiguous status of intergovernmental entities created under the Interlocal Cooperation Act (Chapter 39.34 RCW). Having formed under the Interlocal Cooperation Act, Cascade has had difficulty with both of these issues that has presented challenges related to issuing debt and getting regulatory agencies to recognize how to regulate Cascade. Exhibit D presents information related to the history and reasons for the legislative action that created the opportunity for utility service providers to come together as a municipality to provide regional services. To effect becoming a Joint Municipal Utility Service Agency, Cascade had to modify its Interlocal Agreement which required some policy changes. These policy changes are described on Exhibit C.

<u>**CONSISTENCY WITH COMPREHENSIVE PLAN:**</u> N/A

ADMINISTRATION'S RECOMMENDATION:

Ratify the March 28, 2012 Cascade Water Alliance Joint Municipal Utility Services Agreement.

UPDATE:

Council Utilities, Technology, and Environment Committee discussed this agenda item at their May 17, 2012 committee meeting. The modifications to the Cascade agreement are necessary to change the form of government that Cascade operates under which is a benefit to Cascade and its members. The committee recommends ratifying the March 28, 2012 Cascade Water Alliance Joint Municipal Utility Services Agreement.

ALTERNATIVE(s):

1. Authorize the Mayor to enter into and execute the Amended Contract without referral to Committee.

RECOMMENDATION

Council Utilities, Technology, and Environment Committee/Chair:

~~MOVE TO:~~ ~~Refer AB 6396 to the May 17, 2012 Council Utilities, Technology, and Environment Committee for review and recommendation, returning to the full Council on June 4, 2012.~~

MOVE TO: Ratify the March 28, 2012 Cascade Water Alliance Joint Municipal Utility Services Agreement and authorize the Mayor to execute the Agreement.

Amendments

Language of Proposed Policy Change (green font as shown on Table version of Amendments)		Notes
	provide that administrative, professional or technical services be performed by contract.	
Page 18	**Section 5.2.1 Commitment to Members.** Beginning on the Cascade Supply Date, Cascade shall provide a ~~Full Supply~~ Commitment to each ~~Founding~~ Member. ~~Thereafter,~~ Cascade shall provide a Full Supply Commitment to ~~meet all current and future water supply needs of~~ a Member that joins with Water Supply Assets sufficient to provide for its needs during the following fifteen (15) years (whether or not those Water Supply Assets are transferred to Cascade or retained as Independent Supply.)	**Deletion of "Full" accurately describes steps with membership supply**
Page 24	**Section 5.5 Regional Capital Facilities Charges.** RCFCs shall be calculated according to the RCFC Methodology, which shall define the analytical steps required to calculate the RCFCs according to ~~the greater of: (a) the incremental difference between the average unit cost of expanding the system (i.e., the marginal cost of new capacity) and the average unit cost of the existing system; or (b)~~ the average unit cost of past construction of the existing system plus ~~then-planned~~ the Supply System improvements planned at the time of the calculation.	**In practice, (a) has not been used because it has proven problematic, as it relies heavily on subjective assumptions about timeframe, costs to be included and capacity provided.**
Page 26	**Section 7.1 Asset Management.** Cascade must manage the Supply System in compliance with applicable laws, regulations and Cascade's minimum service standards. ~~Adoption and amendments to the minimum service standards shall require a 65% Dual Majority Vote.~~	**Removed 65% Dual Majority Vote.**
Page 28	**Section 7.5 Water Supply Rates and Charges.** Cascade may sell water to a Non-Member under terms and conditions established by the Board. ~~The terms and conditions shall not be more favorable than the terms and conditions under which water is sold to Members.~~ Revenue received from the sale of water to Non-Members shall be used to offset or reduce Rates and Charges to Members to the extent practicable, except that such revenue need not be treated as reducing or offsetting those amounts that are necessary for the payment of debt service on Bonds and for the provision of reserve and coverage requirements for the Bonds.	**Removing limitation intended for founding membership; future transactions may be of benefit to Cascade and its members under differing terms and conditions.**
Page 32	**Section 8.3 System Reliability Methodology.** Cascade shall develop and adopt a system reliability methodology for planning, operation and management purposes. ~~Adoption and amendments to the system reliability methodology shall require a 65% Dual Majority Vote.~~	**Removes 65% Dual Majority Vote requirement.**
Page 34	**Section 10.3 Disincorporation.** Cascade may ~~be dissolved~~ vote by a 65% Dual Majority Vote (as ratified within one hundred and twenty (120) days of such Dual Majority Vote by 65% Dual Majority of the Members' legislative authorities), to disincorporate. Upon ~~dissolution,~~ disincorporation except as provided in an Asset Transfer Agreement, Cascade's assets initially shall be held by its then current Members as tenants in common.	**Adds ratification requirement.**

Cascade Water Alliance
Interlocal Agreement Table Proposed Policy Changes

	Language of Proposed Policy Change (green font as shown on Table version of Amendments)	Notes
Page 9	**Article 2. Definitions.** **"Full Supply Commitment"** or **"Full Supply"** for any or all of a Member's water needs means that those needs, as projected in the ~~Member's lawfully adopted water supply plan~~ Cascade Water Supply Plan and as agreed to by that Member, shall be met from the Supply System, net of ~~independent supply~~Independent Supply and subject to the other limitations established in this ~~agreement~~Agreement, on an equal parity with all other Full Supply Commitments, and with a guaranteed priority no lower than for any other Supply Commitment made by Cascade; provided that no Member is guaranteed any given amount of supply or capacity.	**Recognizes that Cascade now provides and uses demand projections for its service area**
Page 12	**Section 3.4 Purposes.** Cascade's purposes include ~~only~~ those related to water resources, or any other utility service as allowed under the Act, as authorized by a unanimous vote of the Board, and do not include the provision of other general services to the public, and are to:	**Allows the Board to determine purposes - as allowed under RCW 39.106**
Pages 14-15	**Section 3.5 Powers.** t. for purposes of a Cascade code of ethics, exercise all powers of a municipal corporation and observe the requirements under Chapter 42.23 RCW, now or as hereafter amended.	**Clarifies governing ethics code as RCW 42.23 (Muni) rather than RCW 42.52 (State)**
Page 15	**Section 4.3 Voting.** All Board actions must be approved by Dual Majority Vote of all Members, except where this ~~Contract~~ Agreement requires either a 65% Dual Majority Vote, as provided in Sections 4.7, ~~5.2~~, 5.5, ~~7.1~~, 7.3, ~~8.3~~, ~~10.3~~, 10.4, and Article 11; or ratification by the Members' legislative authority, as provided in ~~Section~~Sections 10.3 and 10.4 and Article 11.	**Encompasses committee discussion on changes to requirement for 65% Dual Majority Vote**
Page 16	**Section 4.5 Executive Committee.** The Chair, Vice Chair, Secretary, and Treasurer ~~and chairpersons of Standing Committees together~~shall constitute Cascade's Executive Committee. The Chair (or acting Chair) shall vote on matters before the Executive Committee only if necessary to break a tie. The Executive Committee's duties and responsibilities are set forth in the ByLaws.	**Streamlines the Exec Comm membership to facilitate ability to meet**
Page 17	**Section 4.6 Staff, Consultants and Contractors.** Cascade staff shall consist of a chief executive officer and other positions established by resolution of the Board. The Board shall appoint, designate the title of, and establish the compensation range of the chief executive officer. The Board shall hire ~~or retain legal counsel and independent accountants and~~ auditors for Cascade. ~~The authority to hire other consultants may be delegated to the Executive Committee.~~ The chief executive officer ~~appoints persons to fill other staff positions~~ may hire all other staff and consultants, and those appointments may be subject to ratification by the Board or the Executive Committee if the ByLaws so provide. The Board may also	**Streamlines hiring process, except for auditor which will remain Board hiring function**

CASCADE RESOLUTION 2011-17

Attachment

CASCADE WATER ALLIANCE
RESOLUTION NO. 2011-17

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE CASCADE WATER ALLIANCE,
A WASHINGTON NONPROFIT CORPORATION,
ADOPTING AN AMENDED AND RESTATED INTERLOCAL AGREEMENT,
ADOPTING MINIMUM DEMAND SHARES FOR SAMMAMISH PLATEAU WATER AND SEWER DISTRICT AND THE CITY OF ISSAQUAH,
ESTABLISHING THE TERMS AND CONDITIONS FOR THE RCFC CREDIT PURCHASE PROGRAM,
AND
AMENDING CASCADE WATER ALLIANCE CODE SECTION 5.25.070 (A PORTION OF THE REGIONAL CAPITAL FACILITIES CHARGE METHODOLOGY)

WHEREAS, The Cascade Water Alliance (Cascade), is a Washington Nonprofit Corporation composed of municipal corporations and special purpose Municipal Corporations that are parties to an Interlocal Contract entered into under authority of the Interlocal Cooperation Act (Chapter 39.34 RCW) for the purpose of providing water supply to meet the growing demands of its Members; and

WHEREAS, Cascade was formed in April 1999, according to the terms of an Interlocal Contract; the Board of Directors of Cascade (Board) approved amendments to the Interlocal Contract in September 1999, November 2002, and December 2004; the Board now desires to amend the December 2004 Amended and Restated Interlocal Contract to raise the maximum administrative dues that may be collected from the Members to 9% of Cascade's annual revenue requirement and to allow the 9% limit to be amended in the budget by a 65% Dual Majority Vote of the Board; and such amendment to the Interlocal Contract requires a 65% Dual Majority Vote (ratified within 120 days by 65%, as measured by Dual Majority Vote, of the Members' legislative authorities); and

WHEREAS, the Interlocal Contract, Section 7.5 provides that specific Demand Shares may be set by the Board to account for circumstances; the Rate Calculation Methodology, adopted by the Board and codified at Cascade Water Alliance Code (CWAC) 5.20.020, provides for the right to recover costs through additional charges or surcharges to address unique circumstances; and the Board now desires to set specific minimum Demand Shares effective January 1, 2012, to account for unique circumstances for Members Sammamish Plateau Water and Sewer District and the City of Issaquah; and

WHEREAS, Section 5.5 of the Interlocal Contract provides that the Regional Capital Facilities Charge (RCFC) be calculated according to an RCFC Methodology, which defines the analytical steps required to calculate the RCFC; the RCFC Methodology was adopted by the Board in Resolution 2006-02 and, by Resolution 2010-02 codified at CWAC 5.25.010 through

5.25.070; the Board has determined it is reasonable, appropriate, consistent with applicable law, and in the best interest of Cascade to amend CWAC 5.25.070 of the RCFC Methodology to authorize a program whereby Cascade may purchase RCFC credits from one or more Members; and such amendment of the RCFC Methodology requires a 65% Dual Majority Vote of the Board; and

WHEREAS, in accordance with the RCFC Methodology and CWAC 5.25.070 as amended by this Resolution, the Board now desires to establish the terms and conditions for an RCFC Credit Purchase Program whereby Cascade may purchase RCFC credits from one or more Members.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE CASCADE WATER ALLIANCE as follows:

Section 1. Amendment to Interlocal Contract. The Board approves and adopts the 2011 Amended and Restated Interlocal Contract, with Section 4.7 amended in the form below; and directs the Chair and the Chief Executive Officer to distribute the 2011 Amended and Restated Interlocal Contract for ratification by Members' legislative authorities.

Section 4.7 Budget; Dues; Financial Management.

The Board must approve an annual budget, determining Cascade's revenues and expenditures no later than sixty (60) days before the beginning of the fiscal year in which that budget will be in effect. The budget will be developed and approved according to a schedule established by the Bylaws. The budget must identify the levels of member charges on which revenue projections are based. The Board may amend the budget.

Each Member must pay annual dues to defray part or all of Cascade's administrative costs based on the number of CERUs served by its water system, regardless of water usage or capacity, and regardless of whether those units are served by the Supply System or by Independent Supply. Total administrative dues collected from all Members may not exceed ~~the greater of $1,000,000 or 5~~ 9% of Cascade's annual revenue requirement ~~less debt service~~. This limit may be amended in the budget by a 65% Dual Majority Vote of the Board. The Board may establish minimum annual dues per Member and may provide that less than all of a Member's CERUs be taken into account in establishing dues.

All Cascade books and records shall be open to inspection by the Washington State.

Section 2. Demand Shares. Beginning January 1, 2012, the minimum Demand Shares for Sammamish Plateau Water and Sewer District and the City of Issaquah are set as follows:

	Minimum Demand Share
Sammamish Plateau Water and Sewer District	1.0
City of Issaquah	0.75

As long as these minimum Demand Shares are in effect, in accordance with section 6.2.2. of each Member Audit Acceptance Agreement, the Production Requirements for Sammamish Plateau Water and Sewer District and City of Issaquah are waived and no penalties may be assessed to these Members for not meeting the initial or modified (by RCFC credit redemption) Production Requirement, provided that the Members maintain the capacity and availability of audited quantities of Independent Supply, subject to audit and potential imposition of RCFCs in the event of loss of supply.

Section 3. Amendment of the RCFC Methodology. The Board approves an amendment to Resolutions 2006-2 and CWAC 5.25.070 (a portion of the Regional Capital Facilities Charge Methodology) and as follows:

5.25.070 RCFC credits.

In recognition of existing or future independent supplies, or as compensation for transfer of such resources, Cascade may issue credits redeemable in lieu of RCFC payments. The number and use of those credits would be defined by the Board and include the following general provisions:

A. ~~No RCFC credits may be redeemed for growth occurring prior to January 1, 2008.~~

~~B.~~ The terms and conditions for ~~rate of~~ redemption of RCFC credits shall be set by the Board to allow redemption under a structure that it determines appropriate to protect Cascade's financial performance and equitable cost recovery. ~~is limited to 50 percent of the growth occurring in any reporting period.~~

B. Cascade may develop a program whereby it offers to purchase RCFC Credits of one or more Members, at a price and with other terms and conditions as established by the Board.

These provisions are intended to protect and stabilize the cash flow derived from RCFCs.

Section 4. RCFC Credit Purchase Program. Pursuant to the RCFC Methodology, as amended by this Resolution, the Board establishes the terms and conditions for the RCFC Credit Purchase Program whereby Cascade may purchase RCFC credits from one or more Members as follows:

Regional Capital Facilities Charge Credit Purchase Program

1. Annual Redemption. Effective with the fiscal year beginning January 1, 2012, and each fiscal year thereafter, RCFC credits held by any Member shall be redeemable

via an annual reimbursement mechanism in accordance with the following redemption rules:

a. Credits may only be redeemed if Cascade receives reported growth and RCFC payment for at least 1,250 CERUs in a given fiscal year as calculated as a total from all Members.
b. All Members shall report and pay for all applicable CERU growth as it occurs in accordance with Cascade reporting requirements and procedures.
c. Cascade shall monitor overall growth and revenue to establish whether or when the threshold is reached or exceeded.
d. After the end of the fiscal year, Cascade shall determine the degree to which the threshold is exceeded, allocate any and all such excess among Members holding valid credits in proportion to their share of that year's growth, and allow the use of credits for any amount thus allocated to and among Members holding valid credits.
e. Cascade will notify each Member with potential reimbursement through credit redemption no later than January 31 of the subsequent fiscal year. The Member will be responsible to confirm whether or to what degree they wish to exercise the resulting use of credits. A failure to respond by the Member within 14 days will be considered notice to redeem the maximum applicable credits and Cascade will by default take this as an affirmative redemption for all applicable credits and issue the corresponding refund.
f. As so directed by the Member or by default if the Member has failed to timely respond, Cascade will refund RCFC revenues corresponding to redeemed credits, reducing the remaining quantity of available credits for that Member. The refund will be based on the full RCFC applicable during the fiscal year for which credits are redeemed.
g. Credits remain non-transferable among Members except as specifically authorized by the Board.

2. <u>One-Time Redemption Option</u>. In the alternative to the annual reimbursement mechanism set forth in Section 1 above, as a one-time offering, each Member with credits may choose to redeem any or all of its outstanding credits, as expressed as a percentage, by notifying Cascade no later than December 31, 2011 of its selection under this Section 2. Absent such notification, this offer expires and the member will by default retain all applicable credits and redeem then under the annual reimbursement mechanism rules set forth in Section 1 above.

   No later than December 31, 2011, a Member may offer up to 100% of its outstanding credits for purchase by Cascade at a price of $2,500 per CERU. Cascade will make full payment no later than December 31, 2012.

   Any Member selecting this alternative may not redeem any of its remaining credits until after December 31, 2025, and would be subject to redemption rules as applicable at that time.

Section 5. This Resolution shall be in full force and effect on the date of its adoption; provided that Sections 2, 3 and 4 of this Resolution shall remain in full force and effect after 120 days only if the 2011 Amended and Restated Interlocal Contract has been ratified by Members' legislative authorities.

ADOPTED AND APPROVED by the Board of Directors of the Cascade Water Alliance at a regular meeting thereof, held on the 26th day of October 2011.

CASCADE WATER ALLIANCE

Lloyd Warren, Chair

Attest – Chuck Clarke, Chief Executive Officer

John Marchione, Vice Chair

Jim Haggerton, Secretary/Treasurer

Members
Yes 7
No 0

Demand Share
Yes 100 %
No ∅ %

10/26/11 Passed

Include in CWAC?

☒ Yes

☐ No

Cascade Resolution No. 2011-17
October 26, 2011
Page 5 of 5

CASCADE WATER ALLIANCE INTERLOCAL CONTRACT (2004)

2005-96

City of Issaquah

AGREEMENT/CONTRACT/DEED/EASEMENT/LIABILITY REVIEW PROCESSING FORM

(Please Print)

im 3/28/05

Note: All information above dotted line must be completed, otherwise all documents will be returned to the originator. Original contract should include the City's hold harmless clause, Certificate of Insurance requirement, and the entity must hold a current City Business License (wording for such items can be found in the All City email dated 1/13/98 from Mary Lorna Meade). At least two originals should be attached if the Contracting Entity wants to receive an original signed copy for their files.

PWE Contract # N/A **This is an agreement to:** ____ Receive Funds ____ Disburse Funds X Other

PWE Project Number(s) /Name(s) with Amounts: CWA Interlocal Agreement

---

Contracting Entity: Cascade Water Alliance

Date Original Contract Signed By Contracting Party 12/15/04

Number of Original Document(s) provided: 2

Contact Person and Title at Above Entity: Michael Gagliardo, General Manager

Phone: 425-453-0930

Official Title of Document Attached Interlocal Agreement Amended and Restated

Summary Purpose of the Document to be Processed: Following Council approval this interlocal agreement sets the guidelines for providing Regional water to the city

Effective Date(s) of Document: From: 12-15-04 **To:** ________ **Change Order Number:** n/a

Originating Department: Public Works Engieering **Staff Person:** Sheldon Lynne

Total City Funding for this Contract (even if zero): 0

Total Non-City Funding for this Contract (even if zero): 0

Total Overall Project Budget (for entire project - not just City portion or this single contract total): 0

List Agenda Bill Number and Date Approved (if City Council Authorization Needed) AB 5266 (3-21-05)

Cost Acctg. Approval GH **Date** 3/25/05 **Forward to Mayor/City Administrator Yes** XX **No** ____

Originating Department Manager Approval: (Signature) [signature]

(Print Manager Name) Bob Brock, PWE Director

Note: Documents usually must be signed by the Contracting Party before the Mayor signs (except for State or County items).

(FOR CITY CLERK'S OFFICE USE & REVIEW PROCESS ONLY BELOW THIS LINE)

Review by City Clerk's Office for All Documents:

1. Business License Needed? Yes ____ (Current #________) or No X ____ MM (Initial & Date)
2. Bond Needed? Yes ____ or No X ____ (Initial & Date)
3. Hold Harmless Agreement Needed? Yes ____ (verify acceptable) or No X 3/28/05 (Initial & Date)
4. Certificate of Insurance Needed? Yes ____ (verify acceptable) or No X ________ (Initial & Date)

Process for Legal/Financial Approval & Document Signature - - Please Initial and Date (*then return to the City Clerk's Office*):

1. City Attorney Approval (*all documents*): ct 3/30/05 (Initial & Date)
2. Finance Director Approval (*all documents involving funds*): ARC 4/1/05 (Initial & Date)
3. Mayor Approval (*all documents needing City signature*): [initials] 4/4/05 (Initial & Date)
4. City Clerk's Review/Attest (*document signature*) Cle 4/5/05 (Initial & Date)

Recording:

1. Does Document Need to be Record with King County? Yes X Interlocal or No ________
2. Fee(s) paid by: a) City _ or b) Contracting Party ________
3. Date Sent for Recording: 4-6-05 to Sheldon ________ Date Received Back from County ; ________

He w/ send to CWA for recording

Rec'd recorded orig. on 2-17-06

Distribution of executed document(s) – original(s) and copies:

___/___ **ORIGINAL** for City Clerk File

________ **ORIGINAL** for Contracting Party via Originating Department Staff Person for Staff Person to Send Out to Entity (*If only one original was provided – only a copy will be available for the Entity*)

________ **COPY/ORIGINAL** to Originating Department Staff Person for Department File (original if third set was provided)

________ **COPY of Processing Form only** to Finance Department (*only when funds are involved*)

Other(s) needing copies: ________

[signature] 2-17-06

City of Issaquah

AGREEMENT/CONTRACT/DEED/EASEMENT/LIABILITY REVIEW PROCESSING FORM

(Please Print)

***Note:** All information above dotted line __must__ be completed, otherwise all documents will be returned to the originator. Original contract should include the City's hold harmless clause, Certificate of Insurance requirement, and the entity must hold a current City Business License (wording for such items can be found in the All City email dated 1/13/98 from Mary Lorna Meade). At least two originals should be attached if the Contracting Entity wants to receive an original signed copy for their files.*

Documents Distributed By (signature): ______________________ On Date: ____________

2006-96

Cascade Water Alliance

RECEIVED
JUN 14 2005
PUBLIC WORKS ENG.

MEMORANDUM

DATE: June 13, 2005

TO: Member Staff

FROM: Pam Higbee

SUBJECT: Recording of Interlocal Contract

Enclosed for your records is a copy of the recording document for Cascade's Interlocal Contract.

1400 112th Avenue SE — Suite 220 — Bellevue, WA 98004
Phone: (425) 453-0930 — Fax: (425) 453-0953
Website: www.cascadewater.org

AFTER RECORDING RETURN TO:

Michael P. Ruark
Inslee, Best, Doezie & Ryder
Rainier Plaza, Suite 1900
777 108th Avenue N.E.
P.O. Box C-90016
Bellevue, WA 98009-9016

CONFORMED COPY

20050504001084
INSLEE BEST DO CONT 72.00
PAGE001 OF 053
05/04/2005 12:32
KING COUNTY, WA

INTERLOCAL CONTRACT

Grantor(s):	Cascade Water Alliance/Members of Cascade Water Alliance
Grantee(s):	Cascade Water Alliance/Members of Cascade Water Alliance
Short Legal Description:	N/A
Assessor's Property Tax Parcel/Account Number(s):	N/A
Reference Number(s) of Documents Assigned or Released:	N/A

Cascade Water
Alliance

MEMORANDUM

DATE: January 20, 2005

TO: Sheldon Lynne

FROM: Michael Gagliardo, General Manager MG

SUBJECT: Amended and Restated Interlocal Contract

Enclosed are two (2) originals of the Amended and Restated Interlocal Contract adopted by the Board of Directors on December 15, 2004 (see enclosed Resolution No. 2004-18). Once adopted by a 65% Dual Majority Vote of the Board, amendments to the Interlocal Contract must be ratified by 65%, as measured by Dual Majority Vote of the Members' legislative authorities, within one hundred and twenty (120) days.

Please arrange for your legislative body to ratify the Amended Interlocal Contract. Once ratified, please have both original contracts executed by an authorized representative and return one to Cascade.

In addition, please provide Cascade with a copy of the resolution, ordinance or other action taken by your legislative body ratifying the Interlocal.

I am available to attend Council or Commissioner Meetings to discuss the amendments and can arrange for participation by Mike Ruark and/or Hugh Spitzer if necessary.

If you have any questions, please contact me.

1400 112th Avenue SE — Suite 220 — Bellevue, WA 98004
Phone: (425) 453-0930 — Fax: (425) 453-0953
Website: www.cascadewater.org

CASCADE WATER ALLIANCE

INTERLOCAL CONTRACT

Recitals

WHEREAS, the Cascade Water Alliance, an intergovernmental organization created by Interlocal Contract effective April l, 1999 (as amended July 2000 and November 2002) to further the interests of its Members with respect to water supply and to work cooperatively with other water supply entities in the region; and

WHEREAS, Members of the Cascade Water Alliance have determined to amend the Cascade Water Alliance's Interlocal Contract to better facilitate the purposes of the Cascade Water Alliance;

NOW, THEREFORE, it is agreed as follows:

ARTICLE 1. Agreement

The Cascade Interlocal Contract, effective April 1, 1999, and entered into under authority of the Interlocal Cooperation Act, Chapter 39.34 RCW is amended and re-stated as provided herein.

ARTICLE 2. Definitions

"Asset Transfer Agreement" means an agreement between Cascade and a Member by which the Member transfers title to Water Supply Assets to Cascade, with or without monetary consideration, to be operated and maintained as part of the Cascade Water System.

"Authorized Issuer" means either: (a) Cascade (or a successor entity); or (b) a Member or other entity authorized to issue Bonds for the benefit of Cascade and approved by Resolution of the Board.

"Board" means the Board of Directors of Cascade.

2005-96

Cascade Water
Alliance

INTERLOCAL CONTRACT

Amended and Restated

December 15, 2004

TABLE OF CONTENTS

CASCADE WATER ALLIANCE

INTERLOCAL CONTRACT

Recitals

WHEREAS, the Cascade Water Alliance, an intergovernmental organization created by Interlocal Contract effective April l, 1999 (as amended July 2000 and November 2002) to further the interests of its Members with respect to water supply and to work cooperatively with other water supply entities in the region; and

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ARTICLE 2. Definitions

"Asset Transfer Agreement" means an agreement between Cascade and a Member by which the Member transfers title to Water Supply Assets to Cascade, with or without monetary consideration, to be operated and maintained as part of the Cascade Water System.

"Authorized Issuer" means either: (a) Cascade (or a successor entity); or (b) a Member or other entity authorized to issue Bonds for the benefit of Cascade and approved by Resolution of the Board.

"Board" means the Board of Directors of Cascade.

"Bonds" means short-term or long-term bonds, notes, warrants, certificates of indebtedness, or other obligations issued by, or on behalf of Cascade.

"ByLaws" means the ByLaws of Cascade, as adopted and amended by the Board.

"Cascade" means the Cascade Water Alliance.

"Cascade ERUs" ("CERUs") means equivalent residential units, calculated according to the Regional Capital Facilities Charge Methodology.

"Cascade Source Exchange Program" means a program adopted by Resolution of the Board for the replacement of all or a portion of a public water systems existing water supply to benefit stream flow and fish without serving growth or increasing that system's water supply. A program utilizing Lake Tapps Water Supply shall include the terms and conditions for source exchange contained in the Lake Tapps' Water Right Report of Examination.

"Cascade Source Exchange Program Agreement" means an agreement between Cascade and a Member or another public water supplier to implement the Cascade Source Exchange Program.

"Cascade Supply Date" means the date for the Founding Members and each new Member, established by Resolution of the Board, upon which Cascade undertakes a Supply Commitment.

"Contract" means this Cascade Water Alliance Interlocal Contract.

"Demand Share" means either a Member's current share of water provided through the Supply System, or estimated share of water to be provided through the Supply System, whether Full Supply or Interruptible Supply, expressed in millions of gallons per day. Demand Share is calculated according to the Rate Calculation Methodology.

"Dual Majority Vote" means Board approval of a proposal on the basis of a simple majority of all Members, allowing one vote per Member, together with a simple majority of all Members on the basis of each Member's Weighted Vote. A "simple majority" means a majority of all Members of Cascade, not just the Members present and voting.

"65% Dual Majority Vote" means Board approval of a proposal on the basis of a 65% supermajority of all Members, allowing one vote per Member, together with 65% supermajority of all Members on the basis of each Member's Weighted Vote. A "supermajority" means 65% of all Members of Cascade, not just the Members present and voting.

_**"Founding Member"** means the City of Bellevue, Covington Water District, the City of Issaquah, the City of Kirkland, the City of Redmond, Sammamish Plateau Water and Sewer District, Skyway Water and Sewer District, and the City of Tukwila.

"Gross Cascade Revenue" means all of the earnings and revenues received by Cascade from any source whatsoever including but not limited to: (a) Member Charges; (b) revenues from the sale, lease or furnishing of other commodities, services, properties or facilities; (c) the receipt of earnings from the investment of money in any maintenance fund or similar fund; (d) and withdrawals from any rate reserve or rate stabilization fund or account.

However, Gross Cascade Revenue shall not include: (a) principal proceeds of Bonds or any other borrowings, or earnings or proceeds from any investments in a trust, defeasance or escrow fund created to defease or refund obligations relating to the Water Supply System (until commingled with other earnings and revenues included in Gross Cascade Revenue) or held in a special account for the purpose of paying a rebate to the United States Government under the Code; (b) taxes and other income and revenue which may not legally be pledged for revenue bond debt service; (c) improvement district assessments; (d) federal or state grants allocated to capital projects; (e) payments under Bond Insurance or other credit enhancement policy or device; (f) insurance or condemnation proceeds used for the replacement of capital projects or equipment; (g) earnings in any construction fund or bond redemption fund; (h) deposits to any rate reserve or rate stabilization fund or account; or (i) any revenues generated by any Independent Supply except those amounts that are payable to Cascade pursuant to this Contract or another interlocal agreement.

"Independent Supply" or **"Independent Supplies"** means a Member's Water Supply Assets that are not part of the Supply System.

"Member" or **"Members"** means one or more member agencies of Cascade.

"Member Charges" means all payments that Cascade Members are required by this Contract to make to Cascade, including but not limited to all Rates and Charges, RCFCs, dues, assessments and other payments from Members.

"Net Cascade Revenue" means Gross Cascade Revenue less Operations and Maintenance Costs.

"Non-Member" means any person or agency that is not a party to this Contract.

"Operations and Maintenance Costs" or **"O&M Costs"** means all expenses incurred by Cascade to operate and maintain the Supply System in good repair, working order and condition, including without limitation, payments made to any other public or private entity for water or other utility service. Except as approved by the Board, Operations and Maintenance Costs shall not include any depreciation, capital additions or capital replacements to the Supply System.

"Rates and Charges" means the rates and charges (not including RCFCs) chargeable to each Member using the Rate Calculation Methodology plus any late payment or other charge that may be due.

"Rate Calculation Methodology" means the method of setting Rates and Charges adopted by the Board in accordance with Section 7.5.

"Regional Capital Facilities Charges" ("RCFCs") means the charges to each Member for new CERUs connected to that Member's water distribution system.

"Regional Capital Facilities Charge Methodology" ("RCFC Methodology") means the method of determining the RCFCs adopted by the Board in accordance with Section 5.5.

"Satellite Systems" means water supply facilities identified as such by the Board, including but not limited to facilities that serve a portion of a Member's customers but that are not part of the Member's main water system.

"Seattle Contract Purveyor" or **"Seattle Contract Purveyors"** means a Member that is or was a party to The City of Seattle Water Purveyor Contracts, Version A or Version B, dated November 1981 (as amended) executed prior to July 1, 1998.

"Supply Commitment" means the obligation undertaken by Cascade, established by Resolution of the Board to supply water to a Member. With respect to Members, that obligation shall be characterized as "**Full Supply Commitment,"** or an **"Interruptible Supply Commitment"** defined as follows:

"Full Supply Commitment " for any or all of a Member's water needs means that those needs, as projected in the Member's lawfully adopted water supply plan, shall be met from the Supply System, net of independent supply and subject to the other limitations established in this agreement, on an equal parity with all other Full Supply Commitments, and with a guaranteed priority no lower than for any other Supply Commitment made by Cascade; provided that no Member is guaranteed any given amount of supply or capacity.

"Interruptible Supply Commitment" means a supply of all or part of a Member's water needs from the Supply System on an as-available basis on a lower priority than any Full Supply Commitment.

The Supply Commitment for a Member shall be defined by this Interlocal Contact, the terms and conditions of membership, and the Supply Commitment resolution.

"Supply System" means the Water Supply Assets owned or controlled by Cascade.

"Water Supply Assets" means tangible and intangible assets usable in connection with the provision of water supply, including without limitation, real property, physical facilities (e.g., dams, wells, treatment plants, pump stations, reservoirs, and transmission lines), water rights, capacity and/or contractual rights in facilities or resources owned by other entities, and investments in conservation programs and facilities.

"Watershed Management Plan" means a plan adopted by Cascade for purposes of regional water supply, water transmission, water quality or protection, or any other water-related purpose, including but not limited to the plans identified in RCW 39.34.190 (3).

"Water Supply Plan" means the Cascade Regional Water Supply Plan (which may include the Cascade Watershed Management Plan) adopted by the Board as provided in Section 8.1 and 8.2.

"Weighted Vote" means a vote in which each Member's vote is counted according to the Member's Demand Share, but no Member shall have a Weighted Vote of less than one.

ARTICLE 3. Formation of Entity; Purpose and Powers

Section 3.1 Formation. The Cascade Water Alliance was created on April 1, 1999 as a public body and an instrumentality of its Members, which exercises essential governmental functions on its Members' behalf as authorized by the Interlocal Cooperation Act (RCW 39.34). Cascade is incorporated under RCW 39.34.040(3) as a public nonprofit corporation in the manner set forth in RCW 24.03 or 24.06 and it may, with Board approval, be incorporated as a partnership in the manner set forth in RCW 25.04, or the Board may organize the form of Cascade in any other manner permitted by law. In addition to its status under any other applicable law, Cascade shall constitute a "watershed management partnership" as provided in Chapter 39.34 RCW. The Board may approve the filing of Articles of Incorporation or similar documents in connection with incorporating Cascade or organizing it in some other manner.

Section 3.2 Membership. Subject to restrictions on future Cascade water rights, or to limitations upon water's place of use imposed by contract or permit, any municipal water utility serving within the Central Puget Sound Region may be admitted to Cascade. The decision to admit new Members rests with the sole discretion of the Board, which shall determine whether to extend a membership offer taking into consideration the audit findings, Cascade water resources, and any other factors the Board deems advisable.

When a municipality applies for membership, Cascade shall conduct a water supply audit according to the methodology and within the period determined by the Board. Audit results shall be provided to the Board and to the applicant.

If a membership offer is extended, it shall address the nature of the Water Supply Assets being transferred or retained and the "value" of those assets in terms of the calculation of an applicant's Demand Share, RCFCs and other matters relating to the rights and obligations of the applicant and Cascade, which must be recorded in the form that the Board determines and which will constitute, along with this Contract, the conditions under which an applicant becomes a Member of Cascade. An applicant for membership shall be admitted by adoption of a Resolution of the Board accepting the application for membership and incorporating the terms and conditions of membership.

Each membership application must be accompanied by a nonrefundable application fee based on the cost of the audit and other costs related to the admission of a new Member or a request for new supply. The Board shall set the application fee for each applicant based on the estimated cost of processing the application, including the cost of the audit.

As a condition of membership, each new Member admitted to Cascade shall, in addition to any other applicable fees, rates, charges or assessments, pay to Cascade the membership fee, as established by the Board.

If an applicant's planning process or plans are materially out of compliance with the requirements of the Growth Management Act, the Board may condition an offer of membership upon the applicant's compliance with that act.

Section 3.3 Conversion to Municipal Corporation Status. In accordance with Section 10.4, Cascade may be converted into a separate municipal corporation if, and as permitted by law. Upon the creation of such a separate municipal corporation, all Cascade rights and obligations and all Member rights and obligations under this Contract shall transfer to that new municipal corporation.

Section 3.4 Purposes. Cascade's purposes include only those related to water resources, and do not include the provision of other general services to the public, and are to:

a. provide a safe, reliable and high quality drinking water supply to meet the current and projected demands of Cascade Members serving the Central Puget Sound Region, and for Non-Members as determined by Cascade, and to carry out this task in a coordinated, cost-effective, and environmentally sensitive manner;

b. develop, contract for, manage, acquire, own, maintain and operate Water Supply Assets, including without limitation, surface water supplies, groundwater supplies, reclaimed water supplies, and other water supply resources as determined by the Board;

c. contract with Seattle to transfer to Cascade and to modify Seattle's rights and duties with respect to Seattle Contract Purveyors;

d. contract for, or assume certain contractual rights and duties related to the Tacoma Second Supply Pipeline project;

e. purchase and provide water supply, transmission services, treatment facilities and other related services;

f. provide conservation programs to promote the wise and efficient use of resources;

g. carry out emergency water supply and shortage management programs for its Members when demands exceed available supply;

h. coordinate and plan cooperatively with other regional or local water utilities and other entities to maximize supply availability and to minimize system costs;

i. develop a Water Supply Plan addressing the needs of its Members and develop a Watershed Management Plan serving the needs of its Members and Cascade itself and develop a regional water supply plan with other water providers as Cascade may find convenient or necessary to meet regional, state and federal planning requirements, and to take a leadership role in developing and coordinating those supply plans;

j. share costs and risks among Members commensurate with benefits received; and

k. carry out, or to further other water supply purposes that the Members determine, consistent with the provisions of this Contract.

Section 3.5 Powers. To further its purposes, Cascade has the full power and authority to exercise all powers authorized or permitted under RCW 39.34 and any other laws that are now, or in the future may be, applicable or available to Cascade and to engage in all activities incidental or conducive to the attainment of the purposes set forth in Section 3.4 of this Contract, including but not limited to the authority to:

a. acquire, construct, receive, own, manage, lease and sell real property, personal property, intangible property and other Water Supply Assets;

b. operate and maintain facilities;

c. enter into contracts;

d. hire and fire personnel;

e. sue and be sued,

f. exercise the power of eminent domain (through its Members at their individual discretion, unless and until Cascade has that power under applicable law);

g. impose, alter, regulate, control and collect rates, charges, and assessments,

h. purchase and sell water and services within and outside the geographical boundaries of its Members;

i. borrow money (through its Members or other entities at their individual discretion or as authorized by Chapter 39.34 RCW now or in the future), or enter into other financing arrangements;

j. lend money or provide services or facilities to any Member, other governmental water utilities, or governmental service providers;

k. invest its funds;

l. establish policies, guidelines, or regulations to carry out its powers and responsibilities;

m. purchase insurance, including participation in pooled insurance and self-insurance programs, and indemnify its Members, officers and employees in accordance with law;

n. exercise all other powers within the authority of, and that may be exercised individually by all of its Members with respect to water supply, conservation, reuse, treatment and transmission, or any of the other purposes set forth in Section 3.4;

o. exercise all other powers within the authority of, and that may be exercised individually by all its Members with respect to watershed planning and management; and_

p. exercise all other corporate powers that Cascade may exercise under the law relating to its formation and that are not inconsistent with this Interlocal Contract or with Chapter 39.34 RCW or other applicable law.

ARTICLE 4. Organization Structure; Board

Section 4.1 Composition, ByLaws and Meetings. Cascade is governed by a Board of Directors consisting of one individual representative appointed by Resolution of the Member's legislative authority. Members may similarly appoint Alternate Board Members. Each Board Member and each Alternate Board Member must be an elected official of the Member.

The Board shall adopt ByLaws consistent with this Interlocal Contract that specify, among other matters, the month of Cascade's Annual Meeting, Board powers and duties and those of the Executive Committee, Standing Committees, Officers and employees.

The Board shall meet as required by the ByLaws, but no less than quarterly.

Section 4.2 Powers of the Board. The Board has the power to take all actions on Cascade's behalf in accordance with voting provisions set forth in Section 4.3. The Board may delegate to the Executive Committee or to specific Cascade Officers or employees any action that does not require Board approval under this Contract.

Section 4.3 Voting. All Board actions must be approved by Dual Majority Vote of all Members, except where this Contract requires either a 65% Dual Majority Vote, as provided in Sections 5.2, 5.5, 7.1, 7.3, 8.3, 10.3, 10.4, and Article 11; or ratification by the Members' legislative authority, as provided in Section 10.4 and Article 11. The Board may act by voice votes, as set forth in the ByLaws. Any Member may require a recorded tabulation of votes either before or immediately after a voice vote is taken. Although voting is, in part, based on Weighted Vote, the Members expressly agree that there is only one class of voting membership, and voting occurs within that single class.

Any Member that has been declared to be in default of its obligations under this Interlocal Contract by the Board shall lose its right to vote until the Board has declared the default to be cured.

Section 4.4 Officers and Committees. Cascade Officers shall include a Chair, a Vice Chair, a Secretary and a Treasurer. The Chair serves as the chair of the Board (and may be known as the "President", if the ByLaws so designate) and performs those duties set forth in the ByLaws.

The Vice Chair shall perform the duties of the Chair in the Chair's absence and shall perform other duties as set forth in the ByLaws. The Secretary shall be responsible for Cascade records and performs other duties as set forth in the ByLaws. The Treasurer shall be responsible for Cascade accounts and financial records and performs other duties as set forth in the ByLaws.

Consistent with the provisions of this Contract, the Board may, in the ByLaws, establish additional Officers and set forth their duties.

The Board may create and appoint Members to Standing Committees and special committees as it deems appropriate. Committee Members need not be elected officials or employees of Members, but Standing Committee Chairs must be Board Members or Alternate Board Members.

Section 4.5 Executive Committee. The Chair, Vice Chair, Secretary, Treasurer and chairpersons of Standing Committees together constitute Cascade's Executive Committee. The Chair (or acting Chair) shall vote on matters before the Executive Committee only if necessary to break a tie. The Executive Committee's duties and responsibilities are set forth in the ByLaws. The Executive Committee shall not have the power to:

a. approve any contract for a term longer than three years;

b. approve any contract involving expenditure by, or revenue to Cascade in excess of such amounts and under such circumstances as set forth in the ByLaws;

c. retain or dismiss the chief executive officer or determine the chief executive officer's compensation; or

d. take any actions expressly reserved to the Board by this Contract or the ByLaws.

The Executive Committee shall have the authority, if necessary, to avoid default on any Bond, to withdraw from any capital reserve fund or rate stabilization fund, an amount equal to the amount necessary to avoid a default and to authorize payment of that amount to avoid default.

Section 4.6 Staff, Consultants and Contractors. Cascade staff shall consist of a chief executive officer and other positions established by the Board. The Board shall appoint, designate the title of, and establish the compensation range of the chief executive officer. The Board shall hire or retain legal counsel and independent accountants and auditors for Cascade. The authority to hire other consultants may be delegated to the Executive Committee. The chief executive officer appoints persons to fill other staff positions, and those appointments may be subject to ratification by the Board or the Executive Committee if the ByLaws so provide. The Board may also provide that administrative, professional or technical services be performed by contract.

Section 4.7 Budget; Dues; Financial Management. The Board must approve an annual budget determining Cascade's revenues and expenditures no later that sixty (60) days before the beginning of the fiscal year in which that budget will be in effect. The budget will be developed and approved according to a schedule established by the ByLaws. The budget must identify the levels of Member Charges on which revenue projections are based. The Board may amend the budget.

Each Member must pay annual dues to defray part of Cascade's administrative costs based on the number of CERUs served by its water system, regardless of water usage or capacity, and regardless of whether those units are served by the Supply System or by Independent Supply. Total dues collected from all Members may not exceed the greater of $1,000,000.00 or 5% of Cascade's annual revenue requirement, less debt service. The Board may establish minimum annual dues per Member and may provide that less than all of a Member's CERUs be taken into account in establishing dues.

All Cascade books and records shall be open to inspection by the Washington State Auditor.

ARTICLE 5. Asset Development and Supply Commitment

Section 5.1 Property Acquisition, Ownership and Disposition. Cascade may construct, purchase, rent, lease, manage, contract for, or otherwise acquire and dispose of Water Supply Assets and other assets. Cascade may control and manage both the assets it owns and the assets that are owned by Members that have transferred control and management of those assets to Cascade. This Contract does not vest in Cascade any authority with respect to Members' other facilities or assets, such as Water Supply Assets retained by Members as Independent Supply.

Subject to Cascade's agreement, a Member may transfer to Cascade its title to, or operational control and management of Water Supply Assets. Water Supply Assets may also be fully retained by Members as Independent Supply, subject to the provisions of Article 6. At the discretion of the Board, Cascade may accept title to, or operational control and management of Water Supply Assets offered by Members or accept supply assets that constitute all or part of a Member's Satellite System(s). The Board may accept supply assets subject to the terms and conditions arranged between Cascade and the Member, based on the result of the audit process and mutual needs.

Cascade may enter into Asset Transfer Agreements which shall provide for the terms and conditions of: (a) Cascade's operation of the transferred Water Supply Asset with respect to the Member transferring the asset; (b) Cascade's operation, maintenance and replacement of the Water Supply Asset as part of the Supply System; (c) return or disposition of the Water Supply Asset if Cascade terminates its existence or the Member withdraws; (d) continuation of service (if appropriate) to Members or former Members by the Member receiving the Water Supply Asset at reasonable rates and charges or payment to Cascade of the cost of replacing the Water Supply Asset; and (e) such other conditions as the Board and the Member agree upon.

Members shall not be deemed to hold legal ownership rights in any Water Supply Assets owned by Cascade, whether those Water Supply Assets have been developed by, purchased by, or transferred to Cascade, and regardless of the accounting treatment of RCFC payments and other payments made to Cascade.

Section 5.2 Supply Commitment

Section 5.2.1 Commitment to Members. Beginning on the Cascade Supply Date, Cascade shall provide a Full Supply Commitment to each Founding Member. Thereafter, Cascade shall provide a Full Supply Commitment to meet all current and future water supply needs of a Member that joins with Water Supply Assets sufficient to provide for its needs during the following fifteen (15) years (whether or not those Water Supply Assets are transferred to Cascade or retained as Independent Supply) commencing on the Member's Cascade Supply Date. When a supply contract is negotiated with Seattle, any Member that is a Seattle Contract Purveyor shall relinquish its rights under its Seattle Water Purveyor Contract to Cascade and execute such documents as may be necessary to transfer those rights to Cascade. Cascade shall accept those rights and a corresponding obligation to provide a Full Supply Commitment (net of Independent Supply). The approval of a contract with the City of Seattle providing for the initial acquisition of rights to substantial Water Supply Assets, and any material amendment to that contract, shall be effective upon a 65% Dual Majority Vote.

Any Full Supply Commitment shall be subject to water shortages, to Cascade's ability to implement the Water Supply Plan, and to the portion of the Member's needs that can be served by the audited capacity of its Independent Supply. If the needed supply is not available, the shortage shall be shared by all the Members in accordance with Cascade's shortage management plan, except as otherwise provided in Section 5.5. Cascade is not obligated to provide water supply to service area expansions in or outside the urban growth boundary, unless Cascade agrees to such expanded service area. However, Cascade shall be obligated to provide water supply to the entire service area of each Member (as that service area is defined in terms under which the Member was admitted), whether or not some of that service area is within the Member's current jurisdictional boundaries and/or within the current urban growth boundary. Cascade is not obligated to provide increased water supply to any Member if it is determined that the Member's planning process or plans are materially out of compliance with the requirements of the Growth Management Act.

A Member that joins with Water Supply Assets insufficient to provide for its needs for fifteen (15) years receives the Full Supply it desires only if, when, and to the extent it is available within reliability standards determined by Cascade's system reliability methodology. If sufficient Full Supply is not available within reliability standards determined by Cascade's system reliability methodology, the Member receives partial Full or Interruptible Supply, and Full Supply must be provided within fifteen (15) years. Cascade shall then undertake to include in Cascade's Water Supply Plan, and to acquire the facilities or other assets necessary in the Board's determination to provide for that deficit. If Cascade fails to develop sufficient assets to timely provide the increased Full Supply, the commitment becomes a Full Supply Commitment at the end of that fifteen- (15) year period, and any shortage shall be shared by all Members in accordance with Cascade's shortage management plan.

If multiple Members request new Full Supply, requests must be honored in the order received (i.e., in the order in which application is made accompanied by the application fee). With respect to new Members, requests for Full Supply "vest" no earlier than the date that membership is effective. In cases of conflict or ambiguity, the Board may determine the order of requests.

Section 5.2.2 Additional Rules for Members Retaining Independent Supply. Whenever Cascade has a Supply Commitment to a Member that retains Independent Supply, Cascade shall provide Full Supply for all of that Member's water supply needs minus the amount of water that an audit determines may be provided by that Member's Independent Supply. Members are not required to share shortages resulting from the loss of all or part of Independent Supply, although Cascade may make Interruptible Supply available to a Member that loses Independent Supply at prices that are consistent with the price of Interruptible Supply being made available to others at that time. Cascade may at any time and at its cost and expense carry out audits of a Member's Independent Supply.

A Member requesting an additional Full Supply Commitment due to loss of Independent Supply shall make that request by Resolution of the requesting Member's legislative authority. When and as determined by the Board, the Member shall pay an amount equal to the RCFCs allocable to the number of CERUs that can be served by the replacement supply provided or to be provided by Cascade. Cascade shall then include the supply in its Water Supply Plan, and provide the supply when it becomes available, but in any event within fifteen (15) years. If, within fifteen (15) years the supply is not available, Cascade's commitment becomes a Full Supply Commitment and any shortage with respect to that supply must be shared by all the Members in accordance with the Shortage Management Plan, except as otherwise provided in Section 7.3.

Section 5.2.3 Additional Rules for Source Exchange. The Board may, at its sole discretion, authorize a Cascade Source Exchange Program Agreement with a Member or Non-Member. The terms and conditions of a Cascade Source Exchange Program Agreement shall be developed from a source exchange proposal submitted to the Board. The agreement shall identify: (a) the water right (instantaneous and annual) to be augmented or replaced; (b) the Water Supply Assets to be utilized; (c) mechanisms and arrangements for delivery of regional water; (d) characteristics of supply obligation (for example, peak and average quantities, seasonal or annual delivery, duration, interruptibility and shortage management); (e) reporting requirements; (f) changes in operation needed to benefit stream flow and fish; (g) rates and charges; and (h) such other conditions as the Board and the Member or public water supplier agree upon. The agreement may or may not provide for adjustments to a Member's RCFC payments or credits and whether or not the source exchange is a loss of a Member's Independent Supply that would be subject to the provisions of Section 5.2.2.

Section 5.3 Financing of Assets. The acquisition of new capital facilities and other Water Supply Assets may be financed using RCFCs, transfers of Water Supply Assets, Rates and Charges, the issuance of revenue Bonds and such other sources as the Board may deem appropriate.

Section 5.3.1 Issuance of Bonds. An Authorized Issuer may issue Bonds payable from and secured solely by all or a portion of Net Cascade Revenue, evidencing indebtedness up to an amount approved by Resolution of the Board in order to provide financing or refinancing to acquire, construct, receive, own, manage, lease or sell real property, personal property, intangible property and other Water Supply Assets, to establish debt service reserves, to provide for capitalized interest and to pay the costs of issuance of, and other costs related to the issuance of the Bonds. Such Bonds shall be payable solely from all or a portion of the Net Cascade Revenue or (if the Authorized Issuer is other than Cascade) from payments to be made by Cascade out of all or a portion of Net Cascade Revenue, and such Bonds shall not pledge the full faith and credit or taxing power or, except as expressly provided by contract, the revenue, assets or funds of any Member.

Members serving as Authorized Issuers may conduct the financing through "separate systems" permitted by their applicable bond resolutions, or in some other appropriate manner, and Cascade may compensate those Members for all costs associated with the financing. Bond-related documents of Authorized Issuers other than Cascade must expressly permit the Bonds to be refunded or prepaid without penalty prior to their stated maturity, on and after such dates as are approved by the Authorized Issuer and the Board, to allow for a transfer of the obligation to Cascade or to Cascade's successor entity, including without limitation a joint operating agency or similar entity, as may be permitted by law.

Section 5.3.2 Pledge of Revenues. For as long as any Bonds payable from Net Cascade Revenue (or any portion thereof) are outstanding, Cascade irrevocably pledges to establish, maintain and collect all Member Charges in amounts sufficient to pay when due the principal of and interest on the Bonds (and, if the Authorized Issuer is other than Cascade, in addition to the foregoing pledge, to pledge to make timely payments to that Authorized Issuer for the payment of principal of and interest on the Bonds), together with amounts sufficient to satisfy all debt service reserve requirements, debt service coverage requirements, and other covenants with respect to the Bonds.

Each Member hereby irrevocably covenants that it shall establish, maintain and collect rates, fees or other charges for water and other services, facilities and commodities related to the water supply it receives from Cascade and/or its water utility at levels adequate to provide revenues sufficient to enable the Member to: (a) make the payments required to be made under this Contract; and (b) pay or provide for payment of all other charges and obligations payable from or constituting a charge or lien upon such revenues. Each Member hereby acknowledges that this covenant and its covenant in Section 7.9 of this Contract may be relied upon by Bond owners, consistent with this Contract.

Each Member shall pay the Member Charges imposed on it whether or not the Water Supply Assets to be financed through the issuance of Bonds are completed, operable or operating, and notwithstanding the suspension, interruption, interference, reduction or curtailment in the operation of any Water Supply Assets for any reason whatsoever, in whole or in part. Member Charges shall not be subject to any reduction, whether by offset or otherwise, and shall not be conditioned upon the performance or nonperformance of any Member, or of any entity under this or any other agreement or instrument. However, credits against future RCFCs and Rates and Charges described in Sections 5.5 and 7.5, respectively, for development or addition of excess capacity that is either transferred to Cascade or retained as Independent Supply, shall not be considered "offsets" or "reductions" for the purposes of this Section.

If, in connection with the issuance of obligations, any Member establishes a new lien position on revenues relating to its water utility, that Member shall covenant in the relevant documents that the amounts to be paid to Cascade as Member Charges shall be treated either: (a) as part of that Member's internal operation and maintenance costs payable prior to debt service on those obligations; and/or (b) for any portion of those Member Charges that is allocable to capital costs, as a contract resource obligation payable prior to debt service on those obligations. If any Member has existing outstanding revenue obligations relating to its water utility, it shall include substantially similar "springing covenants" in the documents relating to any new parity obligations.

Section 5.3.3 Continuing Disclosure. To meet the requirements of United States Securities and Exchange Commission ("SEC") Rule 15c2-12(b)(5) (the "Rule") as applicable to a participating underwriter for any Bonds and any obligation of each Member as an "Obligated Person" under the Rule, Cascade and each Member agree to make an appropriate written undertaking, respectively, for the benefit of holders of the Bonds consistent with the requirements of the Rule.

Section 5.3.4 Preservation of Tax Exemption for Interest on the Bonds. Each Member covenants that it will take all actions necessary to prevent interest on tax-exempt Bonds from being included in gross income for federal income tax purposes, and it will neither take any action nor make or permit any use of proceeds of tax-exempt Bonds or other funds treated as proceeds of those Bonds at any time during the term of those Bonds that will cause interest on those Bonds to be included in gross income for federal income tax purposes.

Section 5.3.5 Additional Certificates. Each Member further agrees to provide such certificates or verifications as are reasonably requested by an Authorized Issuer in connection with the issuance of Bonds under this Section.

Section 5.4 Supply Expansions and System Extensions. Cascade must provide for Supply System expansions and extensions to meet the needs of additional water customers of Members, subject to consistency with applicable growth management plans and comprehensive plans, Cascade's water supply plan, orderly asset development, reasonable cost and financing capacity. The Board shall establish a water supply development process, including criteria governing the evaluation of new projects, and that process must promote equality of costs and services (other than direct local services), regardless of geographic location. The results of the water supply planning process must be reflected in Cascade's Water Supply Plan. The Board shall have the authority to undertake new projects identified in Cascade's Water Supply Plan for the expansion of Water Supply Assets and regional transmission system extensions to meet Members' projected needs. To reduce costs, Cascade may, to the extent that the Board deems advisable, enter into agreements with Members to wheel water through their existing systems. When facilities are constructed that are used partially by Cascade for wheeling water and partially by Members or other entities for their purposes, the Board may determine an appropriate Cascade contribution to the cost of those facilities. Existing arrangements among Members (and between Members and Non-Members), in place when a Member joins Cascade, remain unaffected except as otherwise agreed between Cascade and the other entities concerned.

Section 5.5 Regional Capital Facilities Charges. To allocate growth costs to those Members that require capacity increases, each Member shall pay to Cascade an RCFC for each new CERU connected to its water distribution system. Growth in water usage by existing CERUs is not subject to RCFCs unless that growth constitutes a CERU increase as provided in the RCFC Methodology. Members with a supply deficit must pay an RCFC commensurate with that deficit. To the extent that a Member transfers to Cascade or retains as Independent Supply water supply in excess of its needs, it receives a corresponding credit against future RCFCs.

Subject to the provisions of Section 5.2.2, a Founding Member pays no RCFCs with respect to the number of CERUs served as of January 31, 2003, or other such later date as determined by Resolution of the Board.

A new Member with adequate supply shall commence paying RCFCs fifteen (15) years prior to the date that its Water Supply Assets are projected to be insufficient to provide for its needs as determined by the Board (taking into consideration the results of the Water Supply Audit).

A Member that joins with Water Supply Assets that are projected to be insufficient to provide for its needs for fifteen (15) years shall immediately pay RCFCs for the number of CERUs representing the deficit as determined by the Board.

RCFCs shall be calculated according to the RCFC Methodology, which shall define the analytical steps required to calculate the RCFCs according to the greater of: (a) the incremental difference between the average unit cost of expanding the system (i.e., the marginal cost of new capacity) and the average unit cost of the existing system; or (b) the average unit cost of past construction of the existing system plus then-planned Supply System improvements. The methodology shall provide for an annual escalator, recalculation and update not less frequently than every fifth year, and a methodology for determining CERUs. The RCFCs shall be imposed on the Member for each new CERU of that Member in accordance with the terms of this Contract. Amendments to the RCFC Methodology shall require a 65% Dual Majority Vote.

If a Founding Member owns Water Supply Assets or transfers Water Supply Assets to Cascade under Section 5.1, to the extent the audited capacity of those assets (including Seattle Contract Purveyor rights) exceeds the Member's needs, that Member shall receive a credit against future RCFCs. If a Member seeks to transfer assets substantially in excess of its foreseeable needs, Cascade may negotiate appropriate compensation arrangements for the transfer.

Members that develop new Independent Supply that is approved by the Board in accordance with Article 6, similarly receive a credit effective when the Independent Supply is placed in service as determined by the Board.

A Member that accepts ownership of a Satellite System that Cascade agrees to serve shall pay an RCFC for the amount of supply needed to serve that system in excess of its rated capacity.

Members that experience a net reduction in the number of CERUs served shall receive a CERU-for-CERU credit against future RCFCs.

RCFC credits may not be transferred among Members without Board approval.

Members shall not be required to pass RCFCs to their customers as capital facilities charges, but may provide for the payment of RCFCs in whatever manner they deem appropriate.

For Members joining with an unmet net supply need, Cascade may, under circumstances determined by the Board, require the prepayment of RCFCs allocable to the full amount of the requested supply, i.e., when funds are needed to begin the construction of facilities immediately.

Section 5.6 Transfer Upon Mergers, Consolidations and Assumptions. If: (a) two or more Members merge or consolidate; (b) a Member or a Non-Member assumes jurisdiction of part or all of a Member; or (c) a Member assumes jurisdiction of part or all of a Non-Member, the jurisdictions' water supply rights from and obligations to Cascade must be transferred or assumed under applicable law and consistent with the requirements of this Contract and the obligations of Cascade.

ARTICLE 6. New Independent Supply

Members may not bring new Water Supply Assets on-line as Independent Supply without Board approval. That approval may be granted or denied following an evaluation process, based on whether the Board determines that development of the proposed Independent Supply will benefit or be adverse to the interests of the Members as a whole. Recognizing that in certain circumstances the acquisition of additional Independent Supply might benefit (or cause no material harm to) the Members, new supplies under one (1) MGD may be approved by the Board regardless of the provisions of the Water Supply Plan and without a formal evaluation process.

New supplies in amounts greater than one (1) MGD must be described in and be consistent with the Water Supply Plan.

Members that have invested in the development of new Independent Supply assets may offer to sell their interest in such assets to Cascade. Cascade may, in its sole discretion and subject to mutually agreeable terms and conditions, purchase the Member's interest in such Independent Supply asset by reimbursing or otherwise compensating the Member for its investment in the project to the extent that investment has been capitalized. Once Cascade has purchased a Member's interest in a project, the project will be considered a Water Supply Asset of Cascade and be incorporated into the Water Supply Plan.

ARTICLE 7. Asset Management

Section 7.1 Supply System Management. Cascade is responsible for managing, on behalf of all Members, the Supply System. Cascade is not responsible for managing Independent Supply unless it has expressly agreed to do so. Supply System management responsibilities shall be governed by Cascade's system management plan adopted by the Board. Cascade's system management plan concerns, without limitation, matters such as daily system operations and maintenance, interface with other supply providers, contractual obligations, water quality, billing, management and administration. Cascade may delegate and/or contract out its Supply System responsibilities.

Cascade must manage the Supply System in compliance with applicable laws, regulations and Cascade's minimum service standards. Adoption and amendments to the minimum service standards shall require a 65% Dual Majority Vote.

Section 7.2 Conservation. Cascade shall develop and carry out, and Members must participate in, water conservation programs that are uniform among Members. The Board shall develop and implement a Cascade conservation management plan that provides a mandatory base conservation program that functions to reduce both average and peak demands and may establish a charge or assessment to fund development and implementation of the program. Members may implement additional conservation programs. The Board may adopt wholesale charges in addition to normal Demand Share charges to encourage resource conservation. The Board may also provide or contribute to additional local conservation programs that are not offered to all Members, and these local programs may be locally funded or funded by Cascade. Members that fail to comply with base programs as set forth in Cascade's conservation management plan may be required to assume a disproportionate reduction in water supply or to pay penalty charges, or both.

Section 7. 3 Shortages and Emergency.

Section 7. 3.1 Shortages. Members must respond to water shortages in a collective, shared fashion under a Cascade shortage management plan adopted by the Board. Resources must be shared in a manner that reduces the risk of severe shortages to each Member. Cascade's shortage management plan may include without limitation, a definition and classification of shortages, a shortage contingency plan including mandatory programmatic actions among all Members in the event of shortages, allocation of authority for determining and responding to shortages, and a communications and outreach program for the public. Members shall not be required to implement Cascade's shortage management plan in areas not served by the Supply System.

In the event of shortages, Cascade shall reduce or halt Interruptible Supply before invoking the Shortage Management Plan with respect to all Members with a Full Supply Commitment. However, the Board may, by 65% Dual Majority Vote, continue service in the amounts it deems appropriate to one or more Members receiving Interruptible Supply.

The Board may require that Members failing to comply with mandatory shortage management programs implemented under Cascade's shortage management plan assume a disproportionate reduction in supply or pay penalty charges, or both.

In the event of a Cascade-wide water shortage, Members with Independent Supply may, without penalty, decline to participate in the shortage management program for that shortage by foregoing all supply from Cascade for the duration of the emergency or shortage.

To avoid shortages resulting from emergencies or the inability to develop sufficient supplies, the Board may, by 65% Dual Majority Vote, establish moratoria on connections or additional commitments for future water services by the Members. A moratorium may be discontinued by a Dual Majority Vote of the Board.

Section 7. 3.2. Emergency. The Board shall include in Cascade's shortage management plan policies and procedures for addressing short-term disruptions of water supply, transmission or water quality, and it may delegate to the General Manager authority to address such disruptions according to such policies and procedures.

Section 7.4 Water Quality. Cascade shall be responsible for water quality that meets or exceeds all federal or state requirements at the point of delivery from Cascade to the Member, consistent with applicable laws and regulations. Cascade assumes source water quality responsibility and liability with respect to Water Supply Assets under its ownership or control (including water wheeled to a Member through another Member's facilities). Cascade is also responsible for preparing and carrying out water quality activities compatible with the water quality requirements of regional water suppliers integrated with Cascade's system (e.g., Tacoma, Everett and Seattle).

Cascade may, in its sole discretion, determine and adjust the appropriate method and level of treatment of water that it supplies, so long as that water meets applicable state and federal requirements. If water that it supplies meets those requirements, Cascade shall not be obligated to adjust the method or level of treatment so that the water can be more readily blended with a Member's Independent Supply or more readily transmitted through a Member's internal system. Each Member shall remain responsible for water quality within its respective distribution system, assuming that adequate water supply quality is provided by Cascade at the point of delivery from Cascade.

Each Member shall be responsible for all costs related to making water supplied by Cascade compatible with that Member's internal system, including but not limited to, costs of additional treatment.

Section 7.5 Water Supply Rates and Charges. The Board shall set Rates and Charges according to a Rate Calculation Methodology adopted from time to time by the Board. The Rate Calculation Methodology for Members' Supply Commitment shall provide for the definition and calculation of Demand Shares and for a uniform pricing structure with a commodity charge and fixed charges allocated by Demand Share.

Cascade may sell water to a Non-Member under terms and conditions established by the Board. The terms and conditions shall not be more favorable than the terms and conditions under which water is sold to Members. Revenue received from the sale of water to Non-Members shall be used to offset or reduce Rates and Charges to Members to the extent practicable, except that such revenue need not be treated as reducing or offsetting those amounts that are necessary for the payment of debt service on Bonds and for the provision of reserve and coverage requirements for the Bonds.

A Member shall be assigned a Demand Share based on the Board's best estimate of capacity to be used by that Member. Initially, the Board may base its estimate on a Seattle Contract Purveyor's use of water from Seattle. For a Member that joins without a supply history as a Seattle Contract Purveyor, or for a Member that has received only part of its water from Seattle, the Demand Share shall be established based on an audit of that Member's past three (3) years of water use. After three (3) years as a Member, the baseline demand and capacity obligation for that Member shall be fixed based on actual experience as a Member. Specific Demand Shares may be set by the Board to account for circumstances, such as (by way of example and not by limitation) costs of extending the Supply System to a Member, or when Independent Supplies affect regional demand patterns. When water supply from Cascade is wheeled through a Member to another Member, Cascade may presume that the first Member receiving the water is the "User" for calculation of Demand Shares unless the Members concerned instruct Cascade to use a different allocation. Rate credits for Water Supply Asset transfers are not deducted in the calculation of Demand Shares but are applied to reduce what a Member would otherwise pay.

The Board must set Member Charges at levels it determines to be sufficient, together with other available revenue sources, to provide adequately for Operation and Maintenance Costs, Bond debt service, coverage and other covenants, replacement and renewal of facilities, reserves and other costs that the Board deems appropriate. The Board may provide that a Member's failure to participate in the planning process may result in penalty charges.

A Member that has transferred Water Supply Assets shall receive a credit, determined when those assets are audited and transferred, based on the useful life of those facilities and on the Member's use of the water produced by those assets or an amount of water equivalent to the amount of supply from them.

The Board may implement wholesale charges (additional to Demand Share-based charges and variable commodity charges) to reduce extreme peak use (e.g., "peaking-off of the pipe").

Water Rates and Charges must be the same for all Members receiving the same class of service (subject to credits, surcharges and penalty charges).

Section 7.6 New Water Surcharge.

A new water surcharge of $0.75 per 100 cubic feet (ccf) shall be imposed, effective on the Cascade Supply Date, and continue through December 31, 2011. It shall be applicable to all water purchased by Members over and above each Member's Old Water Allowance in the Seattle Purveyor Contract, if applicable, or to all water purchased by non-Seattle Purveyor Members. New water surcharge revenues shall be used to offset or reduce Rates and Charges to Members to the extent practicable, except that such revenue need not be treated as reducing or offsetting those amounts that are necessary for payment of debt service on Bonds and for the provision of reserve and coverage requirements for the Bonds.

Section 7.7 Franchises and Easements. Except to the extent otherwise required by state law, each Member shall provide franchises and rights of way on, under or across that

Member's streets or other property, to Cascade and to other Members for Water Supply Assets, without charging any fees, rent or charges other than the customary and usual right-of-way permit and inspection fees.

Section 7.8 Sales of Water to Non-Members. Unless approved by the Board, a Member shall not sell water, including source exchange water, supplied by Cascade, nor shall a Member sell Independent Supply offset by water supplied by Cascade, to a Non-Member. Notwithstanding the foregoing, any Member may sell water supplied by Cascade to a Non-Member to the extent required by a contract in effect as of the date the Member joins Cascade.

Section 7.9 Payment Procedures; Default; Step-Up Provisions.

Section 7.9.1 Invoice and Payment.

(a) Cascade shall provide each Member with periodic invoices showing the Member Charges payable by that Member for the billing period and the due date. Invoices shall be provided monthly or on other such periodic schedule as determined by the Board, but no more frequently than monthly nor less frequently than once every six months. The Board will determine a due date for all invoices.

(b) Payment of any and all invoices shall be due and payable on or before the due date, and shall be made by wire transfer or such other means as are agreed to by Cascade and the Member. If a treasurer, trustee, fiscal agent or escrow agent is appointed in connection with the issuance of Bonds, Cascade may require, and specify on the invoice, that certain amounts be provided directly to that person or entity, and the Member shall pay those amounts in the manner and to the person so specified.

(c) If full payment of any invoice is not received on or before the due date, such payment shall be considered past due and a late payment charge shall accrue for each day that the invoice remains unpaid. The late payment charge shall equal the product of the unpaid amount and an interest rate established by the Board. Late payment charges shall continue to accumulate until the unpaid amount of the invoice and all late payment charges are paid in full. Further, if an invoice or any portion thereof remains unpaid for more than sixty (60) days after the due date, Cascade may pursue any legally available remedy at law or equity for the unpaid amount, including without limitation, specific performance and collection of the late payment charge. Cascade's right to enforce payments in this regard may be assigned to a treasurer, trustee, credit enhancement provider or other entity. Furthermore, upon written notice, Cascade may reduce or suspend delivery of water until the invoice and late payment charges are paid.

(d) If any Member disputes all or any portion of an invoice, it shall notify Cascade immediately upon receipt. If Cascade does not concur, the Member shall remit payment of the invoice in full, accompanied by written notice to Cascade indicating the portions of the invoice that the Member disputes and the reasons for the dispute. The Member and Cascade shall make a good faith effort to resolve such dispute. If the Member fails to remit payment of the invoice in full pending resolution of the dispute, the prevailing party in an action relating to the collection of that invoice shall be entitled to reasonable attorney fees and costs.

Section 7.9.2 Default and Step-Up.

(a) If any Member fails to make any payment in full for more than fifty (50) days past the due date, Cascade shall make written demand upon that Member to make payment in full within ten (10) days of the date that the written demand is sent by Cascade. If the failure to pay is not cured within the ten (10) day period, the Member shall be deemed to be in default.

(b) Upon an event of default as described in subsection 7.9.2(a), the other Members shall pay Cascade (in addition to Member Charges otherwise due) the defaulting Member's Member Charges in proportion to each remaining Members' Demand Share in accordance with a schedule established by Resolution of the Board.

(c) The payment of a proportionate share of the existing defaulted Member's Member Charges by Members shall not relieve the defaulting Member of its liability for those payments. Cascade shall have a right of recovery from the defaulting Member on behalf of each Member. Cascade may commence such suits, actions or proceedings at law or in equity, including but not limited to suits for specific performance, as may be necessary or appropriate to enforce the obligations of this Contract against any defaulting Member. Cascade's right to enforce payments in this regard may be assigned to a treasurer, trustee, credit enhancement provider or other entity. Amounts recovered by Cascade as payment of amounts due shall be passed through to each Member in proportion to the share that each assumed, in cash or in credit against future Member Charges as the Board shall determine.

(d) The prevailing party in any such suit, action or proceeding, shall be entitled to recover its reasonable attorney fees and costs against the defaulting Member.

ARTICLE 8. Planning

Section 8.1 Water Supply Plan. Cascade must plan for its Members' water supply needs. That planning shall be to be compatible with the equivalent planning responsibilities of other wholesale water providers and with state, county and city planning responsibilities under the Growth Management Act. The Board must adopt, and may from time to time amend, a Water

Supply Plan that must be based on no less than a twenty- (20) year planning horizon. Cascade shall coordinate its planning effort with local and regional utilities and other appropriate agencies and work to encourage cooperative region-wide planning and coordination.

Each Member shall actively participate in Cascade's water supply planning and shall provide to Cascade accurate data regarding its facilities and operations together with good-faith estimates of future needs and a description of any involvement in the development of new Independent Supplies. Each Member's water comprehensive or system plan shall be consistent with any plans adopted by Cascade, and shall be consistent with applicable requirements of the Growth Management Act and comprehensive plans.

Section 8.2 Watershed Management Plan. Cascade may adopt Watershed Management Plans, as appropriate, for the watersheds within its service area provided that a Watershed Management Plan may take the place of, or may be incorporated into a Cascade Water Supply Plan. In fulfilling its responsibilities for watershed management, Cascade may enter into interlocal agreements with Non-Member municipalities to engage in watershed management, including development of Watershed Management Plans and the implementation and financing of such plans.

Section 8.3 System Reliability Methodology. Cascade shall develop and adopt a system reliability methodology for planning, operation and management purposes. Adoption and amendments to the system reliability methodology shall require a 65% Dual Majority Vote.

ARTICLE 9. Filings

This Contract must be filed with the King County Office of Records and Elections or with any other applicable county auditor, in accordance with RCW 39.34.040, and must be submitted for review by the Washington State Department of Health and the Washington State Department of Ecology, in accordance with RCW 39.34.050.

ARTICLE 10. Duration and Dissolution; Withdrawal

Section 10.1 Duration. Except as provided in Section 10.3, Cascade shall remain in existence for the longer of the following: (a) the period it holds any assets; (b) the period during which Bonds are outstanding; or (c) the period it continues to include Members.

Section 10.2 Withdrawals. A Member may notify Cascade of its intent to withdraw by delivery to Cascade of a Resolution of its legislative authority expressing such intent. Upon receipt of such Resolution, the Member shall lose its right to vote and the Board shall determine: (a) the withdrawing Member's allocable share of the cost of the then-existing obligations of Cascade; and (b) the withdrawing Member's obligations to Cascade. "Then-existing obligations of Cascade" means obligations or costs incurred by Cascade as of the date the Member's withdrawal notice is received, including but not limited to Bond obligations, contract obligations and cash financed capital projects; provided that a withdrawing Member's allocable share shall in no event include an obligation for future expenses for which Cascade has not incurred a legal obligation; and provided further, that to the extent the Member's obligation (with respect to such costs) is re-paid over time, the Member shall be entitled to a credit for supply abandoned by the Member and is otherwise used by Cascade. A "withdrawing Member's obligation to Cascade" includes but is not limited to, the Member's share of fixed operating costs, any other expenses contained in Cascade's adopted budget for that year, and any assessments or other similar charges lawfully imposed by Cascade. For purposes of the preceding sentence, "fixed operating costs" shall be determined in the year of withdrawal, and the Member's obligation with respect to such costs shall be limited only to that amount required to pay for supply abandoned by the Member and not otherwise used by Cascade.

The allocable share of cost or obligations shall be determined by the Board, taking into consideration as deemed applicable by the Board: (a) the ratio of the Member's Demand Share to total Member demand; (b) the ratio of the Member's contribution to Cascade revenue to total Cascade revenue including RCFCs; (c) the cost or a portion of the cost of capital projects or facilities specially benefiting the Member; and (d) and any other factor the Board deems appropriate to consider. The Member's withdrawal shall be effective on payment of such allocable share or provision for arrangements to pay such allocable share that are satisfactory to the Board. Until the effective date of withdrawal, the Member shall continue to comply with all applicable provisions of this Interlocal Contract.

Upon withdrawal, except as provided in an Asset Transfer Agreement, the withdrawing Member shall have no right to, or interest in any Water Supply Assets owned by Cascade. The withdrawing Member shall be deemed to have abandoned any and all rights to service, to the use of Cascade Water Supply Assets or other rights with respect to Cascade (except as otherwise expressly provided in this Contract).

Notwithstanding the provisions of this Section 10.2, Cascade will, upon the withdrawal of a Member that has transferred operational control and management of (but not title to) an Independent Supply Asset to Cascade under Section 5.1, return operational control of such asset to the withdrawing Member. Return of operational control and management will be subject to: (a) continued use by Cascade, to the extent and for such time as the Board deems such use necessary for Cascade to continue providing service to its Members; and (b) payment or provision for payment of any Cascade costs, including but not limited, to those associated with the withdrawing Member's Independent Supply Asset.

The Board may establish additional generally applicable conditions and requirements for withdrawal.

Section 10.3 Dissolution. Cascade may be dissolved by a 65% Dual Majority Vote. Upon dissolution, except as provided in an Asset Transfer Agreement, Cascade's assets initially shall be held by its then current Members as tenants in common. Each Member's ownership interest must be based on that Member's Demand Share as of the time of the dissolution. Cascade's liabilities (including Bonds and other contractual obligations) initially shall be distributed based on Members Demand Shares as of the time of the dissolution. Assets and liabilities must be distributed in accordance with agreement or contract, under a voluntary mediation process, or by a court of law. A court may appoint an arbitrator or special master. Distribution shall be based on the best interests of efficient and economic water supply in the entire area served by the Members, subject to a rebuttable presumption that Water Supply Assets will be returned to the Member that originally transferred them to Cascade. That presumption may be overcome by a showing that another asset distribution is in the best interests of efficient and economic water supply. The proceeds of any sale of assets must be distributed among the then current Members based on the Demand Shares at the time of dissolution.

Section 10.4 Successor Entity. Notwithstanding the provisions of Section 10.3, upon a 65% Dual Majority Vote (ratified within one hundred and twenty (120) days by 65%), as measured by Dual Majority Vote of the Members' legislative authorities, all assets, liabilities, and obligations of Cascade may be transferred to any successor entity (including without limitation, a joint operating agency or other municipal corporation, as permitted under state law), and all obligations of Members and parties contracting with Cascade become obligations to the successor entity.

ARTICLE 11. Amendments.

Amendments to this Contract shall be effective upon approval by 65% Dual Majority Vote (ratified within one hundred and twenty (120) days by 65%), as measured by Dual Majority Vote of the Members' legislative authorities.

ARTICLE 12. Applicable Law and Venue.

This Contract is governed by the laws of the state of Washington. The venue for any legal action arising from a dispute under this Contract is the Superior Court for King County.

ARTICLE 13. No Third Party Beneficiaries.

There are no third-party beneficiaries to this Contract except for the rights of Bond owners as provided in Section 5.3.2, no person or entity other than an agency signatory to this Contract shall have any rights hereunder or any authority to enforce its provisions, and any such rights or enforcement must be consistent with and subject to the terms of this Contract.

ARTICLE 14. Severability.

If any provision of this Contract or its application is held by a court of competent jurisdiction to be illegal, invalid, or void, the validity of the remaining provisions of this Contract or its application to other entities or circumstances shall not be affected. The remaining provisions continue in full force and effect, and the parties' rights and obligations must be construed and enforced as if the Contract did not contain the particular invalid provision. But if the invalid provision or its application is found by a court of competent jurisdiction to be substantive and to render performance of the remaining provisions unworkable and infeasible, is found to seriously affect the consideration, and is inseparably connected to the remainder of the contract, the entire Contract is deemed void.

ARTICLE 15. Entire Agreement.

This Contract constitutes the entire and exclusive agreement between the parties relating to the specific matters covered in this Contract. All prior or contemporaneous verbal or written agreements, understandings, representations or practices relative to the foregoing are superseded, revoked and rendered ineffective for any purpose. This Contract may be altered, amended or revoked only as set forth in Article 11. No verbal agreement or implied covenant may be held to vary the terms of this Contract, any statute, law, or custom to the contrary notwithstanding.

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency

By: Ava Frisinger

Title: MAYOR Date: April 4, 2005

Attest: Christine J. Eggers

Title: CITY CLERK Date: 4-4-2005

Authorized by: AB 5266 / Motion
(Resolution or Ordinance)

Date: 3-21-2005

Cascade Water Alliance:

By: ________________________________

Title: Chair Date: DECEMBER 15, 2004

Attest: ________________________________

Title: General Manager Date: DECEMBER 15, 2004

Authorized by: Resolution No. 2004-18

Date: DECEMBER 15, 2004

WHOLESALE WATER AGREEMENT BETWEEN CITY OF ISSAQUAH AND IHCA (2004)

WHOLESALE WATER AGREEMENT

Between the City of Issaquah and
the Issaquah Highlands Community Associations for:

WATER SERVICE TO
THE GRAND RIDGE DRIVE SUBAREA OF
ISSAQUAH HIGHLANDS

THIS AGREEMENT is entered into effective June 2, 2004, the date of the last signature, between the CITY OF ISSAQUAH, a Washington municipal corporation ("City"), and the ISSAQUAH HIGHLANDS COMMUNITY ASSOCIATION, a nonprofit Washington corporation ("IHCA"), on the terms provided herein. In consideration of the obligations and undertakings herein, the parties agree as follows:

AGREEMENT

FOR GOOD AND VALUABLE CONSIDERATION, the receipt and adequacy of which are hereby acknowledged, the parties agree as follows:

1. **Supply Amount**. The City of Issaquah (the "City") shall supply from the water allocation for Issaquah Highlands wholesale water service to the Grand Ridge Drive Water Utility master meter in a quantity of up to 14.34 acre-feet per year (8.9 gpm Annual Average Daily Demand, 22.2 gpm Maximum Daily Demand). Any supply use above this amount is considered interruptible supply which may not be available. Standby emergency supply will be provided in accordance with current City policy.

2. **Cost.** IHCA shall be responsible for reading individual meters bi-monthly for each of its association members and reporting the consumption bi-monthly to the City of Issaquah Finance Department for billing purposes. All costs associated with the operations, maintenance, capital, water purchases, and any other cost associated with the supply of water to the Grand Ridge Drive Water Utility shall be paid for by the property owners being served by the utility.

a. IHCA shall be responsible for payment of all charges for water. IHCA shall advise its association members of the City's rights regarding delinquent accounts.

b. Each property shall have separate metered connections to the main for domestic and irrigation service to meet city standards.

c. Where fire suppression systems are installed in homes, these systems shall be connected directly to the main through an appropriately sized meter that will be read and water use reported to the City but not billed for either consumption or demand in the event of a fire. Service, other than fire suppression, taken from behind the fire meter is expressly prohibited. If service is taken from behind the fire meter for other than fire service, it will be billed double the rate that is described below.

d. IHCA shall report the size of any new meter installation at the time of installation.

e. Bi-monthly Charges: The City will calculate charges owed for demand through each water meter based upon bi-monthly consumption plus the fixed meter charge in accordance with the current retail rates charged by the City to its customers. The City will then sum these amounts and bill IHCA bi-monthly. Payment shall be due 30 days after billing, and thereafter it is delinquent.

f. The IHCA will be responsible for paying a fixed bi-monthly meter charge on the master meter(s) equal to the AWWA capacity flow factor compared to a ¾ X 5/8 inch meter times the fixed bi-monthly amount eharged for a residential ¾ x 5/8 inch meter. (For example: if a 6-inch meter can flow 50 times that of a ¾ x 5/8 inch meter, then the multiplier would be 50.)

g. Unaccounted for water (the difference between the volume measured by the master meter(s) and the sum of the volumes measured by all permanent and temporary meters in the system over a period of one year) in excess of 4% of the volume passing through the master meter(s) will be billed to IHCA at a unit cost equal to the highest retail block rate for single family customers

h. In the event that payment becomes delinquent, late charges will be assessed to full amount owed by IHCA at a rate in accordanee with the Issaquah Municipal Code. If the IHCA account is delinquent, the City after 30-day written notice to IHCA may shut-off all wholesale water service at the master meter(s),. and/or the City may, in its sole discretion, require IHCA to deposit up to 4 months estimated water fees in cash with the City Finance Director prior to reconnection. Such deposit shall be constantly maintained until the City, in its sole discretion determines otherwise.

i. IHCA shall pay to Issaquah, the Regional Connection Charges for all meters installed behind the master meter(s) equal to the amount due for that connection in accordance with adopted regional connection charges in effect at the time of hookup.

j. In the event of a condition that requires emergency expenditures to maintain a sufficient water supply, the City may impose an emergency surcharge on all of its retail and wholesale customers, including IHCA in order to pay for such expenditures.

k. Currently the City does not have a water utility tax. In the future, if such a tax is imposed the tax will also apply to IHCA.

3. **Commencement of Water Service.** The City shall not commence water service to the Grand Ride Drive Water Utility until an Operating Permit has been issued by the Washington State Department of Health, management and operations systems are

in place, the Master Meter and Backflow Preventer have been installed, tested, and accepted by the City.

4. **Master Meter(s) and Backflow Preventer(s).** IHCA shall install master meter(s) of appropriate size(s) to ensure accurate volume measurement at high and low flows as specified by a licensed professional engineer , a telemetry link and modifications to the City's water operations center, and backflow preventer(s) at the point of connection between the City's system and the Grand Ridge Drive system. The point of connection shall be located off of NE Harrison Street North. The City shall own, operate, and maintain the master meter and the backflow preventer, telemetry, and the contents in the master meter vault. The master meter, telemetry, backflow prevention, master meter vault, and any other appurtenances owned and operated by the City shall be approved by the City's water utility operations manager and engineering department prior to construction by Port Blakely Communities on behalf of IHCA. Modifications, if needed for service, at a later date shall be paid for by IHCA.

5. **Fire Flow**. The City shall supply water from the 1232 operating zone and hence the maximum service elevation from this operating zone (without repumping) is approximately 1142 feet above sea level. Issaquah shall not exceed a maximum fire flow rate of 1,000 gpm measured at the master meter. It is understood that the actual rate of flow at the point of use is dependent upon the hydraulic behavior of the distribution system between the master meter and the point of use, and Issaquah therefore makes no representation with regard thereto.

6. **Water Quality.** Each party will be responsible for complying with applicable state and federal drinking water quality standards as to their respective water systems.

7. **Conservation.** The IHCA shall adopt and adminster a water conservation plan for the Grand Ridge Drive lots. The plan will be reviewed and approved administratively by the City, which approval will not be unreasonably withheld and will be consistent with conservation standards for large rural lots.

8. **IHCA Responsibilities:**

a. IHCA shall be responsible for design, construction, and operation of the Grand Ridge Drive Water System.

b. IHCA shall be responsible to plan for water supply and distribution in compliance with the State Department of Health water system planning regulations and coordinate it with the City of Issaquah.

9. **Dispute Resolution**. The parties shall designate representatives for the purposes of administering this Agreement and resolving disputes arising from this Agreement, except as provided below. Each party shall notify the other in writing of its designated representatives. Each party may change its designated representatives by written notice to the other.

Disputed that cannot be resolved by the representatives designated herein shall be referred to the chief executive office of each party for mediation and/or settlement. If such dispute is not resolved within sixty (60) days, either party, or both parties, may file a demand for arbitration, in which event this issue shall be submitted to an arbitrator acceptable to both parties and the matter shall be arbitrated pursuant to the rules and procedures of the American Arbitration Association. The decision of the arbitrator shall be final and binding on both parties.

Water rates, penalties for delinquent payment, fees for shutting off meters for delinquent payment, imposition of taxes, the requiring of a deposit due to delinquency and emergency surcharges shall not be subject to arbitration.

10. **Liability/Hold Harmless**. The City shall indemnify, defend, and hold harmless IHCA, its offieers, agents and employees, from and against any and all claims, losses or liability, including attorneys' fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of the City, its officers, agents and employees, in the performance of this Agreement. With respect to the performance of this Agreement and as to claims against IHCA, its officers, agents, and employees, the City expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend, and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of the City. This paragraph shall not apply to any damage resulting from the negligence of IHCA, its agents, and employees. To the extent any of the damages referenced by the paragraph were caused by or resulted from the concurrent negligence of IHCA, its agents or employees, this obligation to indemnity, defend and hold harmless is valid and enforceable only to the extent of the negligence of the City, its officers, agents and employees.

IHCA shall indemnify, defend and hold harmless the City, its officers, agents and employees from and against any and all claims, losses or liability, including attorneys' fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure of the City, its officers, agents and employees, in the performance of this amendment and as to claims against the City, its officers, agents, and employees, the City expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extends to any claim brought by or on behalf of any employee of IHCA. This paragraph shall not apply to any damage resulting from the negligence of the City, its agents, and employees. To the extent any of the damages referenced by this paragraph were caused by or resulted from the concurrent negligence of the City, its agents and employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of IHCA, its officers, agents and employees.

11. **No third party beneficiaries.** This agreement is intended to benefit the parties hereto only. This agreement and the duties and obligations herein are not intended to benefit any third parties, including without limitation, the association members of IHCA.

12. **Successors and Assigns.** The benefits and burdens of this Agreement shall be binding on the IHCA and the City and their respective successors and assigns.

13. **Termination.** This agreement shall terminate on December 31, 2029. The City and IHCA may choose to renegotiate this agreement prior to the termination date.

14. **Police power not affected.** Nothing herein shall be construed to limit or affect the City's police powers.

15. **General.** This Agreement shall be governed by the laws of the State of Washington. This Agreement shall not be amended without the signatures of the parties. For any other default under this Agreement, the non-defaulting party may seek any remedy authorized at law or in equity. If a suit or action is instituted to enforce or interpret any provisions of this Agreement, then the substantially prevailing party shall be entitled to recover its reasonable attorneys fees and costs of litigation, including fees and costs on appeal. Any notice given under this Agreement shall be in writing and either (a) personally delivered, (b) sent by U.S. certified mail, return receipt requested, postage prepaid, or (c) or sent via verified facsimile transmission to the addressee's mailing address or fax number set forth below.

16. **Effective Date**. The Agreement is effective as of the date of the last signature below.

CITY OF ISSAQUAH, a
Washington municipal

By Ava Frisinger
Ava Frisinger, Mayor

Date: 6-2-2004
1307 E. Sunset Way
P. O. Box 1307
Issaquah, WA 98027-1307

Approved as to form:
Wayne Tanaka
City Attorney

ISSAQUAH HIGHLANDS COMMUNITY
ASSOCIATION, a Washington nonprofit corporation

By John Adams
John Adams, President

{WDT569404.DOC;1/00010.150070/}

Date: 5/19/2004
Issaquah Highlands Community Center
1401 Park Drive N.E.
Issaquah, WA 98029
Fax: 425-427-8050

PORT BLAKELY COMMUNITIES, a Washington corporation

By Judd Kirk
Judd Kirk, President
Date: 5/24/04
1775 - 12th Ave. N.W., Suite 101
Issaquah, WA 98027
Fax: 425-391-9028

REGIONAL WATER SUPPLY DESIGN AND FACILITY EXTENSION (1999)

file

AUGUST 27, 1999 DRAFT

AGREEMENT

Between The City Of Issaquah and Port Blakely Communities for: REGIONAL WATER SUPPLY DESIGN AND FACILITY EXTENSION

THIS AGREEMENT is entered into effective ________________, 1999, between the CITY OF ISSAQUAH, a Washington municipal corporation ("City"), and PORT BLAKELY COMMUNITIES, INC. a Washington corporation ("PBC"), on the terms provided herein. In consideration of the obligations and undertakings herein, the parties agree as follows:

INTRODUCTION/PURPOSE/RECITALS

A. PBC previously signed an agreement with the City to fund preliminary planning work for definition of a route and connection point for a regional water supply extension. This Agreement sets forth the further agreement for PBC to design and construct a regional water supply extension and interim supply solutions, subject to the approvals and rights set forth herein. The definitions for capitalized terms used in this Agreement are set forth in Attachment A.

B. The City needs additional water supply sources to meet population growth. The 2-Party Agreement provides that "The City shall provide water to the UGA Portion of the Project sufficient for the Allowable Development. The City's obligation to provide water is subject to *Force Majeure* events including insufficient water supplies if the City has taken good-faith efforts to increase water supply and/or adopt conservation measures in order to provide adequate water service for the Allowable Development." (§ 3.12 of 2-Party Agreement)

C. The City has limited personnel and financial resources. As a result, the City might not be able to provide regional water supply facilities to timely meet demand or as inexpensively as a private entity. PBC needs additional municipal water supply so it can continue development of the Issaquah Highlands project.

D. The parties wish to cooperate through this Agreement. PBC will be entitled to recover, in accordance with the terms of a latecomer agreement or other applicable provisions of law, defined project costs using a latecomer charge or other reimbursement system. This Agreement details the terms and conditions for the design, construction and reimbursement of the regional water supply facilities.

E. It is anticipated that water demand will exceed the existing water supply in year 2001 without a new source. A chart is attached as Attachment B showing the available water based upon the Interim Supply Solution established for this Agreement consisting of the recently adopted State Department of Health reservoir nesting rules (as defined in Attachment A-1). The regional water supply will be a long-term solution to accommodate the City's growth.

F. The City has entered into a wholesale agreement with the City of Bellevue ("Wholesale Agreement") to provide water supplied by Seattle under Bellevue's Water Purveyor Contract.

G. Issaquah Highlands' first phase of development is connected to the City's existing well water system, but will convert to the regional supply source once completed.

H. PBC has, concurrent with this Agreement, entered into a private funding agreement with Intracorp Real Estate LLC ("Intracorp") to share the costs of the Joint Segment of the Regional Facilities for the mutual benefit of and water service to the Issaquah Highlands project and the East Village Project. Subject to the terms of that private funding agreement, PBC will act as the representative for both projects in dealing with the City for construction of the Regional Facilities, any conveyance of Reserved MGD capacity in the Regional Facilities, and reimbursements from New Users who may connect to the Regional Facilities, as provided in this Agreement. PBC may enter into other private funding agreements with other Financial Participants.

AGREEMENT

FOR GOOD AND VALUABLE CONSIDERATION, the receipt and adequacy of which are hereby acknowledged, the parties agree as follows:

1. Additional Water Supply Facilities

PBC will construct, on the terms provided in this Agreement, the Regional Facilities (as defined in Attachment A) for a water supply connection with Bellevue. The City will use the Interim Supply Solution implemented by PBC to provide water supply to the I/H Property and the East Village Property ("EV Property") if needed due to any unexpected delays in the regional supply connection. For the duration of the planning, design and construction of the Regional Facilities by PBC under this Agreement, the City's obligation to also plan, design and construct additional water supply facilities under the 2-Party Agreement shall be waived. If the pursuit of the Regional Facilities is terminated by PBC (by written notice from PBC under Section 5.3), then the City shall resume planning, design and construction of additional water supply systems using a new schedule that recognizes the delay associated with the PBC Regional Facility pursuit.

2. Relationship to 2-Party Agreement

This Agreement is consistent with the 2-Party Agreement, except as modified in the next to last sentence in Section 1 above. All other terms and conditions of the 2-Party Agreement remain in effect.

3. Analysis, Permitting and Design Work

PBC will directly contract with a qualified engineering firm for work involving the alternative analysis, related alignment studies, applications for SEPA (with a 3-party agreement with the City if an environmental impact statement is required) and permits, pre-design, design and construction of Regional Facilities. PBC shall contract directly with and pay the consultant for the work subject to satisfactory agreement between the City and PBC on the latecomer or other reimbursement as provided in this Agreement. If PBC fails to complete any phase of the planning or design or construction, the City will not be responsible for any of PBC's or its consultant's accumulated costs or work-in-process, and PBC shall include a statement in its consultant's contract of such non-liability on the part of the City.

4. Construction

4.1 Plans and Specifications. The parties to this agreement commit to work cooperatively to achieve completion of these additional water facilities. Upon completion of the permitting and design work, PBC will undertake the construction of the Regional Facilities pursuant to plans and specifications and at locations and along a route selected by PBC and approved by the City as a developer's extension implementing the 2-Party Agreement, subject to City approval of the plans, specifications, location and route pursuant to the City's adopted standards and the requirements of the Wholesale Agreement with Bellevue. PBC's obligation to construct the Regional Facilities is conditioned on execution of private funding agreements approved by PBC and the Financial Participants, including the owners of the EV Property.

4.2 Plans Approvals. Prior to construction, PBC shall submit its construction plans to the State Department of Health (DOH) and to the City for City approval pursuant to its adopted standards and the requirements of the Wholesale Agreement with Bellevue. If the facility is within the SPAR right-of-way, the SPAR team must also approve the plans. The City will inspect construction.

4.3 Conveyance to City After Construction. The City Public Works Department (Engineering and Operations and Maintenance Departments) shall accept the Regional Facilities as soon as reasonably possible after PBC's request if (a) they have been constructed at no cost to the City in accordance with the plans and specifications approved by the City, (b) the City has not been subjected to or required to bear any cost of such construction, except as agreed to in writing by the City, and (c) they are lien-free. A performance bond is required prior to construction of the Regional Facilities, unless the parties otherwise agree. A maintenance bond is required for the Regional Facilities. The maintenance bond term shall be one year and for 30% of the facility value. After City acceptance, the City will own and operate the completed facility. No portion of the Regional Facilities shall be used until ownership is transferred to and accepted by the City, but subject to PBC's reservation of Reserved Capacity as described in Section 5.6.

5. Cost Reimbursement; Eligible Costs.

5.1 Planning, Permitting and Design. Reimbursement to PBC of all eligible "Design Eligible Costs" for the Regional Facilities shall be through the mechanisms described in Section 5.2 below.

5.2 Engineering and Construction. PBC will pay all costs necessary to complete the engineering, construction and transfer of ownership to the City of the Regional Facilities, but subject to PBC's right to terminate under Section 5.3. PBC may not include the following costs or expenses in the "Design Eligible Costs" or "Construction Eligible Costs": legal fees to interpret or enforce this Agreement or the 2-Party Agreement, and contractor incentives for early completion. PBC shall be entitled to recover all of the Design Eligible Costs and Construction Eligible Costs of the Regional Facilities through the following mechanisms: private funding agreement(s); fair share payments from New Users or other users under Section 5.6; or latecomer or other agreements. PBC may undertake financing, cost-sharing and participation agreements or construction of the facilities under this Agreement through a related entity or through other entities or arrangements with private parties including "Financial Participants," so long as the design and construction are consistent with this Agreement. PBC shall continue to be obligated under this Agreement unless the City otherwise approves.

5.3 PBC Right to Terminate.

5.3.1 Grounds; Notice. As provided in Sections 5.1 and 5.2, PBC shall pay for the alternative analysis, related alignment studies, pre-design and SEPA and permitting applications pursuant to the schedule in Section 6. These costs are estimated to exceed $600,000. PBC also shall complete the permitting, design and construction of the Regional Facilities pursuant to the schedule in Section 6, but PBC shall have the right to terminate this Agreement and thereupon have no further obligation to design, permit and construct the Regional Facilities if (a) permits and approvals for these facilities are not obtainable or can only be obtained under Unreasonable Terms, (b) the total of the permitting, engineering and other soft costs and the construction hard costs for these facilities exceed or are reasonably estimated to exceed $15 million (*i.e.* 120% of the present estimated cost of $12.5 million for the Regional Facilities), or (c) PBC and the City mutually determine that the Regional Facilities are not needed for foreseeable demands on water supply for the I/H Property or the EV Property. To the extent provided in the private funding agreement, Intracorp shall have the further right to terminate its financial participation in the Joint Segment if the City and Intracorp do not execute a development agreement for the East Village Project. Any dispute between the City and PBC on the existence of the grounds for termination shall be resolved by using the Dispute Resolution provisions of Section 5.11. The termination shall be effective at the later of (i) forty-five (45) days after PBC delivers a termination notice to the City or (ii) the conclusion of the Dispute Resolution (if invoked). Notwithstanding PBC's termination and the cessation of its obligations, the City shall allow a Financial Participant to be substituted for and to perform the PBC obligations set out in this Agreement effective upon PBC's termination, except that if Intracorp substitutes for PBC, it shall only be obligated to complete the Joint Segment of the Regional Facilities. The Financial Participant must give the City notice of its agreement to substitute and perform before the effective date of PBC's termination. A Financial Participant that substitutes for PBC following PBC's exercise of its termination right shall receive an assignment of PBC's rights to reserve capacity and other reimbursement to the extent such an assignment is expressly provided for in the private funding agreement between PBC and the Financial Participant(s).

5.3.2 City Notice on Nonperformance. If the City in good faith believes PBC is not diligently proceeding under this Agreement to design, permit and construct the Regional Facilities, then the City may give a notice of nonperformance under Section 12 identifying the failure and PBC shall respond during the 60 day cure period in Section 12.1 with a schedule or action(s) addressing the City notice. As provided in the private funding agreement, Intracorp or other Financial Participant may request the City issue the notice of non-performance if it believes PBC is not diligently proceeding under this Agreement. The City's notice also shall be sent to the Financial Participants. If the City does not concur with PBC's response, then the matter shall be resolved by using the Dispute Resolution provisions of Section 5.11. During the period of Dispute Resolution, the City shall not be obligated to allow any new connections which would be using the 2,920 ERUs allocated under Section 7.1(b).

5.3.3 Procedure for Financial Participant Substitution. The substitution of a Financial Participant for PBC under this Agreement (due to PBC termination under Section 5.3.1 or after a PBC Default under Section 12.2(a)) shall follow the procedures specified in this Section 5.3.3. A Financial Participant who is funding both segments of the Regional Facilities (*i.e.*, the Joint Segment and the I/H Property segment) shall have the first right to substitute ("PBC-Financial Participant"). If the PBC-Financial Participant gives written notice to the City of its agreement to substitute and perform PBC's obligations at least fifteen (15) days before the effective date of PBC's termination, then this Agreement, including the right to terminate on the grounds provided in Section 5.3.1 above, shall remain in effect and the PBC-Financial Participant shall assume all of the rights and obligations of PBC under this Agreement.

If the PBC-Financial Participant does not elect to substitute by said date, then either Intracorp or a Financial Participant funding the Joint Segment and the EV Spur Line (but not the I/H Property segment) ("EV-Financial Participant") may elect to substitute and perform by delivering written notice to the City before the effective date of PBC's termination. If timely notice is given, then this Agreement, including the right to terminate on the grounds provided in Section 5.3.1 above, shall remain in effect and Intracorp or the EV-Financial Participant shall assume all of the rights and obligations of PBC under this Agreement, except for any portion of the Regional Facilities beyond the Joint Segment (*i.e.*, no obligation for the I/H Property segment).

Upon the substitution of a Financial Participant or Intracorp under this Section 5.3.3 before the end of the 45-day termination period, all engineering reports, studies, plans and specifications and other related documents shall become the property of the substituted party.

5.4 Regional Facilities Latecomer Reimbursement. The private funding agreement between PBC and the EV Property will substitute for a latecomer agreement on the EV Property. However, upon the request of (a) the Glacier Ridge Partnership or Grand Ridge Partnership as to the I/H Property or (b) Intracorp or other owner of the EV Property, the City shall establish a latecomer collection system within the I/H Property or the EV Property, as applicable, and for any other benefited properties, by using the City's code provisions for water cost recovery contracts (IMC 13.90 as it may be amended). The reimbursement to the I/H Property and the EV Property from other property owners under this section and Section 5.5 collectively shall never exceed 100% of the reimbursable Design and Construction Eligible Costs (i.e. those exceeding the proportionate cost share for the I/H Property and EV Property), but PBC as to the I/H Property or the owner of the EV Property as to that property may be reimbursed for their proportionate cost share if it elects a latecomer system for its own respective property as provided in the second sentence in this Section.

5.5 Interim Supply Solution Reimbursement. Since the Interim Supply Solution adopted for this Agreement is the DOH reservoir nesting rule, no reimbursement shall be due PBC for the existing reservoirs which provide this nesting access. However, if the DOH nesting rule or a substantially equivalent rule is not in effect when interim supply is to be provided by the City (*i.e.* before completion of the Regional Facilities) and PBC must construct additional facilities as described in Attachment A-1, then PBC shall track the eligible costs for the new facilities comprising the Interim Supply Solution separate from the eligible costs relating to the Regional Facilities. If the City uses any new Interim Supply Solution facility constructed by PBC within fifteen (15) years after completion of the new Interim Supply Solution facility, except for use during the interim until the Regional Facilities are accepted by the City, then the City shall reimburse PBC for the depreciated value of the Interim Supply Solution facility at the time the City begins using the facility as part of its water system. Any dispute involving actual use by the City, the value of the facility or other matters relating to the Interim Supply Solution facility shall be resolved by dispute resolution under Section 5.11.

5.6 New User Fair Share Payment. In addition to any latecomer system established under Section 5.4, the City and PBC will cooperate to obtain fair share contributions from any persons or entities located inside or outside the City who propose to connect to or receive water from the Regional Facilities ("New User") as provided in this section. Subject to the terms of the private funding agreement with Intracorp, PBC shall act as the representative with the City for both the I/H Property and the EV Property for purposes of conveyance of the Reserved Capacity and distribution of any reimbursement under this Section.

5.6.1 Excess Capacity in Regional Facilities. The parties acknowledge that the Bellevue/Issaquah Wholesale Water Supply Agreement requires that the Regional Facilities be constructed with excess capacity, *i.e.* the 24" pipeline (or a small pipeline with greater flow velocity) has capacity of approximately 10 MGD (or 20,202 ERUs with conservation based on 495 gal/peak day), but only 4.2 MGD peak day demand (or 8,485 ERUs with conservation based on 495 gal/peak day) currently will be supplied through the Regional Facilities under the Wholesale Agreement. Since the I/H Allowable Development and the EV Property are not expected collectively to require more than the 8,484 water ERUs supplied by the 4.2 MGD, PBC's construction of the Regional Facilities results in a substantial excess capacity of 5.8 MGD available for New Users ("Reserved Capacity"). The respective ownership and interest of the I/H Property and the EV Property in the 4.2 MGD and the 5.8 MGD Reserved Capacity of the Joint Segment shall be based upon the actual final funding by the I/H Property and the EV Property for the joint segment of the Regional Facilities, unless the private funding agreement expressly provides a different ownership allocation. [For example, if actual funding is pursuant to a cost sharing ratio of 67% for Issaquah Highlands and 33% for East Village, then that funding ratio would constitute the respective ownership and interest both for the 4.2 MGD currently supplied (*i.e.* 2.814 MGD for the I/H Property and 1.386 MGD for the E/V Property) and for the 5.8 MGD Reserved Capacity (*i.e.* 3.886 MGD for the I/H Property and 1.914 MGD for the EV Property).

5.6.2 Fair Share Contribution. The City shall not allow a New User to connect to or use the Regional Facilities to convey water unless a satisfactory fair share contribution is made and paid to PBC (as representative for the I/H Property and the EV Property) for use of the Reserved Capacity. The New User's fair share contribution shall be calculated by multiplying the cost of the Regional Facilities (*i.e.* the Design and Construction Eligible Costs incurred by PBC under this Agreement) times the ratio of the New User's MGD of water demand or allocation divided by the total pipeline capacity of 10 MGD (and this denominator shall be 10 MGD even if the pipe's flow capacity and corresponding MGD is changed in the future). [For example, if a New User such as a water purveyor has a water supply demand or authorization to use 5 MGD, then its fair share contribution would be 5 MGD ÷ 10 MGD, or 50%, multiplied by the final cost of the Regional Facilities].

5.6.3 Reservation of Capacity; Mandatory Sale to City. Unless the City and PBC adopt a latecomer agreement or other mutually agreed reimbursement system covering the New Users, then PBC (as representative for the I/H Property and the EV Property) shall retain and there is hereby reserved to PBC (as representative for the I/H Property and the EV Property) all right, title and interest in the Reserved Capacity in the Regional Facilities. This reservation of capacity is of the pipeline (and not the water itself) and shall be expressly stated in PBC's conveyance (as representative for the I/H Property and the EV Property) of the Regional Facilities to the City under Section 4.3. When a New User seeks to connect to or use water from the Regional Facilities and upon a City request, PBC (as representative for the I/H Property and the EV Property) shall be obligated to sell to the City the pro rata portion of the Reserved Capacity in the Regional Facility for the benefit of New User upon the City's payment to PBC (as representative for the I/H Property and the EV Property) of its fair share amount for the pro rata portion of the Reserved Capacity. The parties anticipate each New User correspondingly will reimburse the City for this fair share cost of this pro rata portion of the Reserved Capacity. PBC (as representative for the I/H Property and the EV Property) shall only sell to the City (and no other party) and its sale is mandatory upon the City's request and payment as provided above.

The City shall pay to PBC (as representative for the I/H Property and the EV Property) the New User's fair share payment, and PBC shall retain the reimbursement or shall distribute the appropriate share thereof to the Financial Participants pursuant to its private funding agreement. To allow proper repayment for lands within the I/H Property or the EV Property, respectively, which has been sold to third parties at the time of the City's payment in the preceding sentence, the I/H Property and the EV Property shall either (i) include the right to obtain water in the purchase price paid by buyers in each respective project (*i.e.* the buyer paying no separate water connection fee), in which case PBC (as representative for the I/H Property and the EV Property) will retain the payment or distribute it to the Financial Participants pursuant to its private funding agreements, or (ii) enter into written private contracts or other documented arrangements with property owners which expressly direct to whom any water capacity payment should be made (which may include PBC or other owners of the I/H Property or the EV Property if the contract so provides). The City shall not be obligated to pay the fair share to PBC (as representative for the I/H Property and the EV Property) to the extent expressly prohibited by court order or statute. Upon a City request, PBC (as representative for the I/H Property and the EV Property) shall convey the Reserved Capacity to the City (which may then convey to CWA) on the terms provided in Section 5.8.1.

5.6.4 Additional Users of 4.2 MGD. In addition to New Users using the Reserved Capacity, the collective water use on the I/H Property and the EV Property may not require the full 4.2 MGD for their collective full developments. As provided in the private funding agreement with Intracorp, if either PBC or Intracorp does not require its full allocable share of the 4.2 MGD for the I/H Property and/or the EV Property, respectively, as mutually determined by the City and PBC or Intracorp for its respective property, then the City may allow additional properties to connect to or use the unused portion of the 4.2 MGD upon a fair share reimbursement to PBC (as representative for the I/H Property and the EV Property). The reimbursement amount to be paid by the new property(ies) shall be (a) the proportionate share of MGD use or other appropriate basis mutually approved by the City and PBC (as representative for the I/H Property and the EV Property), multiplied by (b) the costs of the Regional Facilities (*i.e.* the Design and Construction Eligible Costs incurred by PBC under this Agreement). The City's payment of the reimbursement to PBC (as representative for the I/H Property and the EV Property) is subject to the same provisions in Section 5.6.3 for fair share payments for Reserved Capacity. PBC shall retain or distribute the reimbursement with respect to either the I/H Property or the EV Property or both in proportion to the amount of unused MGD released by those respective properties for the New User.

5.6.5 Connection to EV Spur Line. If any New User or additional user proposes to connect to the EV Spur Line, then the reimbursements to be paid under Section 5.6.2 for New Users or Section 5.6.4 for additional users shall include the cost of the EV Spur Line as well as the cost of the Joint Segment of the Regional Facilities.

5.7 City Water Connection Charge. If PBC constructs the Regional Facilities with a direct tie to Issaquah Highlands, then PBC or successor owners within the Issaquah Highlands project who connect to the Regional Facilities will not pay the Water General Facility Connection Charges that otherwise would be payable for connections to the City system supplied by well water. Likewise, if the EV Property connects with a direct tie to the Regional Facilities, then the owners within the EV Property would not pay the City's Water General Facility Connection Charges adopted for the City's system supplied by well water.

5.8 Regional Water Connection Charge.

5.8.1 Cooperation with Cascade Water Alliance. The parties acknowledge the City intends to become a member of the Cascade Water Alliance ("CWA"), and the City may transfer the Regional Facilities and/or the Reserved Capacity to the CWA (which may be a "Water Supply Asset" under the CWA Interlocal Agreement). The provisions of this Section 5.8.1 are for the purpose of providing reimbursement to PBC (as representative for the I/H Property and the EV Property) for the costs incurred to build the Reserved Capacity. Therefore, if the CWA seeks to acquire the Reserved Capacity and upon a City request, PBC (as representative for the I/H Property and the EV Property) shall be obligated to sell to the City the requested portion of the Reserved Capacity in the Regional Facilities for the benefit of the CWA upon the City's payment to PBC (as representative for the I/H Property and the EV Property) of the fair share amount for the pro rata portion of the Reserved Capacity or upon the City's or CWA's establishment of an alternative mechanism which assures payment, appropriate credits against the RCFCs, or other consideration of equivalent value to I/H Property and the EV Property for their respective fair share amounts. The City and PBC shall cooperate in negotiating a transfer of water supply assets including but not limited to (a) establishing an appropriate cost value for the Regional Facilities or Reserved Capacity consistent with the Design and Construction Eligible Costs, (b) establishing any appropriate payments to or credits for the benefit of the I/H Property and EV Property against any Regional Connection Facility Charges ("RCFC") by the CWA, (c) recognizing any unpaid or unreimbursed eligible costs owing to PBC for the Regional Facilities, and (d) implementing the terms of this Agreement. These cooperative efforts shall include negotiating in good faith with the CWA at appropriate times, such as the transfer of title to or control of the Regional Facilities and/or Reserved Capacity to the CWA, to accomplish the terms of this section.

5.8.2 RCFC Obligations for Existing Users. For any users within the I/H Property or the EV Property which already are connected to the City's well water system when the Regional Facilities are completed, those users shall convert to the Regional Facilities within a reasonable time after the City's acceptance of the Regional Facilities ("Converting Users"). If that conversion occurs after the City has joined the CWA, then PBC (as representative for the I/H Property and the EV Property) will be responsible to pay the difference, between the RCFC amount (if due to CWA after application of any credits or other agreements with the CWA as referenced in Section 5.8.1) and the amount those Converting Users previously paid to the City as a connection charge, i.*e.* City's Water General Facility Connection Charges (for the I/H Property, this is detailed in the "MOU for Grand Ridge General Facility Charges") for those connections if the RCFC is higher than the amount originally paid to the City for its GFC. The amounts paid by PBC (as representative for the I/H Property and the EV Property), or the amounts reasonably estimated once the RCFC is known, shall be included as eligible costs of the Regional Facilities for latecomer and New User reimbursements. The City shall assign or pay to the CWA (if due CWA) the portion of the RCFC equal to the connection charge those Converting Users previously paid to the City. Nothing herein shall prevent PBC from entering into private contracts or other arrangements with Issaquah Highland properties which require the Converting Users to reimburse PBC for this additional amount due for the RCFC. Likewise, nothing herein shall prevent the EV Property owners from entering into private contracts or other arrangements with purchasers within the EV Properties which require the Converting Users to reimburse the EV Property owners for this additional amount due for the RCFC. The City will be responsible to pay PBC (as representative for the I/H Property and the EV Property) the difference between the RCFC's and the City's Water General Facility Connection Charges (for the I/H Property, this is detailed in the "MOU for Grand Ridge General Facility Charges") for those Converting Users if the RCFC is lower than the amount paid for the City GFC, but no refund is due PBC (as representative for the I/H Property and the EV Property) if there is no RCFC due (*e.g.* if users have converted to the Regional Line before the City joins CWA or if the CWA grants credits for existing users who convert).

5.8.3 RCFC Obligations for Future Users. All users within the I/H Property and the EV Property whose initial connection is to the Regional Facilities (*i.e.* which never connected to the City's well water system) after formation of the CWA shall pay the RCFC if it is due to the CWA. For properties in the I/H Property and the EV Property sold after the date of this Agreement, the respective owners shall record or otherwise give notice of the potential RCFC payment.

5.9 Alternative Funding for Regional Facilities. PBC, the City and the Financial Participants may mutually agree to other funding for the Regional Facilities. The parties agree the design and permitting work under this Agreement will proceed, and be reimbursable to PBC (as representative for the I/H Property and the EV Property) through latecomer payments if the costs qualify as "eligible costs," even if alternative construction funding is approved under this section, so long as the design and permitting work is of benefit in constructing the facilities and the facilities are built.

5.10 No City Obligation to Pay Construction Costs or Assume Risks. The facilities under this Agreement are being constructed as developer extensions, and the City shall have no obligation to pay any costs of design, permitting or construction under this Agreement or to assume any risk related thereto.

5.11 Binding Dispute Resolution. Any dispute between the City, PBC or the Financial Participants related to any aspect of Section 5.3, 5.5, 5.6, 5.8, Attachment A-1, or any other section which expressly provides for dispute resolution shall be resolved by the binding dispute resolution provisions of Section 5.21 of the 2-Party Agreement, which section is incorporated herein by this reference.

6. Schedule

Design and construction of the Regional Facilities are anticipated in accordance with the following schedule, and the City and PBC shall work to meet the following schedule:

Event Milestone	**Approval**	**Target Completion Date**
Regional Facilities Agreement	City/PBC	June 7, 1999
Sign wholesale agreement for regional supply with Bellevue	Respective cities	Completed April 20, 1999
Sign and record latecomer agreement against benefited properties	Public Works/PBC/City Council	June 30, 1999, using estimated amounts for eligible costs
Record against benefited properties final latecomer payment amounts for funding reimbursement	Public Works/PBC	Upon completion of construction after final eligible costs are known
Alternative Analysis	Public Works/PBC	June 30, 1999
Alignment Studies	Public Works/PBC	Aug. 16, 1999
Pre-design and Route Research for key pipeline components	Public Works/PBC	Nov. 3, 1999
SEPA/permitting	Planning Dept./other agencies with jurisdiction	July 28, 2000
Design	Public Works/PBC (per § 4.1)	May 3, 2000
Approve plans and specs	Public Works/DOH	July 30, 2000
Commencement of construction	Public Works/DOH/PBC	August. 1, 2000
Completion of Construction	Public Works/PBC	Mar. 1, 2002
Acceptance of Project and Transfer of Ownership	Public Works/PBC	Sept. 1, 2002
Operation and in-service (*i.e.* commencement of water delivery)	Public Works	Sept. 1, 2002

7. Water Supply.

7.1 Water Supply Assurance. In consideration of PBC's (as representative for the I/H Property and the EV Property) obligations under this Agreement, the City hereby grants PBC the right to connect the I/H Property, and the owners of the EV Property to connect the EV Property, to the City's water system and commits and allocates water supply for full buildout of the Issaquah Highlands' Allowable Development and the EV Property as follows.

a) The City already has set aside 780 ERUs for Phase 1A of the Issaquah Highlands development, and those 780 ERUs are confirmed hereby and are not subject to any conditions or termination of water assurance provided herein (but these ERUs are subject to conservation and other City-wide regulations, and these ERUs shall be released from the well water supply system effective upon connection to the Regional Facilities).

b) Effective on the date of this Agreement, the City commits and allocates 2920 water ERUs from the City's water system to the respective properties as follows: 1956 for the I/H Property and 964 for the EV Property. Subject to Section 7.1(e), the actual use of these 2920 ERUs shall not commence unless (i) one of the Interim Supply Solutions has been implemented (*i.e.* as of the date of this Agreement, the DOH reservoir nesting rule described in Attachment A-1 has been adopted and constitutes the Interim Supply Solution without the requirement to construct any new facilities), and (ii) PBC has irrevocably waived in writing its right to terminate under Section 5.3 and has posted the performance bond or other financial assurance for construction of the Regional Facilities. The interim ERU allocations for the respective properties under this Section 7.1(b) may be assigned and transferred from the EV Property to the I/H Property or *vis-a-versa*, based upon a party's default or for other reasons, to the extent provided in the private funding agreement with Intracorp or other Financial Participants.

c) Effective on the date that the Regional Facilities are accepted by the City and in service (*i.e.* commencement of water delivery), the City commits and allocates the 4.2 MGD from the Regional Facilities to the respective I/H Property and EV Property based upon the final cost sharing amounts for the joint segment of the Regional Facilities, as described in Section 5.6.1. [For example, if the final funding is 67% by I/H and 33% by EV, then 2.814 MGD is allocated to the I/H Property for its Allowable Development and 1.386 MGD is allocated to the EV Property. Upon allocation from the Regional Facilities, the allocation of water ERUs under this Section 7 from the City's well water supply is released. The parties acknowledge the 2-Party Agreement for Issaquah Highlands or the East Village development agreement may be amended in the future to authorize additional Allowable Development, in which case the parties at that time shall consider a corresponding increase in water allocation.

d) Until the I/H Property and the EV Property is served by the Regional Facilities as provided in Section 7.1(c), the City shall not allocate to any other person or entity or property the 3700 ERUs that the City commits and allocates to the I/H Property and the EV Property pursuant to this Agreement. Relevant City water utility and water system records shall reflect the water supply commitments made in this Agreement.

e) Notwithstanding any other provision of this Agreement, PBC and other owners within the I/H Property, and owners within the EV Property may submit plat, site plan or other development applications consistent with City regulations at any time and shall receive from the City water commitments from the City consistent with City policy in effect at the date of the plat or other permit application. However, such water commitments for on-going applications shall correspondingly reduce the number of ERUs allocated respective to the I/H Property and the EV Property under Sections 7.1(a) and (b). [For example, if a new plat application within Phase 1 of I/H is filed by PBC requiring 100 water ERUs, then the City's prior Phase 1 reservation of water (see Section 7.1(a)) will be reduced from 780 to 680 ERUs; if a new plat application within Phase 2 is filed requiring 120 ERUs, then the water allocation in Section 7.1(b) for I/H Property will be reduced from 1956 to 1,836 ERUs. If a plat is filed in the EV Property requiring 100 ERUs, then the water allocation in Section 7.1(b) for EV Property will be reduced from 964 to 864 ERUs.

7.2 **Certificates of Water Assurance.** To implement Section 7.1, the City upon the request of PBC for the I/H Property, or by the owners of the EV Property, shall issue certificates of water assurance specifying the ERUs stated above. However, the water supply commitments in Section 7.1 are made without any requirement for a further certificate or other City action, but the certificates may be issued for the purpose of further evidencing the City's water supply commitments for the I/H Property and the EV Property. The City may collect an administrative fee for certificates issued under this section and Section 7.3 to recover its costs of review and issuance. If the certificate is issued before PBC's posting of the bond or other financial assurance in Section 7.1(b) above, then the form of the certificate shall contain the express conditions of the water commitments, including but not limited to the potential termination or reduction of commitments under the circumstances described in Section 7.4.

7.3 **Allocation of Water ERUs Within I/H and EV Property.** For the I/H Property, PBC shall assign the ERUs assured under Section 7.1 to specific parcels within the I/H Property as part of PBC's development under the 2-party Agreement. When PBC makes such assignments, PBC shall notify the City and record the amount of the water ERU assignments for specific parcels within the I/H Property. Likewise, the owners of the EV Property may assign the ERUs assured under Section 7.1 to specific parcels within the EV Property as part of its development under its development agreement. When either party makes such assignments, PBC or the EV Property owner, as appropriate, shall notify the City and record the amount of the water ERU assignments for specific parcels within the I/H Property or EV Property. Upon such recording, the ERUs allocated to such parcels shall run with the land and be binding upon and inure to the benefit of the owners and successors-in-interest of those parcels. After recording and upon the request of PBC or the EV Property owner, or a successor owner, the City will re-issue a certificate of water assurance for the specific parcel in the assigned ERU amount.

7.4 **Termination or Reduction of Assured Water.** The water assurance in Section 7.1(b) (*i.e.* 2920 ERUs) shall terminate if and only if (a) PBC delivers a termination notice as provided in Section 5.3 whereby it will not implement the Regional Facilities and no Financial Participant notifies the City that it will substitute for PBC, (b) the City terminates this Agreement due to a Default by PBC prior to PBC's posting of the bond or other financial assurance under Section 7.2 (b) above and no Financial Participant notifies the City that it will substitute for PBC pursuant to Section 7.5, (c) the I/H Property and the EV Property are served by the Regional Facilities pursuant to Section 7.1(c), or (d) the Buildout Period ends as defined under the 2-Party Agreement for the I/H Property and the development agreement for EV Property. The water assurances in Section 7.1(d) shall remain in effect upon substitution for PBC as follows: if a PBC-Financial Participant substitutes (*i.e.* agrees to complete both the Joint

Segment and the I/H Property segment of the Regional Facilities), then the water allocations to both the I/H Property and the EV Property in Section 7.1(d) shall remain in effect; if Intracorp or an EV-Financial Participant substitutes (*i.e.* agrees only to build the Joint Segment), then the water assurance for the EV Property in Section 7.1(d) will remain in effect (and the water allocation otherwise made to the I/H Property may be assigned to the EV Property under the private funding agreement). The water assurances in this Section 7 are subject to reduction as (i) allocations are made pursuant to Section 7.1(e) for water ERUs for new plat applications or other permits, or (ii) part of City-wide measures in the event of an Uncontrollable Force (defined in Section 9). Further, these water assurances are subject to reduction if the City's wholesale water supply amount of 1.7 MGD (average daily demand) or 4.2 MGD (peak day demand) is permanently reduced pursuant to, or at the end of the term of, the City's wholesale contract with Bellevue. Any permanent reduction in water assurance based on reduced wholesale supply shall be proportionate (*e.g.* if wholesale supply is reduced by 10%, then the assured water ERUs under Section 7.1(b) and 7.1(c) would be reduced by 10%), and the City shall provide alternative water (which for the I/H Property will be in accordance with the terms of Section 3.12 of the 2-Party Agreement, including *Force Majeure*) for the ERUs of Allowable Development which are reduced due to wholesale supply reduction.

7.5 PBC Obligation. The obligations to design, finance, and construct the Regional Facilities under this Agreement shall not be assigned or transferred by PBC without the City's written consent, exclusive of a Financial Participant's substitution rights provided herein. The City shall not assign or transfer any of its rights or obligations under this Agreement, or enter into another agreement relating to the Regional Facilities, without PBC's written consent (which may include prior consent by PBC in a written agreement between PBC and a successor in title or a Financial Participant). No successor in title or Financial Participant in title shall have any duty or liability to perform PBC obligations under this Agreement unless that successor or Financial Participant expressly agrees to do so. However, if PBC has committed a Default under this Agreement, then a Financial Participant, by delivering written notice to the City in accordance with the procedures and timing of Section 5.3.3 after PBC's Default, shall have the right to substitute and perform the PBC obligations set out in this Agreement. Intracorp may substitute and perform the PBC obligations with respect to the Joint Segment only. Such Financial Participant shall receive an assignment of PBC's rights to the Reserved Capacity and other reimbursement and the interim water allocations to the extent such an assignment is expressly provided in a written agreement between PBC and the Financial Participant.

8. General Provisions

8.1 2-Party Agreement; Other Agreements. The parties incorporate by reference into this Agreement the following "General Provisions" of the 2-Party Agreement: Governing Law (§ 5.1); Interpretation and Severability (§ 5.4); Authority (§ 5.5); Time of Essence (§ 5.9); Integration (§ 5.10); Authorized Agent (§ 5.12) ; and Notice (§ 5.18). Except as provided in Section 8.2, this Agreement is made solely for the benefit of the City and PBC and no third party shall have any rights under this Agreement except for those provisions benefiting a Financial Participant. This Agreement represents the entire agreement between the parties on the subjects covered herein, and PBC has not entered into any other agreements dealing with the subjects covered herein, except PBC has entered into a funding agreement with one or more Financial Participants as provided in Section 5.2 (who include East Village and any other party which PBC identifies to the City upon PBC's entering into a contract with such participant) and with contractors, consultants or others to implement the terms of this Agreement.

8.2 Third Party Beneficiary. This Agreement is executed concurrent with, and is effective upon such concurrent execution of, a private funding agreement between PBC and Intracorp. In consideration of its financial participation in the Joint Segment of the Regional Facilities, Intracorp is a third party beneficiary of this Agreement. Intracorp has, and may bring an action to enforce, all the rights provided to it as a Financial Participant, including but not limited to, the rights provided in Sections 1, 4, 5.3 through 5.11, 7.1 through 7.5, and 12.2. Any action by Intracorp shall include both the City and PBC. If any matter is subject to Dispute Resolution between the City and PBC, then Intracorp's enforcement likewise shall require Dispute Resolution under Section 5.11. And provided further, that Intracorp may substitute and perform PBC's obligations with respect to the Joint Segment only.

9. Uncontrollable Force

9.1 Excused Delay. If a party to this Agreement, by reason of an Uncontrollable Force, is rendered unable, wholly or in part, to perform its obligations under the Agreement, then upon said party giving notice and particulars of such Uncontrollable Force, its obligation to perform shall be suspended or correspondingly reduced during the continuance of any inability so caused, but in no greater amount than required by the Uncontrollable Force and for no longer period, and the effects of such cause shall, so far as possible, be remedied with all reasonable and prompt dispatch. The affected party shall not be responsible for its delay in performance under this Agreement during delays caused by the Uncontrollable Force.

9.2 Defined. "Uncontrollable Force" means any cause beyond the control of a party hereto and which by the exercise of due diligence that party is unable to prevent or overcome. Such causes may include, but not be limited to the following: an act of God, fire, flood, volcano, earthquake, explosion, nuclear accident, act of war, insurrection or riot, physical unavailability of the City's ground water source due to depletion of the aquifer, and litigation preventing performance.

10. No Joint Venture. Nothing in the Agreement shall create a joint venture or partnership between the parties.

11. Indemnity. If any person brings suit or counterclaim against the City challenging the provisions of or the City's authority to enter into this Agreement and/or seeking recovery of any monies paid pursuant to this Agreement, then PBC agrees to indemnify, defend and hold the City harmless from any judgment and shall pay for the City's (and its officers, agents, employees and contractors) costs of suit, pre- or post-judgment interest, consequential damages and reasonable attorneys' fees, expert witness fees, staff time, consultants fees and all other directly related out-of-pocket expenses and reimbursement of any monies paid pursuant to this Agreement. Notwithstanding the preceding sentence, if the basis of the person's claim or cause of action is the City's negligence, intentional misconduct or breach of this Agreement, then the City shall indemnify PBC to the same extent and for the same costs as specified in the preceding sentence. References to the City and PBC includes their respective officers, agents, and employees. In the event of concurrent negligence, including RCW 4.24.115, each party shall indemnify and hold the other harmless only to the extent of that party's negligence. The indemnifying party shall have the option but not obligation to defend the indemnified party in any such suit, but if the indemnifying party elects not to defend, then it shall reimburse the indemnified party on a monthly basis for the costs described in this section. Notwithstanding any other provision in this Agreement, to the extent a court of competent jurisdiction determines that the City is precluded from collecting any fees, costs, or other monies under this Agreement, then the City shall be under no further obligation to pay said precluded sums to PBC (as representative for the I/H Property and the EV Property). It is further specifically and expressly understood that the indemnification provided herein constitutes each party's waiver of immunity, as between themselves, under Industrial Insurance, Title 51 RCW, solely for the purposes of this indemnification. This waiver has been mutually negotiated by the parties. The provisions of this section shall survive the expiration or termination of this Agreement. The Contractor shall defend, indemnify and hold the City, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including attorney fees, arising out of or in connection with the construction of the Regional Facilities under this Agreement, except for injuries and damages caused by the sole negligence (or other grounds stated above) of the City.

12. Notice and Cure; Default.

12.1 Event of Default. Each of the following shall constitute an "Event of Default":

a) A material breach in performance of this Agreement by a party, which breach has continued for a period in excess of sixty (60) days after the defaulting party has been notified in writing by the other party that such breach will, unless corrected within such 60-day period, constitute an Event of Default, except if the cure cannot reasonably be completed within sixty (60) calendar days, then the party shall not be in default so long as it commences the cure within sixty (60) calendar days and promptly and diligently completes the same.. The notice shall specifically identify the alleged breach and the action(s) that would cure it. The City shall deliver its notice to any Financial Participant that has requested notice in writing.

b) A filing by a party to seek protection under any applicable bankruptcy, reorganization, insolvency, dissolution or liquidation law, which filing has not been dismissed within 90 days.

12.2 Remedies. Upon the occurrence of any Event of Default by a party, the other party may exercise any remedy or combination of available remedies, including but not limited to the following:

a) Terminate this agreement by delivering notice to the defaulting party and to any Financial Participant that has requested notice in writing, *provided*, however, that if PBC is the defaulting party, any Financial Participant may substitute and perform PBC's obligations under this agreement by delivering notice of substitution to the City in accordance with the procedures and timing of Section 5.3.3 and provided further that Intracorp may substitute and perform PBC's obligations with respect to the Joint Segment only.

b) Exercise all rights and remedies provided at law or in equity, and may recover its reasonable attorneys' fees and costs.

13. Implementing Actions. The parties shall take actions reasonably required to implement this Agreement, including the City's scheduling for adoption ordinances, if any, determined beneficial to carry out this Agreement.

CITY OF ISSAQUAH, a Washington municipal corporation

By:______________________________
Ava Frisinger, Mayor

Dated:____________________________

Approved as to form:

By:_______________________
City Attorney

PORT BLAKELY COMMUNITIES, a Washington corporation

By:______________________________
Judd Kirk, President

Dated:____________________________

Attachments:

A Definitions
A-1 Interim Supply Solution Options
A-2 Issaquah Highlands Water Facility Plan
B Chart Showing City Water Supply ERUs
C Maps and Legal Descriptions of I/H Property and EV Property

ATTACHMENT A

Definitions

Allowable Development for the I/H Property is defined in Sec. 3.2 of the 2-Party Agreement as consisting of 3,250 residential units, 425,000 sq. ft. of retail and 2.95 mill. sq. ft. of commercial, and any ERUs of water to serve school or other public uses within Issaquah Highlands is not part of the 3,400 ERUs (780 previously reserved for Phase 1 plus 2,620 under Section 7.1(b) for Phase 2) allocated for Allowable Development. Allowable Development also shall include any additional development authorized on the I/H Property from time to time by amendment of the 2-Party Agreement or other City approval.

2-Party Agreement is the Annexation and Development Agreement for Issaquah Highlands (formerly Grand Ridge) dated June 19, 1996, a memorandum of which is recorded under King County Recording No. 9606251228.

City is the City of Issaquah as defined in the 2-Party Agreement.

Construction Eligible Costs are all reasonable out-of-pocket costs relating to the construction of the Regional Facilities including but not limited to engineering, permitting (including SEPA and all government approvals), bonding, inspection fee and other City fees, right-of-way or property acquisition, construction, taxes, consultant fees, construction management fees, and any PBC payment of the RCFC differential under Section 5.8.2 to convert existing water users to the Regional Facilities (and any repayment by the City to PBC under Section 5.8.2 would be credited as a reduction of PBC's costs). Construction Eligible Costs shall also include interest on the foregoing amounts at the prime rate of Bank of America NT&SA dba Seafirst (using the prime rate on the date PBC posts the performance bond for the Regional Facilities, unless the Mayor and PBC agree to another date or tracking system for interest rates), plus 1%, from the date the costs were incurred until reimbursement of these costs are made pursuant to Section 5.6 of this Agreement.

Event of Default means the failure to cure after notice of non-performance as provided in Section 12.

Design Eligible Costs are all reasonable out-of-pocket costs relating to the preliminary planning, permitting (including SEPA and all government approvals) and design of the Regional Facilities incurred since August 18, 1998 (including those items set out in the RH2 Scope of Work and letter dated August 18, 1998). Design Eligible Costs shall also include interest on the foregoing amounts at the prime rate of Bank of America NT&SA dba Seafirst (using the prime rate on the date PBC posts the performance bond for the Regional Facilities, unless the Mayor and PBC agree to another date or tracking system for interest rates), plus 1%, from the date the costs were incurred until reimbursement of these costs are made pursuant to Section 5.6 of this Agreement.

ERU is a structure or facility that uses 195 (with conservation; or 228 without conservation) gallons of water per average annual day, and 495 (with conservation; or 570 without conservation) gallons of water per peak day. Peak day is a multiple of 2.5 times the average daily use. A single family detached residence is 1 ERU. A multi-family attached residence is 0.67 ERU. 1,250 square feet of commercial space is 1 ERU.

EV Property means the property commonly known as East Village and described in Exhibit C.

EV Spur Line means the water line extending from the Regional Facilities at the SR-900 juncture to the EV Property.

Financial Participant means Intracorp as owner of an option to acquire and develop the EV Property and any other private party whose name has been given to the City and who has (1) entered into an agreement to participate with PBC in the funding of the Regional Facilities as described in Section 5.3, (2) received (or has a contractual right to receive) from PBC an assignment of ERUs pursuant to Section 7.3, and (3) has adequate financial resources to complete the facilities under this Agreement. **PBC-Financial Participant** means a Financial Participant who is participating in the funding of the full length of the Regional Facilities (*i.e.*, the Joint Segment and the segment needed to reach the I/H Property and Holly Street Pump station). **EV-Financial Participant** means a Financial Participant participating only in the Joint Segment of the Regional Facilities.

I/H Property means the total "Partnership Property" as defined in Ex. 1-A of the 2-Party Agreement (which is attached hereto as part of Exhibit C), plus any Expansion Areas or other land subsequently added to the Issaquah Highlands project.

Intracorp means Intracorp Real Estate LLC or its affiliated partnership, Cougar Mountain East Village Partnership, a Washington general partnership.

Interim Supply Solution is implementation of one of the Interim Supply Solution Options listed on Attachment A-1. If the Interim Supply Solution adopted is any one other than the DOH reservoir nesting rule, then the costs of design, permitting and construction of an Interim Supply Solution shall be included as a "Design Eligible Cost" and a "Construction Eligible Cost."

Joint Segment is the segment of the Regional Facilities that extends from Bellevue to SR-900 and benefits both the I/H Property and the EV Property.

MDRT is the staff of the Major Development and Review Team as assigned by the Public Works Director.

New User means a party which will use some or all of the Reserved Capacity of the Regional Facilities as further described in Section 5.6.

Phase 1 is the first phase of development on the Issaquah Highlands project and includes 540 ERUs of residential construction, 250,000 square feet of commercial construction and 50,000 square feet of retail construction. Phase 1 has been planned using 780 ERUs from existing City supply.

Phase 2 is the second phase of development on the Issaquah Highlands project and includes all residential and commercial construction after Phase 1. An ERU in Phase 2 is a structure or facility that uses 198 gallons of water per average annual day, and 495 gallons of water per peak day. The reduction is based on the anticipated results of a conservation program and smaller lots in the Issaquah Highlands project.

Port Blakely Communities or PBC is the developer of the Issaquah Highlands (formerly Grand Ridge) project, their heirs, successors or assigns, as defined in the 2-Party Agreement.

Regional Connection Facility Charges means all equitable, reasonable and published charges imposed by the Seattle Water Department or the Cascade Water Alliance (or the municipal corporation owning and providing regional water service to the Regional Facilities) to any other municipal corporation for the cost of connecting to the Puget Sound regional water supply system. The RCFC is a charge for the pro rata share of the previous capitalized costs of the water supply and treatment facilities that benefit the Regional Facilities.

Regional Facilities means the regional water supply facilities (including, but not limited to pumps, PRV's, valves, meters, transmission mains, storage facilities, and water quality treatment facilities) to be extended using Seattle water as designed, approved, and constructed under this Agreement. It also includes modifications to the existing water supply system to isolate the regional water from the existing system to prevent mixing and blending, and it also includes emergency supply interconnections. As used in this Agreement, the term "Regional Facilities" includes the Joint Segment extending from Bellevue to SR-900, along with the segment needed to reach the I/H Property and the Holly Street pump station. The EV Spur Line is not defined as a Regional Facility under this Agreement.

Reserved Capacity means 5.8 MGD, *i.e.* that portion of the pipeline capacity of the Regional Facilities in excess of the 4.2 MGD as described in Section 5.6.

Unreasonable Terms as used in Section 5.3.1 means permit or regulatory terms or conditions which would not be undertaken by a prudent private business entity due to one or more of the following: uncertainty of success of mitigating or meeting permit conditions, potential liability, difficulty of financing or obtaining lender approval, substantial delay in obtaining final approvals or compliance, substantial additional studies or analysis, or similar difficulties. Any dispute regarding "Unreasonable Terms" shall be determined through Dispute Resolution under Section 5.11.

Wholesale Agreement means the Amendment to Wholesale Water Service Agreement between the City and the City of Bellevue signed April 20, 1999 to supply water to Issaquah under Bellevue's Water Purveyor Contract with Seattle.

ATTACHMENT A-1

INTERIM SUPPLY SOLUTION OPTIONS

Based on the State Department of Health's rule changes adopted effective April 9, 1999 (Chap. 246-290), the Interim Supply Solution for purposes of this Agreement is hereby established as follows: Port Blakely will temporarily "nest" the fire flow and standby storage in the 742 reservoirs so long as the Department of Health continues to allow such access in its regulatory requirements. This storage will be used to convert total City demand to a Peak Week supply scenario. However, all storage sizing calculations shall continue to be in accordance with current City policies. The allowance to temporarily "nest" for purposes of peaking capacity in the interim period (*i.e.* before completion of the Regional Facilities) does not constitute a change in City policy regarding reservoir-sizing criteria. The nesting of storage at the 742 reservoir requires that there be 2.1 million gallons of storage on-line in the 1,232 operating area as identified in the Issaquah Highlands Water Facility Plan attached hereto as Attachment A-2. After the Regional Facilities are completed and in service, nesting will not be allowed in the 742 or 1,232 operating areas of Issaquah Highlands, but this does not preclude the City from adopting, subsequent to signing this Agreement, a policy or procedure which allows continued or future nesting for some or all of the City, including at Issaquah Highlands.

If for any reason the DOH rules in the future do not allow this reservoir nesting or do not allow substantially equivalent use of existing facilities, then PBC may elect in its discretion any of the remaining options for the Interim Supply Solution called for in this Agreement, except Option 6 requires mutual approval with the City (and any dispute shall be resolved by using the procedures of Section 5.11 of this Agreement):

Option 1 – Construct 2.5 million gallons of storage at the 297 grade-line that can be used to convert existing city customers to an interim Peak Week supply scenario.

Option 2 – Build 1.2 million gallons of storage in the 1,232 operating area in excess of the required 2.1 million gallons of storage required for the development. This would create a total of 3.3 million gallons of storage in the 1,232 operating area. The storage would be used as terminal storage to supplement groundwater flows during peak demand conditions. After the regional main is completed, the storage would be used to supply operating, equalizing, fireflow and standby storage for the 1,000 and 1,232 pressure zones. Until the regional main is on-line, no water supply connections may be permitted in the 1,232 operating area. Two million-one hundred thousand (2.1 million) gallons of the 3.3 million gallons would be constructed with an overflow elevation of 1213 and the remaining 1.2 million gallons would be constructed above elevation 1213.

Option 3 – Build 1.2 million gallons of storage in the 1,232 operating area in excess of the required 2.1 million gallons of storage required for the development. This would create a total of 3.3 million gallons of storage in the 1,232 operating area. Two reservoirs will be constructed in the 1,232 operating area, each sized at 1.65 million gallons. The storage would be used as terminal storage to supplement groundwater flows during peak demand conditions. After the regional main is completed, the storage would be used to supply operating, equalizing, fireflow and standby storage for the 1,000 and 1,232 pressure zones. Until the regional main is on-line, no water supply connections may be permitted in the 1,232 operating area.

Option 4 – Build 1.2 million gallons of storage in the 1,232 operating area in excess of the required 2.1 million gallons of storage required for the development. This would create a total of 3.3 million gallons of storage in the 1,232 operating area. This would be accomplished by constructing separate reservoirs in both the 1,232 and 1,000 operating areas with a combined total of 3.3 million gallons. Until the regional main is on-line, no water supply connections may be permitted in the 1,232 or 1,000 operating areas.

Option 5 – [Option selected, *i.e.* DOH rule for reservoir nesting]

Option 6 – Any other supply solution which limits peak demands on the existing groundwater supply system to 287 gallons per day per ERU during the peak demand week for Issaquah Highlands. The solution must meet DOH criteria and be approved by the City of Issaquah.

ATTACHMENT B

CHART OF CITY WATER SUPPLY ERUs

ATTACHMENT C

MAPS AND LEGAL DESCRIPTIONS FOR ISSAQUAH HIGHLANDS PROPERTY AND EAST VILLAGE PROPERTY

SPWSD LAKESIDE INTERLOCAL AGREEMENT (2013)

AGREEMENT

This ("Agreement") is made and entered into by and between the Sammamish Plateau Water and Sewer District, a Washington municipal corporation ("District") and the City of Issaquah ("City") (individually a "Party" and collectively the "Parties") for the purposes set forth below.

SECTION 1: RECITALS

1.01 The District is a water-sewer special purpose district authorized and existing pursuant to Title 57 Revised Code of Washington (RCW). The District owns and operates water and sewer utility systems and provides retail utility services to customers located within the District's corporate and approved utility service area boundaries.

1.02 The City is an optional municipal code city authorized and existing pursuant to Title 35A RCW and other statutes. The City owns and operates water and sewer utility systems and provides retail utility services to customers located within the City's corporate and approved utility service area boundaries.

1.03 Portions of the District's and the City's utility service boundaries are adjacent.

1.04 The District's and the City's exclusive water service area boundaries have been established and approved pursuant to chapter 70.116 RCW, the Public Water System Coordination Act of 1977 (Act). In accordance with the East King County Coordinated Water System Plan (CWSP) prepared pursuant to the Act, the District and the City have been designated the exclusive water service purveyors within their respective authorized water service areas. The District's and the City's retail water service area boundaries have also been established and approved pursuant to water system plans approved by the Washington State Department of Health (DOH), King County and other public agencies with jurisdiction. The water system plans designate the District and the City as the exclusive water service purveyors within their respective authorized retail water service areas.

1.05 The District's and the City's retail sewer service area boundaries have been established and approved pursuant to comprehensive sewer system plans approved by the Washington State Department of Ecology, King County and other public agencies with jurisdiction. The comprehensive sewer system plans designate the District and the City as the exclusive sewer service providers within their respective authorized retail sewer service areas.

1.06 Lakeside Industries, Inc., a Washington corporation ("Lakeside" or "Owner"), owns certain undeveloped real property consisting of approximately thirteen (13) acres located adjacent to and partially fronting Highlands Drive NE located in Issaquah, as legally described and depicted on **Exhibit A** attached hereto and incorporated herein in full by this reference ("Property"). The Property is presently located within the District's corporate boundary and the District's exclusive water service area boundary as established by the CWSP. The Property is presently located within the District's exclusive sewer service area boundary as established pursuant to the District's approved comprehensive sewer system plan.

1.07 The Parties and Lakeside have undertaken studies to determine if the Property is developed whether the District or the City is the most logical provider of retail water and sewer service to the Property based on the sizing and proximity of the Parties' respective water and sewer systems to the Property. Based on the studies, the Parties and Lakeside have determined, if the Property is developed, that (a) the City is the most logical provider of retail water service to the Property, and (b) the District is the most logical provider of retail sewer service to the Property. Based on these determinations, Lakeside has requested the Parties adjust their respective water service area boundaries to indicate and reflect the Property is within the City's designated exclusive water service area. However, the Parties desire to confirm that the Property shall remain within the District's sewer service area boundary, unless otherwise changed pursuant to law.

1.08 The Parties now desire to adjust the Parties' exclusive retail water service areas relative to the Property and the purpose of this Agreement is to undertake and conclude the adjustment of the Parties' respective exclusive water service area boundaries as agreed relative to the Property.

THEREFORE, in consideration of the terms and conditions set forth herein, the Parties agree as follows:

Section 1: Water Service Area Boundary Adjustment

2.01 The Recitals set forth above are incorporated herein in full by this reference.

2.02 The Parties agree the District's water service area boundary is hereby modified and adjusted to delete the Property from the District's exclusive water service area boundary and to add the Property to the City's exclusive water service area boundary on the Effective Date of this Agreement, subject to the City and Lakeside obtaining any approvals of such water service area boundary adjustment required by public agencies with jurisdiction such as the East King County Regional Water Association, DOH and King County. It is the intent of the Parties the City shall be the designated exclusive water service provider for the Property pursuant to the CWSP, and that the District shall cease to be the designated exclusive water service provider for the Property as of the Effective Date of this Agreement.

2.03 The Parties shall amend their respective water systems plans as appropriate to document and formalize the water service area boundary adjustment provided for in this Section 2.

2.04 The Parties agree that there are no other agreements to adjust the Parties' respective existing water service area boundaries other than the agreement to adjust their water service area boundaries relative to the Property provided in this Section 2, including no agreement with respect to adjoining property owned by Lakeside.

Section 3: No Adjustment to Sewer Service Area Boundary

3.01 The Parties recognize, acknowledge and agree the Parties have not agreed to any modification or adjustment to their respective sewer service area boundaries relative to the Property or any other property, and the Property shall remain within the District's corporate and exclusive sewer service area boundary unless otherwise changed by law.

3.02 The Parties agree the District is and shall remain the designated exclusive sewer service provider for the Property unless and until, by further agreement of the Parties or by law, such designation is modified, amended or changed as provided by law.

3.03 The Parties agree, if Lakeside or its successors in interest or ownership develop the Property, it is anticipated the Property shall connect to and receive water service from the City's water system. In that event, upon the completion of the development, or redevelopment, of the Property, and connection to the City's water system, the City shall bill the owner of the Property for water service provided in accordance with the applicable statutes, and City ordinances, policies and procedures regarding the provision of water service to the Property; provided, the District shall provide sewer service to any such development of the Property and, upon the completion of the development, connection of the development to the City's water system and billing by the City to the owner of the property or owner's agents for water service, the City shall provide District with the data and information regarding water consumption by the development as established by the City's water consumption metering at and by the development on the Property. The City shall provide such water consumption data to the District no less frequently than every two (2) months, and within ten (10) days of the City's reading or receipt of water consumption data from the City's meter(s) serving the Property. The water consumption data shall be measured by cubic feet of water provided to the development and to the Property. The consumption data shall be provided by the City to the District in an electronic format csv file which shall include uniquely identifiable customer information in accordance with applicable utility industry standards. The District agrees that this data and information is subject to the Public Records Act and any public disclosure of such data and/or information shall comply with said Act.

3.04 The Parties agree, with respect to any development of the Property requiring sewer service from the District, the District shall be entitled to receive all sewer fees, rates and charges, including applicable general and local sewer connection charges, from the owner of the Property while the Property is located within the District's corporate or sewer service area boundaries, or due and owing to the District pursuant to any contract or agreement the District may enter into with the owner of the Property while the Property was located within the District's corporate or sewer service area boundary.

Section 4: General

4.01 This Agreement is made under, and shall be governed by and construed in accordance with the laws of the State of Washington. Venue and jurisdiction of any lawsuit involving this Agreement shall exist exclusively in state and federal courts in King County, Washington. If either Party breaches or threatens to breach this Agreement, the other Party shall be entitled to seek all legal, injunctive or other equitable relief, and the Parties agree that any violation or breach of this Agreement will cause the other Party irreparable harm for purposes of seeking equitable relief only.

2.07 All notices and/or correspondence hereunder, shall be mailed, faxed or hand-delivered and addressed as follows:

To District:

General Manager
Sammamish Plateau Water & Sewer District
1510 228th Avenue SE
Sammamish, Washington 98075
Phone: 425-392-6256, Fax: 425-391-5389.

To City:

Public Works Director
City of Issaquah
1775 - 12th Avenue NW
Issaquah, WA 98027
Phone: 425-837-3426, Fax: 425-837-3439

4.02 This Agreement states the entire agreement between the Parties as to the subject of this Agreement, superseding all prior communications and agreements between the Parties. If any part or provision of this Agreement is held invalid or unenforceable as written, it shall not affect any other part. If any part of this Agreement is held to be unenforceable as written, it shall be enforced to the maximum extent allowed under applicable law.

4.03 The waiver of any breach of this Agreement or failure to enforce any provision of this Agreement shall not waive any later breach.

4.04 The term "Party" as used in this Agreement shall include, but not be limited to, the Party's employees, staff, agents, contractors, sub-contractors and any other persons, parties or entities providing services to the Party for the purposes set forth herein.

4.05 This Agreement shall be effective on the date by which both Parties have executed this Agreement ("Effective Date").

4.06 This Agreement may be executed in counterparts, each of which shall be deemed an original and with the same effect as if the Parties had signed the same document. All such counterparts shall be construed together and shall constitute one instrument, but in making proof hereof it shall only be necessary to produce one such counterpart.

4.07 The Parties represent and warrant this Agreement has been duly approved and authorized by their respective legislative authorities, that each Party has the full power and authority to enter into this Agreement and to carry out the actions required of them by this Agreement, and all persons signing this Agreement in a representative capacity represent and warrant they have the full power and authority to bind their respective municipal entities.

4.08 In the event of any conflict, claim or dispute between the Parties arising out of or relating to the subject matter of this Agreement, whether or not such conflict, claim or dispute has its basis in law or in equity, the prevailing party shall be entitled to receive from the non-prevailing party all reasonable costs and expenses of every sort whatsoever including, but not limited to, arbitrators' fees, mediation fees, deposition costs, expert witness fees, accounting expenses and actual attorneys' fees incurred or expended, whether or not arbitration or court proceedings are initiated, and including all such costs or expenses incurred or expended in arbitration, in trial, or on appeal.

IN WITNESS WHEREOF, the Parties have executed this Agreement as set forth below.

SAMMAMISH PLATEAU WATER & SEWER DISTRICT

By [signature]

Name: John C Krauss

Title: General Manager

Date: 2/28/13

Approved as to Form
District Legal Counsel

By: [signature]
Its: General Counsel
Dated: 2/5/13

CITY OF ISSAQUAH

By Ava Frisinger

Name: Ava Frisinger

Title: Mayor

Date: 2/4/13

Approved as to Form
Office of the City Attorney

By: Wayne Tanaka
Its: City Attorney
Dated: 2/4/13

EXHIBIT A
LEGAL DESCRIPTION

ALL LOCATED IN THE SE 1/4 OF SECTION 22, TOWNSHIP 24 NORTH, RANGE 06 EAST, W.M., KING COUNTY, WASHINGTON AS FOLLOWS:

LOT A KC BLA #L12L0025 & ISSAQUAH LLA #PLN 12-00035 REC #20121003900003 SD BLA & LLA BEING POR OF E 1/4 OF N 1/2 LY S OF BLACK NUGGET RD TGW POR S 1/2 LY ELY OF NORTH SAMMAMISH PLATEAU ACCESS RD & NLY & WLY OF VISTA PARK 2 & N OF ISSAQUAH HIGHLANDS VISTA PARK ALL IN SE 1/4

Mayor Frisinger
City of Issaquah

AMF 3/19/13
Initial Date

John C. Krauss, General Manager
Sammamish Plateau Water & Sewer District

JCK 3/22/13
Initial Date

SPWSD AGREEMENT FOR INTERTIES AND 297 TANK LEASE (1993)

AGREEMENT FOR INTERTIES AND 297 TANK LEASE

THIS AGREEMENT is made by and between the Sammamish Plateau Water and Sewer District, a municipal corporation, in King County, Washington ("District"), and the City of Issaquah, a municipal corporation, in King County, Washington ("City") for the purposes set forth herein.

SECTION I: RECITALS

1.1 District provides water service to the geographic area known as the Sammamish Plateau, King County, Washington. City provides water service to the City of Issaquah, King County, Washington. A portion of District's southern corporate boundary is located adjacent to City's corporate boundary.

1.2 District and City desire to obtain supplemental water supply for redundancy, fire flow augmentation and other emergency purposes. District and City are willing to allow interties between District and City water systems for such purposes subject to certain terms and conditions. District is further willing to provide City with an additional water by leasing water stored in a District water storage tank subject to certain terms and conditions.

1.3 District and City are authorized by RCW Chapter 39.34 to enter into interlocal agreements for joint action.

In consideration of the terms and conditions contained herein, the parties now agree as follows:

SECTION II: 1ST AVENUE N.E. INTERTIE

2.1 District and City agree to provide each other with an emergency standby source of water through an intertie connection between District and City water systems at the location described and depicted on Exhibit "A" attached hereto, commonly known as District's Corrosion Control Facility. This connection shall be an emergency standby connection, and water shall only be drawn through this point when an emergency occurs. An emergency shall be considered any event that requires District's or City's water supply to be augmented on a temporary emergent basis.

2.2 District or City shall notify the other party in writing at least three (3) business days in advance of the date either party desires to receive water through the intertie. In case of emergency need, District or City shall provide water immediately upon oral notification of such emergency. Follow-up written notice of such emergency request shall be made by District or City to the other party with five (5) days of the commencement of such use.

2.3 The intertie is constructed and owned by District. The intertie is capable of being place into operation at any time.

2.4 Water supplied by District and City through the intertie will be untreated.

2.5 District and City shall use reasonable efforts to provide an uninterrupted supply of water. Neither party shall be liable for any shortage or interruption in the delivery of water. In addition, neither party shall be liable for any failure, interruption, or shortage of water, or any loss or damage resulting therefrom occasioned by any cause beyond the control of either party. District and City do not guarantee the availability of water through the intertie at all times because of each parties' respective needs and water demand. Further, during critical water shortage periods as determined by either party, District or City may close the intertie until sufficient water supply exists to make such available for use by either party. In the event District or City declares and/or imposes water usage restrictions within their boundaries, District and City agree to adopt and impose water usage restrictions no less restrictive than those adopted by the other party as a pre-condition to receiving water through the intertie.

2.6 All water delivered under this agreement may only be resold to members/customers within the parties' respective water service boundary for use therein.

2.7 District shall measure all water delivered through the intertie by metering equipment owned by the District. District and City will monitor the water flow measurements. District shall own, operate, and maintain the intertie up to the City side of the intertie vault. City shall own, operate, and maintain any water line from the City side of the intertie vault to the City water system. District shall be responsible for the flushing of such intertie water line as reasonably necessary to ensure water quality.

2.8 Only District personnel shall operate the intertie valve. City shall notify District when there is a need for emergency intertie water supply; in such event, District's personnel shall operate the valves for opening and closing the intertie.

2.9 In the event that District or City receive water through the intertie, both parties agree to replenish or replace the same volume of water received and delivered from the intertie to the other party within seventy-two (72) hours of the time of receipt. In the event such water delivered is not replaced by the receiving party within such period, the party receiving such water shall pay the other party for such water delivered at the commercial commodity rate charged by the party delivering such water. The party delivering such water shall bill the party receiving such water monthly for the amount of water delivered. The party receiving such water shall pay the other party within sixty days (60) days of the date of such billing. Any billings not paid by the party within such sixty-day period, shall accrue interest at the rate of twelve percent (12%) per annum until paid.

SECTION III: S.E. 56TH STREET INTERTIE

3.1 District agrees to provide City an emergency standby source of water through an intertie connection between District and City water systems to be constructed at the location described and depicted on Exhibit "B" attached hereto. This connection shall be an emergency standby connection, and water shall only be drawn through the intertie when an emergency occurs. An emergency shall be considered any event that causes City's water pressure to drop below thirty (30) psi at the intertie location as a result of fire flow, water line failure, or reduced water supply.

3.2 City agrees to provide District an emergency standby source of water through an intertie connection between District and City water systems to be constructed at the location described and depicted on Exhibit "B" attached hereto. This connection shall be a manual bypass system which will allow City water to flow to District. Water shall only be drawn through the intertie when an emergency occurs. An emergency shall be considered any event that requires water supply to be augmented on a temporary emergent basis.

3.3 District shall notify City in writing at least three business (3) days in advance of the date District desires to receive water through the intertie. In case of emergency need, District or City shall provide water immediately. Follow-up written notice of such emergency need or request shall be made by District or City to the other party within five (5) days of the commencement of such use.

3.4 The intertie will be constructed, installed and owned by City in conjunction with the S.E. 56th Street improvements which are scheduled to be installed in 1993.

3.5 The intertie is primarily a one way intertie with treated water being supplied by District to City. However, in the event that District receives water from City through the intertie, any water provided by City to District will be untreated.

3.6 District and City shall use reasonable efforts to provide an uninterrupted supply of water. Neither party shall be liable for any shortage or interruption in the delivery of water. In addition, neither party shall be liable for any failure, interruption, or shortage of water, or any loss or damage resulting therefrom occasioned by any cause beyond the control of either party. District and City do not guarantee the availability of water through the intertie at all times because of each parties' respective needs and water demand. Further, during critical water shortage periods as determined by either party, District or City may close the intertie until sufficient water supply exists to make such available for use by either party. In the event District or City declares and/or imposes water usage restrictions within their boundaries, District and City agree to adopt and impose water usage restrictions no less restrictive than those adopted by the other party as a pre-condition to receiving water through the intertie.

3.7 All water delivered under this agreement may only be resold to members/customers within the parties' respective water service boundary for use therein.

3.8 City shall measure all water delivered through this intertie by metering equipment owned by City. District and City will monitor the water flow measurements. City shall own, operate, and maintain the intertie up to the District side of the intertie vault. District shall own, operate, and maintain any water line from the District side of the intertie vault to the District water system. City shall be responsible for the flushing of such intertie water line as reasonably necessary to ensure water quality.

3.9 Only City personnel shall operate the intertie valve. District shall notify City when there is a need for emergency intertie water supply; in such event, City personnel shall operate the valves for opening and closing the intertie.

3.10 In the event that District or City receive water through the intertie, both parties agree to replenish or replace the same volume of water received and delivered from the intertie to the other party within seventy-two (72) hours of the time of receipt. In the event such water delivered is not replaced by the receiving party within such period, the party receiving such water shall pay the other party for such water delivered at the commercial commodity rate charged by the party delivering such water. The party delivering such water shall bill the party receiving such water monthly for the amount of water delivered. The party receiving such water shall pay the other party within sixty days (60) days of the date of such billing. Any billings not paid by the party within such sixty-day period, shall accrue interest at the rate of twelve percent (12%) per annum until paid.

SECTION IV: 297 TANK LEASE

4.1 District agrees to provide City an additional emergency standby source of water by leasing to City water stored in a District water tank, commonly referred to as the 297 Tank, at the location described and depicted on Exhibit "C" attached hereto. This water source shall be an emergency standby reserve, and water shall only be drawn from the 297 Tank when an emergency occurs. An emergency shall be considered any event that causes City's water pressure to drop below thirty (30) psi at the S.E. 56th Street intertie location as a result of fire flow, water line failure, or reduced water supply.

4.2 The total storage capacity of the 297 Tank is 2.25 million gallons. District agrees to lease to City up to one half (1/2) of the total tank storage capacity, or up to 1.125 million gallons of water. If the 297 Tank is filled to capacity at the time City requests water from District, City shall be entitled to receive up to 1.125 million gallons of water. In the event the 297 Tank is not filled to its maximum capacity at the time City requests water from District, City shall only be entitled to receive water in the amount of one half (1/2) of the 297 Tank's capacity at the time of City's request; provided, however, in the event of a fire flow emergency, such limitation shall not apply.

4.3 All water provided by District to City from the 297 Tank will be treated.

4.4 City shall notify District in writing at least three (3) business days in advance of the date City desires to receive water from District's 297 Tank. In case of emergent fire flow need by City, District shall provide water immediately. Follow-up written notice of such emergency use shall be made by City to District within five (5) days of the commencement of such use.

4.5 Because any water delivered by District to City from the 297 Tank shall be transferred to the City through the intertie(s) referenced in Sections II and III herein, City's obligation to replace or pay for such water shall be governed by Paragraphs 2.9 and 3.10 herein.

4.6 In addition to payment for water used pursuant to Paragraph 4.5 above, City shall pay District $2,047 per month for fire protection use (fire protection use rate) of the 297 Tank, regardless of the amount of water used by City per month. The fire protection use rate, or as such may be adjusted as provided herein, shall be paid by City to District annually, the first such cumulative payment being due and payable one year from the effective date of this agreement. Any lease rate due and owing District not paid by City within 45 days of such date and successive annual payment dates thereafter shall accrue interest at the rate of 12 percent (12%) per annum until paid; further, in addition to all other legal rights and remedies District may have in the event of City's nonpayment, in the event of City's failure to make such payment within forty-five (45) days of notice from District of such nonpayment, District may thereafter terminate the lease immediately upon 45 days written notice of such termination.

The fire protection use rate set forth herein shall be automatically adjusted every three years, such three-year period commencing from the effective date of this agreement based on the "all urban" consumer price index for the Seattle/Tacoma area (CPI rate); provided that such CPI rate shall be compounded annually to determine the CPI rate adjustment every three years. The base CPI for the purposes of this Agreement shall be the CPI index as published by the U.S. Department of Labor for the "all urban" consumer price index for the Seattle/Tacoma area for the month of January 1994. Provided, however, that in the event the CPI rate increases in an amount greater than 10 percent (10%) in any year, the fire protection use rate set forth herein or as such rate may be adjusted as provided herein, shall be automatically adjusted based on such CPI rate effective for the following year. In such case, a new three-year period for the purposes of adjusting the fire protection use rate shall commence upon the effective date of such new CPI rate.

4.7 The term of the 297 Tank lease shall commence upon the effective date of this Agreement and shall continue for a period of 25 years, provided, however, either may cancel and terminate the tank leasehold upon giving two years advance written notice to the other party.

4.8 District shall use reasonable efforts to provide an uninterrupted supply of water from the 297 Tank. District shall not be liable for any shortage or interruption in the delivery of water. In addition, District shall not be liable for any failure, interruption, or shortage of water, or any loss or damage resulting therefrom occasioned by any cause beyond the control of District. District does not guarantee the availability of water from the 297 Tank at all times because of District's needs and water demand. Further, during critical water shortage periods as determined by District, District may suspend the delivery of water from the 297 Tank until sufficient water supply exists to make such available for use by City.

4.9 All water purchased and delivered to City under this agreement may only be resold to members/customers within City's water service boundary for use therein.

SECTION V: GENERAL PROVISIONS

5.1 Each party shall approve the terms and conditions herein by appropriate resolution or ordinance and provide the other party with a certified copy of same. Each party represents to the other that it has the full power and authority to enter into this Agreement.

5.2 In the event that either party commences any legal action relating to the provisions of this Agreement, the prevailing party shall be entitled, in addition to all other amounts to which it is otherwise entitled in this Agreement, to all costs of litigation, including but not limited to, costs, expert witness and reasonable attorney's fees, including all such costs and fees incurred on appeal.

5.3 District and City agree to hold harmless and indemnify the other party and its employees and agents from any and all claims, damages, costs, and other liabilities caused by the parties' sole negligence or the parties' concurrent negligence, but only to the extent of the parties concurrent negligence, and arising by reason of participation in connection with, or relating to, the performance of this Agreement. In addition, District and City agree to defend, indemnify, and hold the other party harmless from any and all claims, damages, costs, and other liabilities arising out of any use by District or City or its customers receiving or to have received water through the interties or 297 Tank, including emergency use for fire purposes and normal domestic use by any District or City customers which relate in any way to water supplied under this Agreement.

5.4 This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns.

5.5 Any notice to be given or any documents to be delivered by any party to any other shall be delivered in person or by certified mail and addressed to District or City at the following addresses:

To District at:

District Manager
1510 220th Avenue S.E.
Issaquah, WA 98027

With a courtesy copy to:

John Milne
Inslee, Best, Doezie & Ryder, P.S.
Security Pacific Plaza
777 108th Avenue N.E., Suite 1900
Bellevue, WA 98009-9016

To City at:

Mayor, City of Issaquah
P. O. Box 1307
Issaquah, WA 98027-1307

With a courtesy copy to:

Wayne Tanaka
Ogden, Murphy & Wallace
2100 Westlake Center Tower
1601 Fifth Avenue
Seattle, WA 98101-1686

5.6 No waiver by either party of any term or condition of this Agreement shall be deemed or construed as a waiver of any other term or condition, nor shall a waiver of any subsequent breach, whether of the same or of a different provision of this Agreement.

5.7 If any paragraph or provision of this Agreement is held to be invalid, the remainder of the Agreement shall not be affected, and shall remain in force and effect.

5.8 This Agreement shall take effect ("effective date") upon the ratification of this Agreement by both the District Board of Commissioners and the City Council of City.

5.9 This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof and may be modified only by an agreement in writing signed by both parties.

5.10 Each party agrees to comply with all federal, state, and local regulations in the operation of its water system connected to the interties and 297 Tank which is the subject of this Agreement.

Approved as to Form District Legal Counsel	SAMMAMISH PLATEAU WATER AND SEWER DISTRICT ("District")
By John W. Milne	By Gifford W. Miller
Its General Counsel	Its President
Dated May 16, 1994	Dated May 16, 1994

Office of the City Attorney

By [signature]
Its City Attorney
Dated 5-20-94

CITY OF ISSAQUAH ("City")

By [signature]
Its Mayor
Dated 5-23-94

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that Gifford W. Miller is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the Commissioner of Sammamish Plateau Water and Sewer District, a municipal corporation, to be the free and voluntary act of such municipal corporation for the uses and purposes mentioned in the instrument.

ANGELA M BARTON
Notary Public
STATE OF WASHINGTON
My Commission Expires
July 20, 1994

Dated May 16, 1994

Angela M Barton
Notary Public in and for the State of Washington, residing at Maple Valley
My Appointment Expires 7-20-94

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that ____________________ is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the ______________________ of the City of Issaquah, a municipal corporation, to be the free and voluntary act of such municipal corporation for the uses and purposes mentioned in the instrument.

Dated ____________________________

____
Notary Public in and for the State
of Washington, residing at ____________
My Appointment Expires ______________

EXHIBIT "A"

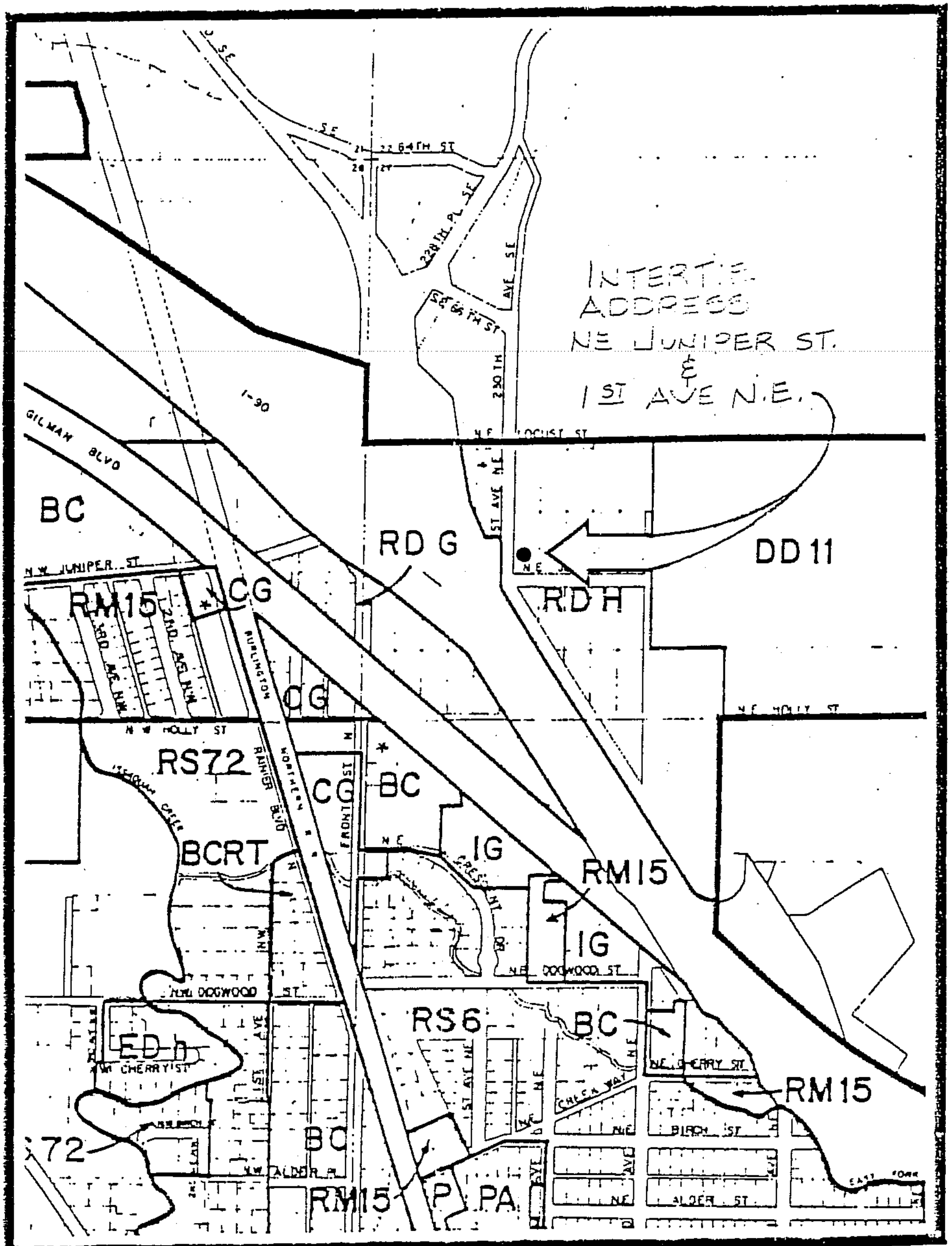
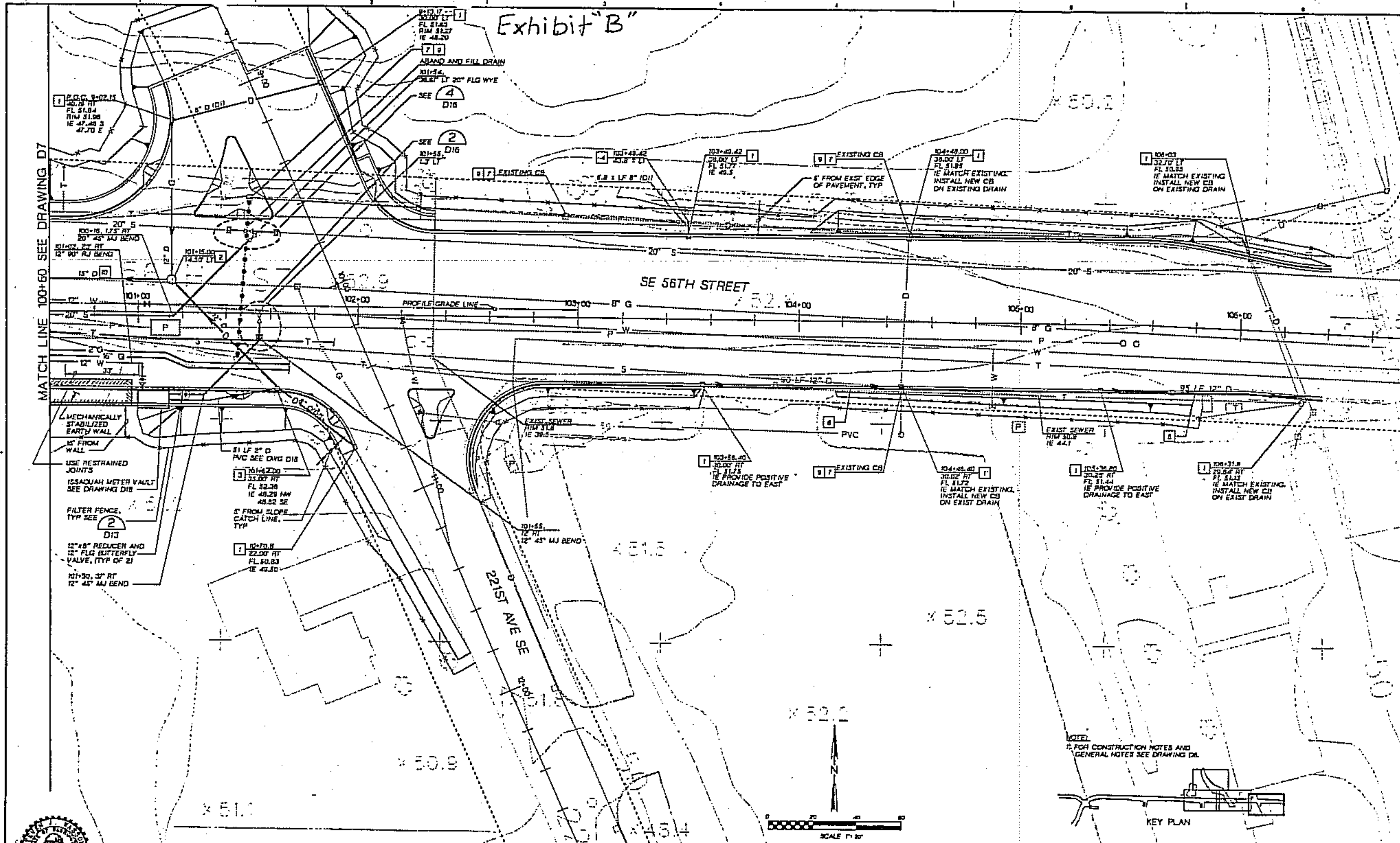


Exhibit J

Exhibit "B"



DSGN	S. WASSON M. MOORE	
DR	D. STAPP	
CHK	S. SUNDGREN R. BEIELER	
APVD	C. SUNDBERG	

NO.	DATE	REVISION	BY	APVD

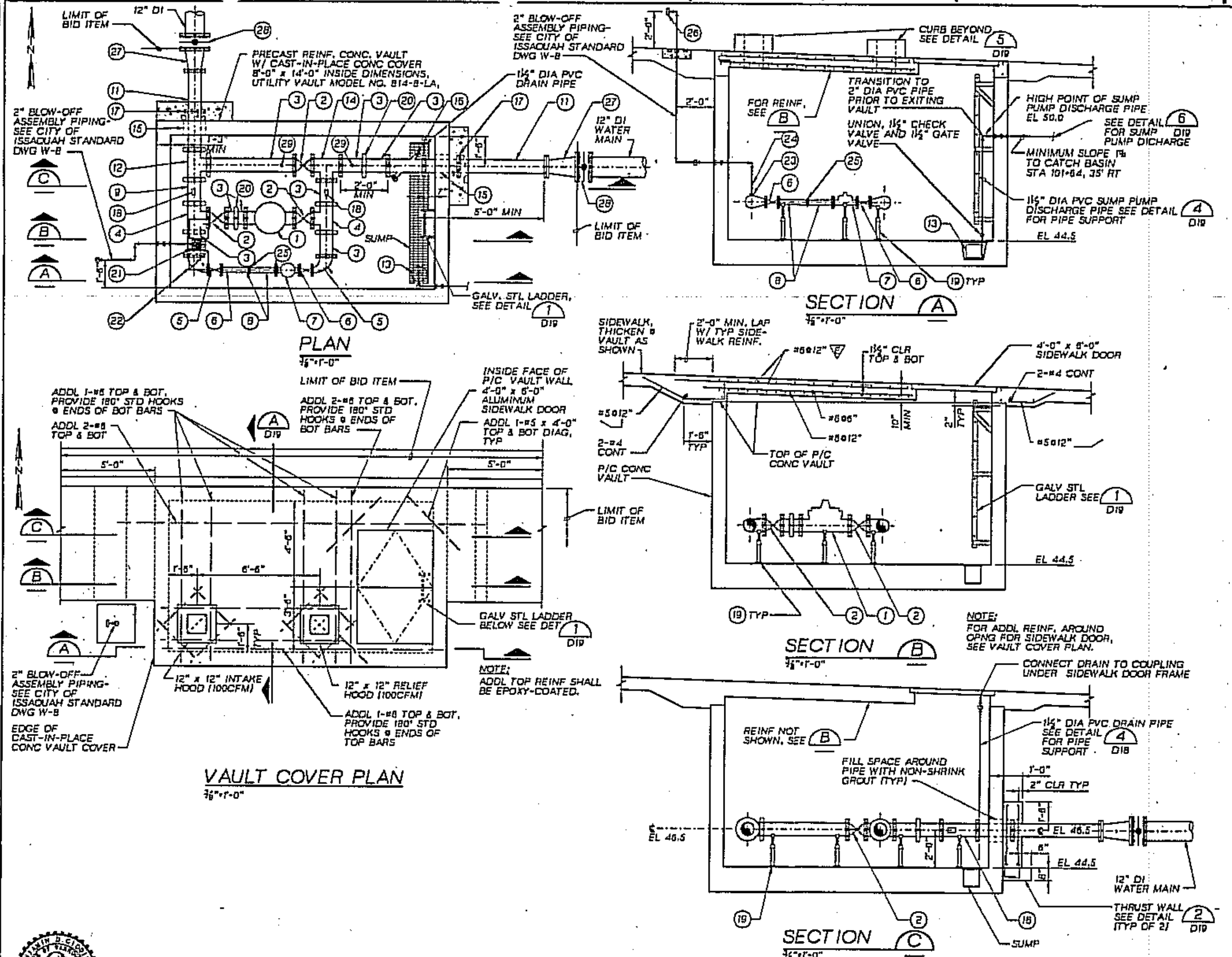
REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2M HILL.

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT
S.E. 56TH ST ROADWAY AND BRIDGE IMPROVEMENTS

F.A. NO. BRM-2004(018) STAGE TWO-B
GRADING, DRAINAGE AND UTILITES

SHEET
DWG NO. D8
DATE APRIL 94
PROJ NO. SEA28049.PK

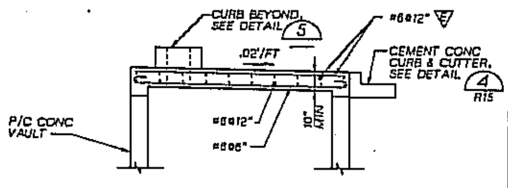


1. 8" PRESSURE REDUCING VALVE, FLG, 250 PSI (CLAYTON MODEL 92G-01ABCDKC WITH X105L2W MICRO SWITCH)
2. 8" GATE VALVE - FLG, 200 PSI
3. 8" PIPE - FLG x GROOVED END
4. 8" TEE - GROOVED END x GROOVED END x FLG
5. 3" x 8" REDUCING 90° BEND, FLG
6. 3" GATE VALVE- FLG, 200 PSI
7. 3" PRESSURE REDUCING VALVE, FLG, 250 PSI (CLAYTON MODEL 92G-01ABSDKC WITH X105L2W MICRO SWITCH)
8. 3" PIPE - FLG x GROOVED END
9. 8" PIPE - GROOVED END
10. NOT USED
11. 8" PIPE - FLG
12. 8" TEE - GROOVED END
13. SUMP PUMP, PACO PIP700a OR EQUAL. PUMP SHALL BE SMALL ENOUGH TO FIT IN SUMP WITH GRATING IN PLACE.
14. 8" TEE, FLG
15. 8" PIPE, FLG
16. 8" SONIC METER - FLG
17. FLANGED JOINT FOR THRUST RING
18. PRESSURE GAUGE - 2½" LIQUID FILLED BRASS FITTED 0-200 psi GAUGE. SPAN INSTRUMENTS MODEL LFS220 OR EQUAL. EQUIPPED WITH ¼ TURN BRASS PETCOCK.
19. ADJUSTABLE PIPE SUPPORT - TYPICAL F & M FIGURE 2915, GRINNEL FIGURE 264 OR EQUAL, SEE DETAIL 3 D19
20. 8" GROOVED END COUPLING
21. SUPPLY FAN
22. 9"x8" DUCT FROM INTAKE HOOD TO SUPPLY FAN CONNECT TO SUPPLY FAN WITH FLEXIBLE CONNECTION
23. ROMAC 202BS SADDLE OR EQUAL WITH 2" BRASS NIPPLE
24. 2" GATE VALVE-THD x THD, 200 PSI
25. 3" GROOVED END COUPLING
26. 2½" (NST) FIRE THREAD ADAPTER WITH CAP
27. 8" x 12" REDUCER- FLG x FLG
28. 12" FLG BUTTERFLY VALVE
29. ¾" THRED-O-LET,¾"BALL VALVE, AND ¾" NIPPLE

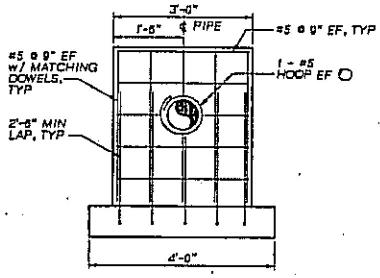
NOTE:
ALL PIPING SHALL BE DUCTILE IRON CLASS 53 UNLESS SHOWN OTHERWISE.

DSGN B GIDDINGS DR K MAY CHK R BEIELER APVD C SUNDBERG	NO. DATE REVISION BY APVD	REUSE OF DOCUMENTS THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2M HILL. CH2M HILL	VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT S.E. 56TH ST ROADWAY AND BRIDGE IMPROVEMENTS	F.A. NO. BRM-2004(016) STAGE TWO-B ISSAQUAH METER VAULT

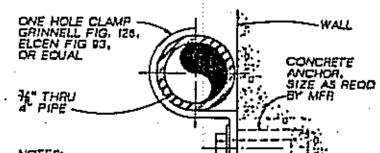
SHEET
DWG NO. D16
DATE APRIL 94
PROJ NO. SEA20040.PK



SECTION A D18
3/8"=1'-0"

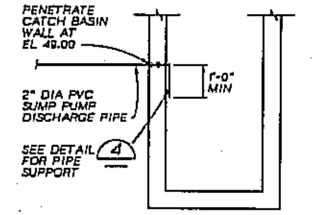


THRUST WALL 2 D18
NTS



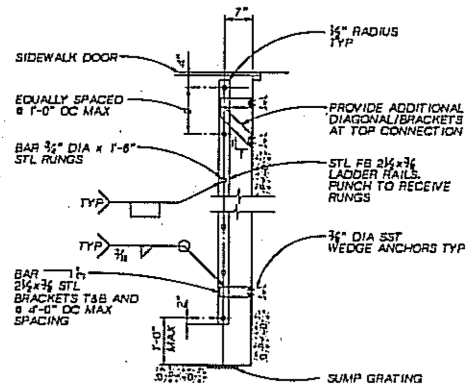
NOTES:
1. SPACE SUPPORTS TO SUIT LOAD.
2. ON STEEL COLUMNS SECURE SUPPORTS WITH GALVANIZED STEEL NUTS AND BOLTS AS REQUIRED.

PIPE SUPPORT 4 D18
NTS



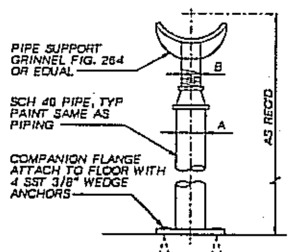
CATCH BASIN 101+84, 35' RT

SUMP PUMP DISCHARGE 6 D18
NTS



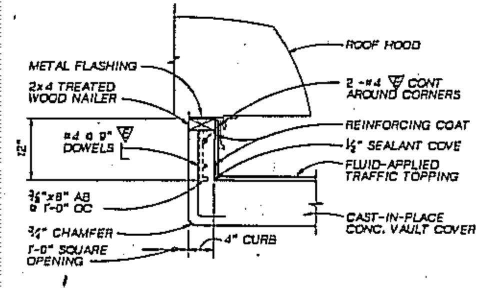
NOTES:
1. HOT DIP GALVANIZE STEEL AFTER FABRICATION.
2. PROVIDE LADDER UP SAFETY POST AT TOP OF LADDER AS MANUFACTURED BY BILCO CO., NEW HAVEN, CT.
3. WEDGE ANCHORS SHALL BE RED HEAD TRUBOLT, HILTI KWIK BOLT II, OR MOLLY PARABOLT.

DETAIL 1 D18
NTS



PIPE DIAM	A	B
3"	2 1/2"	1 1/2"
8"	3"	2 1/2"

PIPE SUPPORT 3 D18
NTS



MECHANICAL CURB DETAIL 5
1 1/2"=1'-0"

CH2M HILL

DSGN	M MOORE
DR	D. STAPP
CHK	R. BEIELER
APVD	C. SUNDBERG

NO.	DATE	REVISION	BY	APVD

REUSE OF DOCUMENTS
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CH2M HILL

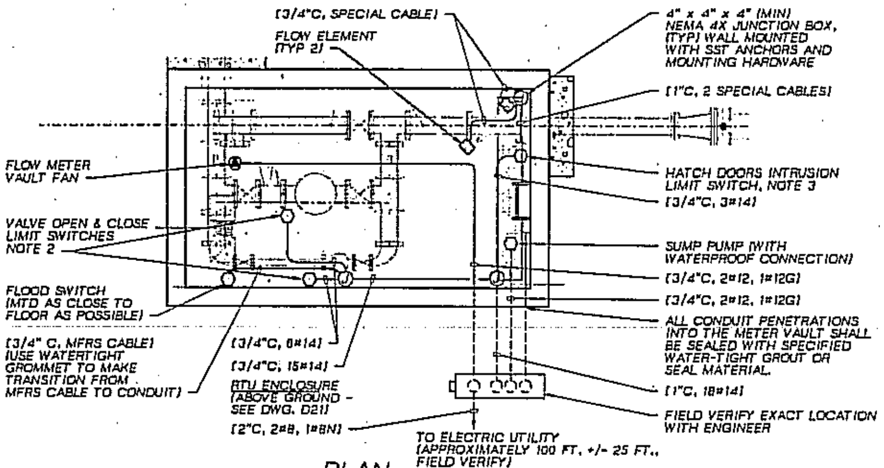
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT
S.E. 56TH ST ROADWAY
AND BRIDGE IMPROVEMENTS

F.A. NO. BRM-2004(019)
STAGE TWO-B

METER VAULT DETAILS

SHEET	27
DWG NO.	D18
DATE	APRIL 94
PROJ NO.	SEA28043.FK

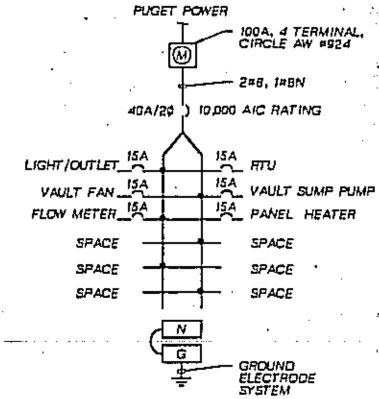


PLAN

1/8"=1'-0"

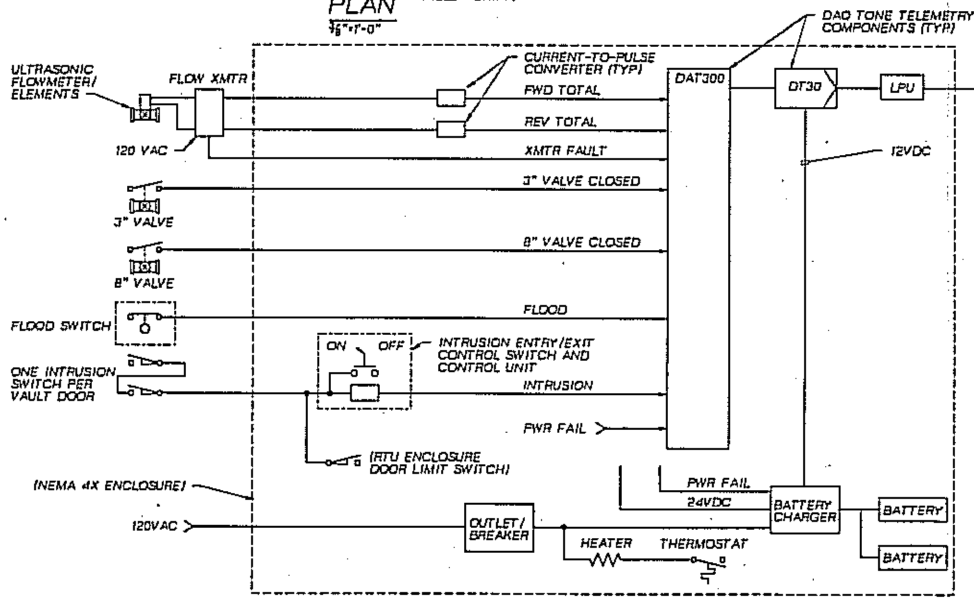
NOTES:

1. ALL CONDUIT SHALL BE RIGID GALVANIZED STEEL. USE LIQUIDTITE FLEX CONDUIT FOR LAST 12" LENGTH TO FIELD DEVICE. INSTALL CONDUIT SUCH THAT IT SLOPES AWAY FROM FIELD DEVICE. INSTALL WEEP HOLE TO ALLOW CONDENSATE, ETC. TO DRAIN FROM CONDUIT.
2. FURNISH NEMA 4X, WATER-PROOF, JUNCTION BOXES AS REQUIRED FOR WIRING IN METER VAULT.
3. MOUNT RTU ENCLOSURE DOOR AND HATCH DOORS INTRUSION LIMIT SWITCH UNIT, AND INSTALL WIRING SUCH THAT ALARM CONTACTS WILL OPEN WHEN EITHER DOOR IS OPENED.
4. CONDUITS AND RACEWAYS SHALL BE INSTALLED SUCH THAT HATCH ACCESS IS NOT IMPEDED IN ANY WAY.
5. GROUND ALL EQUIPMENT PER THE NEC AND PER MANUFACTURER'S REQUIREMENTS.
6. WIRE 4-20mA FLOW SIGNALS AND VALVE "CLOSED" LIMIT SWITCHES TO SAMMAMISH PLATEAU WATER AND SEWER DISTRICT INTERFACE TERMINAL BLOCK.
7. REFER TO SPECIFICATION "ELECTRICAL AND INSTRUMENTATION AND CONTROLS" FOR ADDITIONAL REQUIREMENTS.



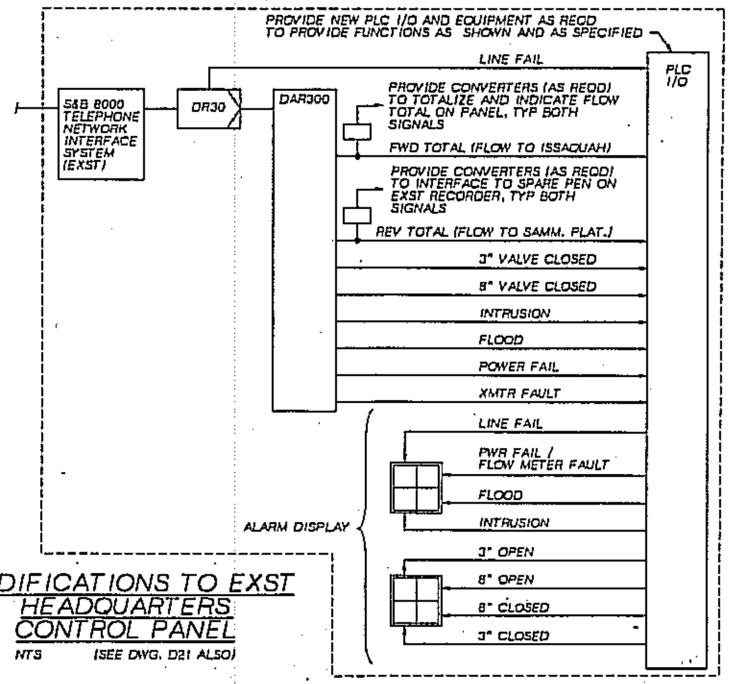
POWER DISTRIBUTION DETAIL

NTS



FLOW METER VAULT RTU (NEW)

NTS



MODIFICATIONS TO EXST HEADQUARTERS CONTROL PANEL

NTS (SEE DWG. D21 ALSO)

DSGN R GEIST	NO.	DATE	REVISION	BY	APVD
DR MAXEY-SUHR					
CHK V ERICKSON					
APVD C SUNDBERG					

CH2M HILL

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CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT

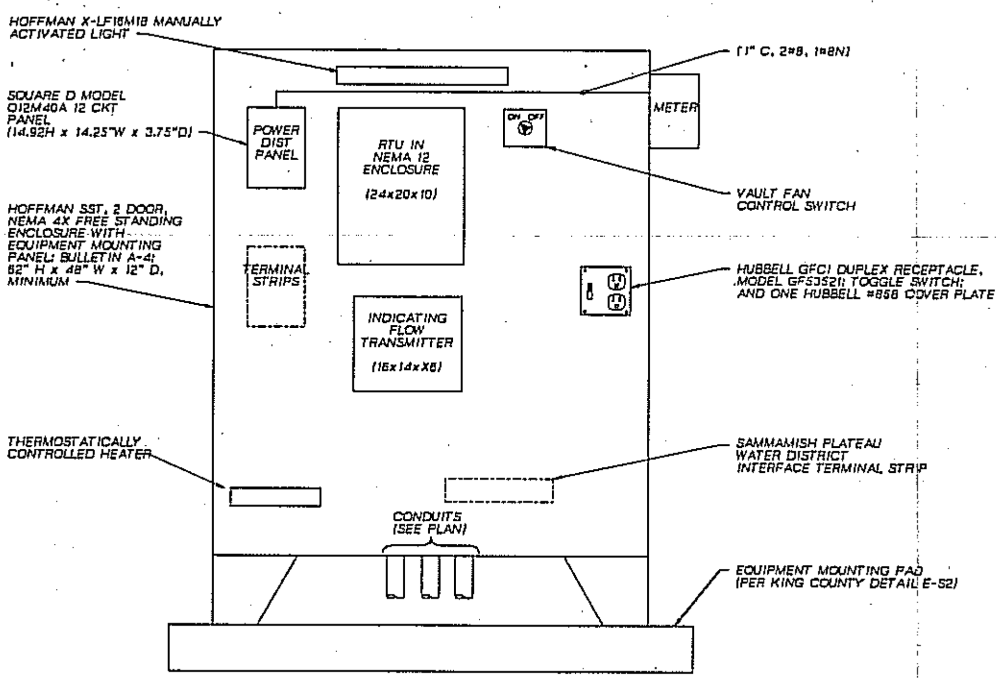
S.E. 56TH ST ROADWAY AND BRIDGE IMPROVEMENTS

F.A. NO. BRM-2004(018)

STAGE TWO-B

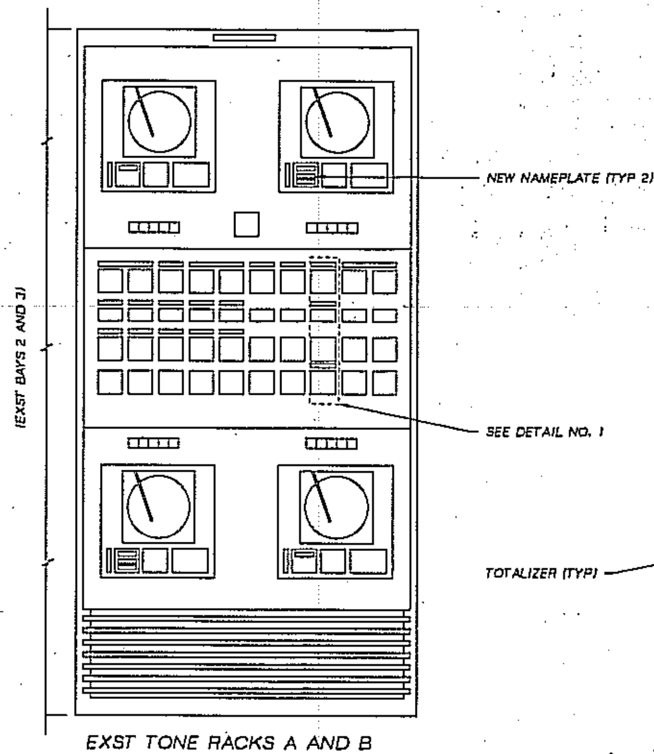
METER VAULT INSTRUMENTATION

SHEET	
DWG NO.	D20
DATE	APRIL 94
PROJ NO.	SEA29943.PK



RTU ENCLOSURE

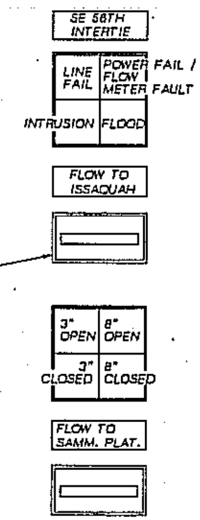
NTS (AT METER VAULT, SEE DWG. D20)



NOTE:
REFER TO SECTION "ELECTRICAL AND INSTRUMENTATION & CONTROLS" SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR WORK IN THE FLOW METER VAULT, AND FLOW METER CONFIGURATION/SETUP.

HEADQUARTERS CONTROL PANEL MODIFICATIONS

NTS



DETAIL 1

NTS

DSGN R GEIST	NO.	DATE	REVISION	BY	APVD
DR MAXEY-SUHR					
CHK V ERICKSON					
APVD C SUNDBERG					

VERIFY SCALE
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IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT
S.E. 56TH ST ROADWAY AND BRIDGE IMPROVEMENTS

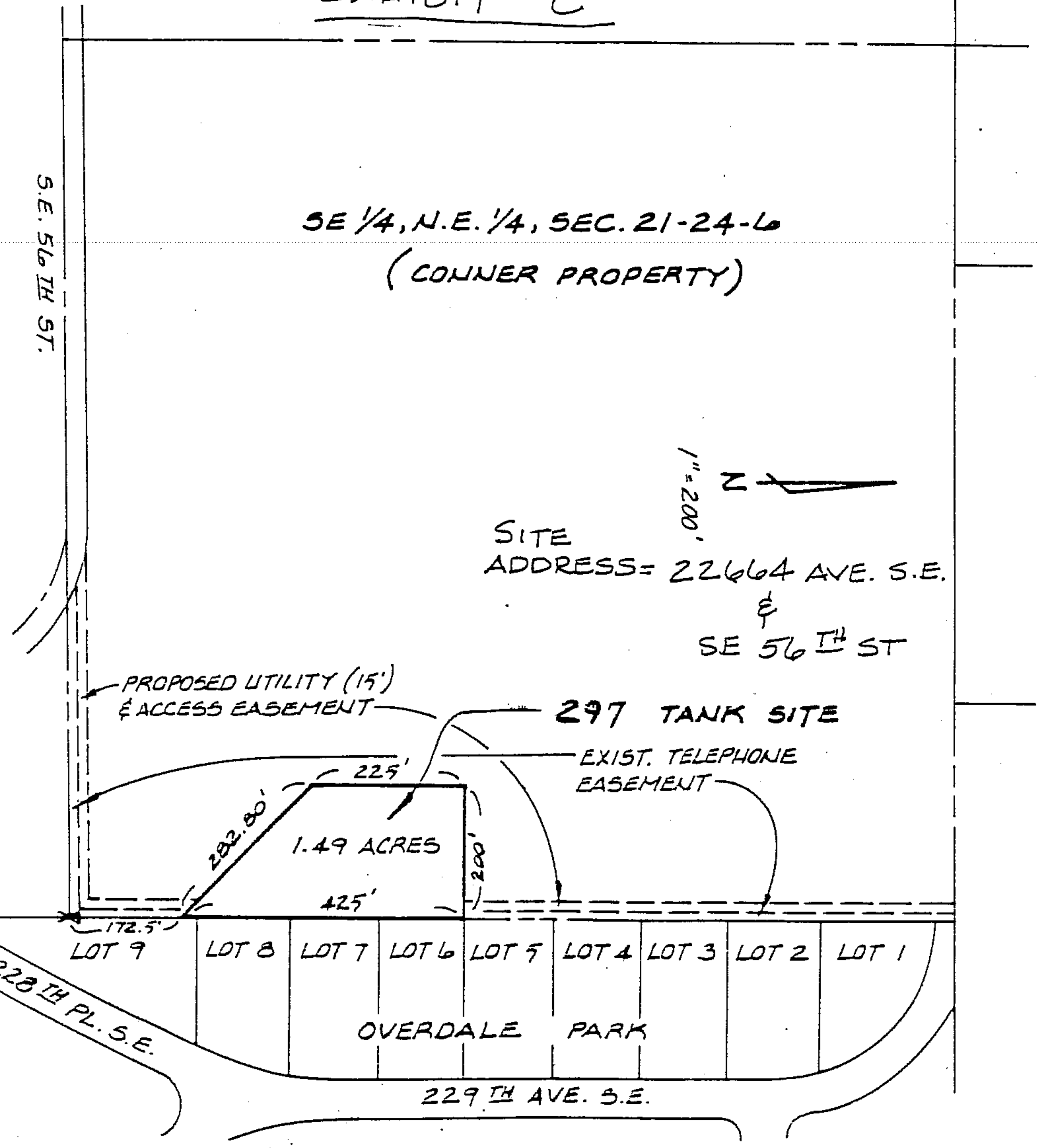
F.A. NO. BRM-2004(019)

STAGE TWO-B

PANEL ELEVATIONS

SHEET
DWG NO. D21
DATE APRIL 94
PROJ NO. SEA28949.FK

EXHIBIT "C"



SE 1/4, N.E. 1/4, SEC. 21-24-6
(CONNER PROPERTY)
S.E. 56 TH ST.
1" = 200'
N
SITE
ADDRESS = 22664 AVE. S.E.
&
SE 56 TH ST
PROPOSED UTILITY (15')
& ACCESS EASEMENT
297 TANK SITE
EXIST. TELEPHONE
EASEMENT
225'
282.80'
1.49 ACRES
200'
425'
172.5'
LOT 9
LOT 8
LOT 7
LOT 6
LOT 5
LOT 4
LOT 3
LOT 2
LOT 1
228 TH PL. S.E.
OVERDALE PARK
229 TH AVE. S.E.

AMENDMENT NO. 1 TO THE AGREEMENT FOR INTERTIES AND 297 TANK LEASE

THIS AMENDMENT is made by and between the Sammamish Plateau Water and Sewer District, a municipal corporation, in King County, Washington ("District"), and the City of Issaquah a municipal corporation, in King County, Washington ("City") for the purposes set forth herein.

SECTION I: RECITALS

1.1 District and City desire a third intertie located on Black Nugget Road to increase system redundancy and other emergency purposes.

1.2 District and City are authorized by RCW Chapter 39.34 to enter into interlocal agreements for joint action.

In consideration of the terms and conditions contained herein, the parties now agree to amend their existing Interlocal Agreement entitled **AGREEMENT FOR INTERTIES AND 297 TANK LEASE** executed in May 1994 by adding the following section:

SECTION VI: BLACK NUGGET ROAD INTERTIE

6.1 District and City agree to provide each other with an emergency standby source of water through an intertie connection between District and City water systems at the location described and depicted on Exhibit "1A" attached hereto, commonly known as Black Nugget Road Intertie. This connection shall be an emergency standby connection, and water shall only be drawn through this point when an emergency occurs. An emergency shall be considered any event that requires District's or City's water supply to be augmented on a temporary emergent basis.

6.2 District or City shall notify the other party in writing at least three (3) business days in advance of the date either party desires to receive water through the intertie. In case of emergency need, District or City shall provide water immediately upon oral notification of such emergency. Follow-up written notice of such emergency request shall be made by District or City to the other party within five (5) days of the commencement of such use.

6.3 The intertie is constructed and owned by the City. The intertie is capable of being placed into operation at any time.

6.4 Water supplied by District through the intertie will be treated. Water supplied by the City through the intertie will be untreated.

6.5 District and City shall use reasonable efforts to provide an uninterrupted supply of water. Neither party shall be liable for any shortage or interruption in the delivery of water. In addition, neither party shall be liable for any failure, interruption, or shortage of water, or any loss or damage resulting therefrom occasioned by any cause beyond the control of either party. District and City do not guarantee the availability of water through the intertie at all times because of each parties' respective needs and water demand. Further, during critical water shortage periods as determined by either party, District or City may close the intertie until sufficient water supply exists to make such available for use by either party. In the event District or City declares and/or imposes water usage restrictions within their boundaries, District and City agree to adopt and impose water usage restrictions no less restrictive than those adopted by the other party as a pre-condition to receiving water through the intertie.

6.6 All water delivered under this agreement may only be resold to members/customers within the parties' respective water service boundary for use therein.

6.7 City shall measure all water delivered through the intertie by metering equipment owned by the City. District and City will monitor the water flow measurements. District shall own, operate, and maintain any water line from the District side of the intertie vault to the District water system. City shall be responsible for the flushing of such intertie water line as reasonably necessary to ensure water quality.

6.8 Only City personnel shall operate the intertie valve. District shall notify City when there is a need for emergency intertie water supply; in such event, City's personnel shall operate the valves for opening and closing the intertie.

6.9 In the event that District or City receive water through the intertie, both parties agree to replenish or replace the same volume of water received and delivered from the intertie to the other party within seventy-two hours of the time of receipt. In the event such water delivered is not replaced by the receiving party within such period, the party receiving such water shall pay the other party for such water delivered at the commercial commodity rate charged by the party delivering such water. The party delivering such water shall bill the party receiving such water monthly for the amount of water delivered. The party receiving such water shall pay the other party within sixty (60) days of the date of such billing. Any billings not paid by the party within such sixty-day period, shall accrue interest at the rate of twelve percent (12%) per annum until paid.

Approved As To Form **District Legal Counsel**	**SAMMAMISH PLATEAU WATER** **AND SEWER DISTRICT ("District")**
By ____________	**By** Ronald E. [signature]
Its ____________	**Its** GENERAL MANAGER
Dated ____________	**Dated** 8-26-96

Office of the City Attorney	CITY OF ISSAQUAH ("City")
By [illegible]	By [illegible]
Its ______________	Its Mayor
Dated 9/4/96	Dated 9-12-96

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that RONALD E. LITTLE is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the GENERAL MANAGER of Sammamish Plateau Water and Sewer District, a municipal corporation, to be the free and voluntary act of such municipal corporation for the uses and purposes mentioned in the instrument.

NOTARY PUBLIC
STATE OF WASHINGTON
SUSAN A. TUCKER
My Appointment Expires APR 1, 1998

Dated August 26, 1996

Name Susan A. Tucker

Notary Public in and for the State of Washington, residing at North Bend, Wa.
My Appointment Expires 4/1/98

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that Rowan Hinds is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the Mayor of the City of Issaquah, a municipal corporation, to be the free and voluntary act of such municipal corporation for the uses and purposes mentioned in the instrument.

DONNALEE PICKREL
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES 9-25-00

Dated 9-12-96

Name Donnalee Pickrel

Notary Public in and for the State of Washington, residing at Issaquah
My Appointment Expires 9-25-00

SPWSD HIGHLAND AREA WITHDRAWAL OF TERRETORY (2011)

SAMMAMISH PLATEAU

SINCE 1948

WATER AND SEWER DISTRICT

December 22, 2011

Sheldon Lynne, Director Public Works Engineering
City of Issaquah
PO Box 1307
Issaquah, WA 98027

RE: Issaquah Highlands Area Withdrawal of Territory

Dear Sheldon:

This is in response to your request that the Sammamish Plateau Water & Sewer District complete a service boundary change for a proposed development of Lakeside Industries owned property. As you noted, the District 2010 Water Comprehensive Plan identified certain areas within the District's corporate limits for de-annexation or withdrawal. This area was identified based on its inclusion in the Issaquah Highlands development area, and associated road development.

The area shown in the Lakeside Industries development proposal extends beyond the previously identified withdrawal area. The area the District will include in the Withdrawal of Territory action will include the previously identified area for withdrawal plus the additional Lakeside Industries development area. A map indicating the proposed area is enclosed.

The District plans to pursue this action by the Resolution Method identified in RCW 57.28.035. One of the requirements of the Resolution Method is as follows:

> *... Whenever the board of commissioners proposes to commence the withdrawal of any portion of its territory located within a city or town using the alternative procedures herein authorized, it shall first notify such city or town of their [its] intent to withdraw the territory. If the legislative authority of the city or town takes no action within sixty days of receipt of notification, the district may proceed with the resolution method.*

At their December 19, 2011 meeting the District Board of Commissioners approved, by motion, for District staff to notify the City of Issaquah of the District's intent to commence the Withdrawal of Territory including both the Issaquah Highlands MPD portion and proposed Lakeside Industries development area. This notification is required based on RCW

This letter is the formal notification to the City of Issaquah, that will start the 60 day period for the City of Issaquah to take action, if the City does not want the District to proceed with the Withdrawal of Territory under the Resolution Method.

Sincerely,

Jay Regenstreif

Jay Regenstreif, P.E.
Planning Engineer

RECEIVED
DEC 27 2011
PUBLIC WORKS ENG.

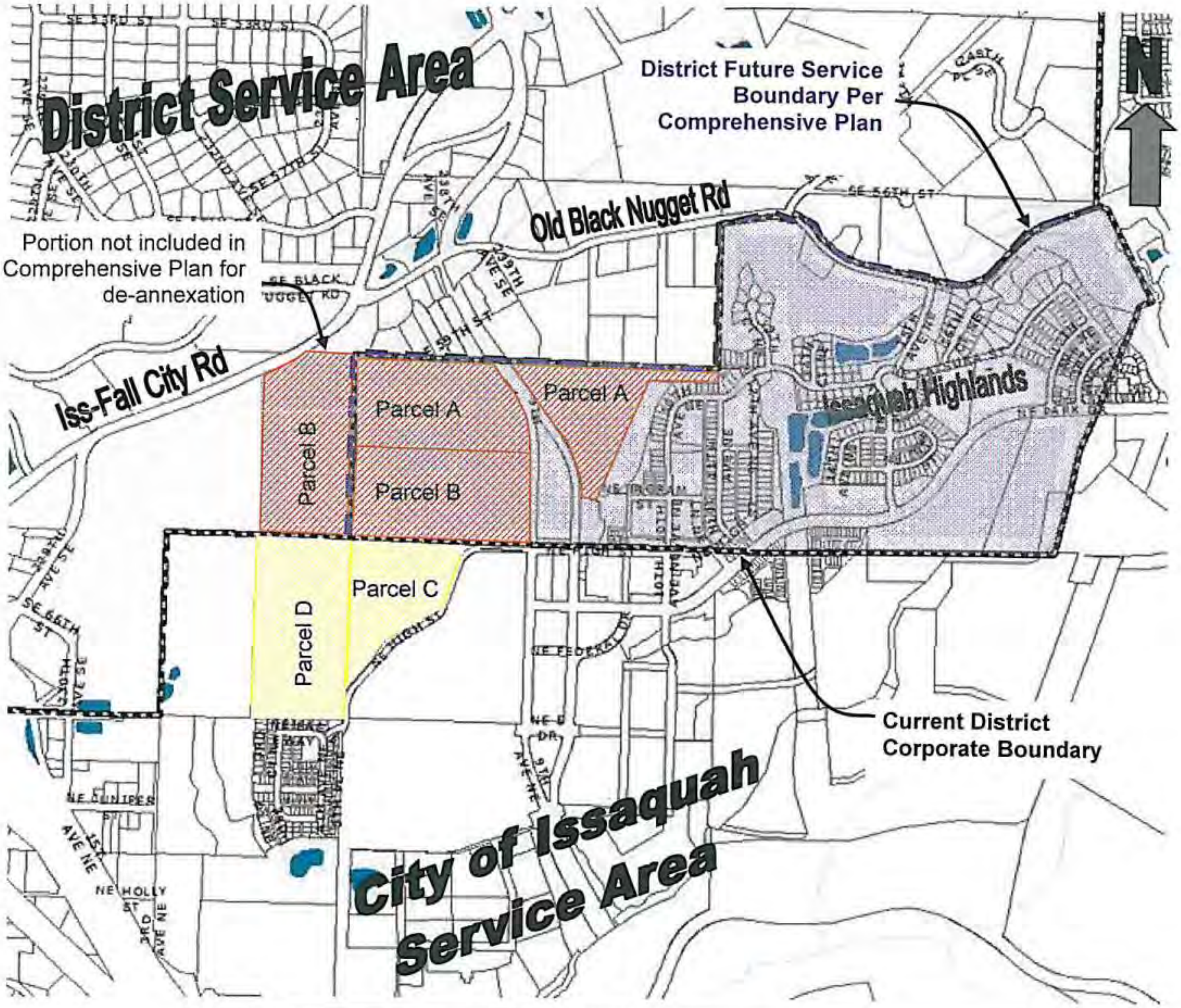
Encl.

11-12-53Iss High Withdrawal 60-day notice.docx

1510 - 228th Ave. S.E. • Sammamish, Washington 98075 • (425) 392-6256 • Fax (425) 391-5389 •

Do your part, be water smart.

Map of Withdrawal of Territory Area



LEGEND

Lakeside Development Parcels in District Corporate Limits	
Lakeside Development Parcels in City of Issaquah Service Area	
Area Proposed for Withdrawal of Territory Action	
Lakeside Ownership	
Other Ownership	

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Appendix E. Water Standards

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Table of Contents

DEFINITIONS

Acceptance of Improvement	Adoption of a resolution by the City of Issaquah City Council, accepting the improvements into city maintenance or written acceptance by the City of Issaquah City Engineer where authorized by City Council.
City	City of Issaquah, a municipal corporation, or the Director of Public Works Engineering and his authorized representatives.
City Engineer	Deputy Director of Public Works Engineering or City of Issaquah Engineer having authorities specified in State Law or City Ordinances or his designated representatives.
Contractor	The person, partnership, firm or corporation contracting to do the work under these Documents. The term shall also include the Contractor's agents, employees and subcontractors.
Developer	The owner and/or other owners of property to be benefited by the proposed extension, including the Developer's agents. Any person, firm, partnership, association, joint venture, or corporation of any other entity responsible for a given project.
Development	The uses to which the land that is the subject of a discretionary action by the City of Issaquah shall be placed, the buildings to be constructed and all alterations of the land and construction incident thereof.
Engineer	The Consulting Engineer, or Staff Engineer and the Engineer's representatives.
Improvements	Public and private land; grading, street work, curbs, gutters, driveway, storm drain facilities, water mains, sanitary sewers and facilities, public utilities including existing overhead utilities required to be converted to underground, landscaping and fences to be installed on land to be used for public right of way, private streets and easements, and any other improvements as defined by City of Issaquah Municipal Code
Plans	All drawings, lists, notes and instructions including reproductions thereof, for the work to be done as an extension to the City system, prepared or approved by the City Engineers.
Professional-Engineer of Work/Record	Professionals in the technical fields of Civil Engineering, Electrical Engineering, Geotechnical Engineering, Engineering Geology, Landscape Architecture, Structural Engineering and Surveying currently licensed or registered in the State of Washington and qualified by both experience and educational background in the specific technical areas as warranted by the specific needs of the proposed development project.
Public Works	Director of Public Works Engineering or his designated

Director	representative.
Otherwise Specified or As Specified	The directions contained in the Plans, Special Provisions, if any, and otherwise as given by the City incident to the performance of the work other than in these General Specifications.
Work	The labor, materials, superintendence, equipment, transportation, supplies and other facilities necessary to convenient to the completion of the proposed extension described in the application.

PREFACE

The City of Issaquah, as a municipal corporation, has a responsibility to the public to ensure utilities laid on public streets or easements are constructed in accordance with currently accepted standards for public work. The requirements imposed upon Contractors or Developers by these regulations are not arbitrary, but are intended by the City as incorporating minimum standards which are prerequisite to acceptance of the work by the City as a part of the utility systems. Privately constructed extensions will not be permitted thereto unless the work is performed in accordance with these regulations.

This document provides standard guidance for design and construction of municipal utilities within the City of Issaquah. These Standards are founded from City policy, Codes, and standards of industry practice for design and construction.

The City of Issaquah Comprehensive Plan and utility (Water or Sewer) System Plan provides policy guidance for the utility network regarding the provisions of level of service. City policies and standards provide a consistent framework for the planning, design, construction, maintenance, operation, and service for the City's utilities and infrastructure. The City manages its utilities and infrastructure in accordance with established federal and state regulations.

These Standards include all items in the Table of Contents, including the Preface, Definitions, Standards/Requirements, Design, Construction and Appendix sections. These Standards do not include design of special facilities, such as pump stations sewer lift stations, roundabouts or reservoirs. These special facilities require unique design requirements and will be subject to individual review by the City.

STANDARDS / REQUIREMENTS

A. Applicability

These Standards shall govern all new construction and upgrading facilities that connect to or become part of the City's system, both in the right-of-way and on private property, even if not owned or maintained by the City. Although these Standards are intended to apply to physical development for City infrastructure, the Standards will not apply for all situations. Compliance with these Standards does not relieve the designer of the responsibility to apply conservative and sound professional judgment. These are minimum Standards and are intended to assist, but not substitute for competent work by design professionals. The City may at its sole discretion due to special conditions and/or environmental constraints, require more stringent requirements than would normally be required under these Standards.

B. Document Coordination and Amendments

Except where these Standards provide otherwise:

All engineering, design and construction shall be in accordance with American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets, King County Surface Water Design Manual (KCSWM), the Washington State Department of Health (DOH) and Department of Ecology (DOE), American Water Works Association (AWWA), and Washington State Department of Transportation (WSDOT) Standard Specifications for Road, Bridge, and Municipal Construction, Manual of Uniform Traffic Control Devices (MUTCD), Issaquah Municipal Code, City of Issaquah's Comprehensive Plan, and the City of Issaquah's Water System Plan and Sewer System Plan.

When reference is made to any specifications, it shall be the latest revision at the time of construction, except as noted on the plans or herein.

C. Developer Responsibility

At no cost to the City, the developer is responsible for design, preparation of plans, submittal of permit applications, payment of City fees, dedication of right-of-way and easements, construction, surveying, material testing, and construction supervision of all infrastructure improvements. All improvements shall be designed per current City Standards and approved by the City Engineer prior to issuance of any permits for construction. All applications for permits and/or other approvals by the City shall be submitted to the Permit Center for processing.

D. Deviation from Standards

The City Engineer or designee may approve deviations to the Standards herein after consultation and consensus with affected city departments. The decision to grant, deny or modify the proposed deviation shall be documented and be based upon evidence that the request can meet the following criteria:

1. The deviation will achieve the intended result in equivalent or superior design; and
2. The deviation addresses public safety and operation; and
3. The deviation will not adversely affect how well the surrounding nearby public facilities can be maintained; and
4. The deviation will not substantially increase maintenance and/or operation and/or capital replacement costs relative to that which these Standards normally would result in and
5. The deviation is consistent with the land use goals/visions for the area.

Applicants submitting plans for required approvals or permits that do not meet all Standards must note the proposed deviation from these Standard(s) on the face of drawings and highlight and describe the deviation(s) on the appropriate plan sheet(s). The notation on the drawings submitted with the application will be considered as a formal request for the City to grant the deviation. Permits issued based on drawings does not assume approval of any deviations that have not been highlighted. Deviations from the standards that are not highlighted on the drawings and a permit is issued based upon those drawings constitutes grounds for revocation of permit(s) and/or withdrawal of any approvals and/or stoppage of any or all of the permitted work. Upon review of the plans, the City may request additional information regarding the request if needed to make a decision. These requests may include but are not limited to engineering calculations, drawings showing aesthetic appearances, additional information on nearby facilities, further analyses regarding public safety and operations of the utility(s), and an explanation of why such a deviation is being requested.

A deviation request for a proposed project cannot be considered until a complete application for a required permit/approval has been submitted.

Any appeal of the decision to grant or deny a deviation shall be reviewed by the Public Works Engineering Director.

E. Errors and Omissions

At the discretion of the City Engineer, any significant errors or omissions in the approved plans or information used as a basis for such approvals will constitute grounds for withdrawal of any approvals and/or stoppage of any or all of the permitted work. It shall be the responsibility of the Developer to show cause why such work should continue and make such changes in plans that may be required by the City before the plans are re-approved.

F. Drawing Standards

Water, sanitary sewer, street and storm sewer designs shall be on separate plan sheets, although alignments of all utilities shall be shown on each utility plan. The City may request profile drawings to show relationship to other underground utilities and/or where the City utility crosses railroad tracks, streets, rivers and drainage ditches and/or any other places where it would clarify construction. Plan sets may be combined for small projects if improvements are clear and legible (contact City engineer for guidance). Designs for water and sewer can be combined on the same plan sheets if plan scale is 1”=10’, 1”=20’, or 1”=30’. The drawing should be easy to read, with all lines and letters to provide good contrast with the paper. Architectural scales for utility drawings will not be accepted.

All plans shall be on a reproducible paper bond sheet 24" X 36", including title block. Project name and site address shall be included in the title block. When more than one sheet is required to cover all of the construction area, an overall drawing will be required. Preliminary plans can be on regular print paper. On plans with more than one sheet, stationing shall proceed from left to right or from bottom to top.

The plan drawing shall show clearly the relationship of the proposed utilty to other existing and proposed underground utilities as well as its relationship to street paving, curb, gutters and sidewalks. All utility appurtenances (i.e.: valves, fire hydrants, fittings/bends, manholes, catch basins, street lights, traffic control devices, etc.) shall be called out and fully located by stationing along centerline of street, or base line of easements, etc.

North Arrow shall be included on all plan view drawings. Where possible, the north arrow shall face up and/or to the right hand side of the plan sheet.

Datum shall show both horizontal (NAD-83/91) and vertical (NAVD 88) control points.

Drafting Standards/Symbols shall conform to Washington State APWA Chapter CAD Standards. Layering shall comply with City requirements (see Appendix A). Lettering shall be done with “Leroy-style” font (AutoCAD “simplex” font).

Upon approval for construction, final plan shall be provided in both hard copy and digital format for record drawings and permanent record. The digital format shall be AutoCAD “.dwg” file, latest version, submitted on CD-ROM. The electronic file shall include all plans, profiles, notes, and details.

Shop Drawings. Shall be on standard size reproducible sheet and may be at any scale which will adequately show the detail necessary for fabrication or construction of the piping, equipment, machinery, etc.

Record Drawings (As-Built), shall meet all the requirements of the Plan Drawing. Final approved record drawings shall also be submitted in mylar form. Utilities outside of public right-of-ways shall be located within easements. Easements and recording numbers shall be shown on the record drawings.

G. Permits

In accordance with the City of Issaquah Municipal Code, permits are required to be obtained from the City of Issaquah prior to commencing construction work within the City. Contact the City Development Services Department for a list of City required permits, approvals, and environmental reviews associated with the requested construction. Permits from other agencies may also be required based on the work being proposed and are the responsibility of the developer to obtain prior to commencing work.

All applications for permits to be issued by the City shall be submitted to the Permit Center for processing.

Specifications, construction drawings, and other required information shall be submitted when approvals or permits are being requested for a project. Construction drawings shall show as a minimum; plan and profile for all existing and proposed improvements, applicable analyses and reports, proposed and existing utilities; and topography. The drawings shall also include right-of-way or easements, improvement alignments, detail drawings of connection points or special features, temporary erosion and sedimentation control, construction disturbance area, tree protection, and critical areas and any other pertinent information necessary for construction. The construction methods and materials for all improvements shall conform to the City Design Standards and all other standard plans and specifications of the City or otherwise adopted by the City. To obtain a complete list of specific submittal requirements please contact the Permit Center.

All drawings, plans, specifications, technical reports, etc., prepared for the purpose of obtaining required permits/approvals shall be stamped and signed by the Professional Engineer registered in the State of Washington responsible for the design. Construction drawings shall be provided in both paper (D) size and CAD format or in another format acceptable to the City Engineer.

At the discretion of the City Engineer, any significant (as deemed by the City) errors or omissions in the approved plans or information used as a basis for such approvals constitute grounds for revocation of permit(s) and/or withdrawal of any approvals and/or stoppage of any or all of the permitted work. It shall be the responsibility of the Developer to show why such work should continue. In order to continue work the Developer must make necessary changes to the approved plans for approval by the City as required to address the issues.

Prior to receiving a Final Certificate of Occupancy and/or acceptance of the work by the City, the applicant shall submit City approved record drawings for all installed improvements.

H. Inspection and Tests

All work may be subject to full-time inspection by the City. The City shall at all times have access to the work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection. The Contractor shall make reasonable tests of the work at the Contractor's expense upon the City's request. Whenever work must be specially tested or inspected for compliance with public regulations, or with the Plans and Specifications, the Contractor shall give the City reasonable notice of the readiness of the work for such test or inspection. The City shall attempt to make inspections within one (1) business day of notification by the Contractor. Work must not be covered up without consent of the City, and if it should be covered without such consent, it must be uncovered for inspection at the Contractor's expense if request by the City.

Inspections shall be performed as follows:

1. Work performed within the public right-of-way or on private property as described in the Standards, whether by or for a private developer, by City forces, or by a City contractor, shall be done to the satisfaction of the City and in accordance with the Standard Specifications, any approved plans and the Standards. Unless otherwise authorized, the City must approve any revisions to construction plans in writing before being implemented.
2. The City shall have authority to enforce the Standards, as well as other referenced or pertinent specifications. The City will appoint project engineers, assistants and inspectors as necessary to inspect the work and they will exercise such authority to ensure the project is constructed in accordance with the standards, standard practices and good workmanship.
3. It is the responsibility of the Developer, Contractor, or their agents to have an approved set of plans, along with any applicable permits on the job site whenever work is being accomplished.
4. It is the responsibility of the Developer, Contractor, or their agents to notify the City at least 5 days in advance of the commencement of any authorized work. A preconstruction conference and/or field review shall be required before the commencement of any work on significant projects as defined by the City.

I. Guarantee by Manufacture

If requested by the City, a written guarantee made by the manufacturer of any materials to be incorporated into the work shall be furnished, guaranteeing to the City that such materials shall conform to the Specifications applying to the work.

J. Warranty

The Contractor is required to provide a warranty to the City for facilities constructed for the City. This warranty will be for a period of not less than one (1) year from the date of final acceptance by the City and will cover material and workmanship defects including but not limited to: asphalt, concrete, valves, piping, landscaping and 12 month plant establishment period and settlement of trenches below City roadways regardless of whether the trench contained a City utility or privately owned utility.

K. Security

Performance Security. A security is required per IMC 12.12.100 and 16.26.120 to guarantee the performance of, or corrections to, permitted work. The amount of security shall cover the City's cost to perform the necessary work but shall equal not less than 150% of estimated total construction cost; or if not specified, be at the discretion of the City. When performing work within city right-of-way, the types of securities required include a cash deposit up to the first $25,000 of required security and the balance may be, but are not limited to, additional cash deposits, assigned savings account letters of credit, loan proceeds and bonds. Securities shall be processed for release by the City upon written final acceptance of the improvements and the plans have been certified "As-Built" record drawings by the Professional Engineer of Work/Record and the Record Drawings approved by the City, all final reports submitted and approved as required and the Warranty Security is posted.

Warranty Security. A security is required during the warranty period to insure adequate funds for the City to perform the necessary warranty work should the developer not do so for improvements against any defective work or labor done or defective materials used in the performance of the improvements throughout the warranty period. The warranty period shall be of one year following completion and acceptance of the improvements unless a longer warranty period is required by the City Engineer. This security shall be not less than 30% of the total construction cost of the public facilities accepted by the City and posted prior to the Performance Security release.

L. Determination of "As Equal"

The City shall be sole judge whether supplies or materials qualify 'as equal' substitutions under the Plans and Specifications. Substitutions are not allowed for items specified as "required" or "sole source".

M. Easements

All easements required shall be obtained by the Developer without cost to the City and shall provide for a permanent easement and construction easement as shown on the Plans. The Developer shall provide the City with supporting date to reify the location of al easements. In the event that legal services are required incident to easements beyond review of the form thereof, the Developer shall pay the costs of such service.

Any required easements shall be obtained (in the name of the City) by Developer at their expense using the City's standard form. A copy of such recorded easement shall be delivered to the City prior to commencement of construction. Prior to acceptance of said improvement, the original easement shall be delivered to the City. The Developer shall provide all necessary easements at his sole cost regardless of changes in the Contract Plans. The City will require the Developer to provide a survey of the record drawing improvement to verify its location in the easement. All easements shall be explicitly called out as to rights and obligations on the final plat.

General Easement requirements for improvements not located in the right-of-way are as follows (evaluated on a case-by-case basis):

Water: Fifteen (15) foot easement over all water lines and appurtenances.

Sanitary Sewer: Fifteen (15) foot easement over all main line sewer lines and appurtenances not located in a multifamily or commercial development, or as otherwise required.

Storm Sewer: Fifteen (15) foot easement over all storm sewer lines and appurtenances not located in a multifamily or commercial development, or as otherwise required.

N. Defective Work and Corrective Action

During construction, work that is found by the City not to comply with the Plans and Specifications shall be remedied so as to comply therewith. Subsequent to completion and within one year after the work has been accepted by City Council, the Developer shall correct or replace any defective work or material discovered by the City. Such correction or replacement shall commence within seven days from the time of receipt of notice from the City and shall be completed promptly.

If not so commenced, or, in emergency, when damage may result from delay, such correction or replacement may be made by the City at the expense of the Developer. The Developer shall reimburse the City, upon demand, for any expense resulting from defects that appear within one year after acceptance of the Developer's work. This includes actual damages, costs of materials and labor expended by the City in making emergency repairs, costs of legal expense, attorney's fees and costs reasonably incurred by the City as a result thereof.

Inspection and project acceptance does not relieve the Developer from the responsibility to provide complete and properly functioning improvements. All corrections required to correct deficiencies shall be borne by the Developer.

DESIGN

A. Design Standards

These Design Standards set forth minimum standards for the planning, design, and construction of water facilities. The work shall be done in accordance with the Plans and specifications prepared by the Engineer and approved by the City. These Standards do not include design of special facilities, such as Pump Stations or Reservoirs. These special facilities require unique design requirements and will be subject to individual review by the City. All work and materials shall conform to AWWA standards. As a preliminary guide, the following general standards of construction and materials are set forth:

1. Design shall comply with the Issaquah Municipal Code (IMC), policies and criteria set forth in the City of Issaquah's Water System Plan, and design requirements as defined within these Standards.
2. Pipe shall be Class 52 ductile iron.
3. Fittings must be Ductile Iron (cement lined).
4. Use of restrained joints is preferred as a standard restraint system. Restraint system shall be clearly identified on the plans and record drawings.
5. Pipe runs from main line to standard hydrants less than 50 feet in length must be a minimum of 6 inches. Pipe runs from main line to standard hydrants more than 50 feet in length must be a minimum of 8 inches.
6. The maximum distance between fire hydrants in single-family use district zones shall be 500 feet. The maximum distance between fire hydrants in commercial, industrial, and apartment (including duplex) use district zones shall be 300 feet.
7. All hydrants newly installed in single-family residential areas shall be supplied by not less than 8-inch mains and shall be capable of delivering 1,000 g.p.m. fire flow over and above average maximum demands at the farthest point of the installation.
8. Air and vacuum release valves shall be installed at principal high points in the system.
9. Dead-end lines are not permitted except as required for frontage improvements. when unfeasible due to topography, or inability to gain easements, in which case hydrants may be provided at the end of the main.
10. System improvements required for multi-family/commercial/industrial developments will be considered and defined by the City at the time service is requested. All costs for domestic service, fire protection, storage, pumping facilities and flow rate control of the supply will be borne by the commercial/industrial developer.
11. Work shall be done only by Contractors experienced in laying public water mains.
12. Mains shall be laid only in dedicated streets or in easements which have been granted to the City. A street is normally not considered dedicated until the plat which created it has been filed with the King County Recorder.
13. Valves shall be placed on all branches from feeder mains, at intersections, between mains and hydrants, between mains and reservoirs, and between mains and pumps. No length of pipe greater than 600 feet shall be left without valve control. A valve shall be located at the end of all dead-end lines when a future extension is anticipated by the City Engineer.
14. Valved tees and crosses shall be provided where future extensions are expected by the Engineer.

15. Pressure Reducing Valves- Main line pressure reducing stations, built according to the City Standard Details and approved as to size by the City Engineer, shall be installed where required to maintain a maximum line pressure of 150 psi. Individual pressure-reducing valves are the responsibility of the owner for all services on mains with a pressure of more than 80 psi and shall be located on private property in accordance with the UPC.

16. Placement of surface appurtenances (manhole lids, water valve lids, etc.) in tire track of traffic lanes shall be avoided whenever possible. Meter vaults shall be located outside the pedestrian access route.

17. Backflow prevention devices shall be installed where the possibility of contamination of the water supply system exists and/or as required by the City, and shall meet the requirements of the WAC 246-290-490 “Cross-Connection Control”. All backflow prevention assemblies installed shall be on the Washington State Department of Health (DOH) list of approved backflow prevention assemblies, most recent edition at the time of installation, and installed according to the Standard Details.

B. Materials

1. General

All materials and equipment shall be new and undamaged. Where possible, the same manufacturer of each item shall be used throughout the job.

All materials not specifically referenced shall comply with applicable sections of ANSI, ASTM, AWWA or the APWA/WSDOT Standard Specifications.

Approved manufactures and model numbers of various materials are listed in Appendix B, Approved Materials, of these Standards. When specific manufactures or models are listed, no substitutions will be allowed without prior approval by the Engineer.

2. Ductile Iron Pipe

Ductile iron pipe shall conform to AWWA Standard C151, Thickness Class 52 or as indicated on the Drawings. Pipe and fittings shall have cement mortar lining conforming to AWWA C-104. Joints shall be mechanical joint or push-on joint and shall conform to AWWA C-111.

Ductile iron fitting shall conform to AWWA Standard C-110. Mechanical or push-on joints shall conform to AWWA Standard C-111. Flanged joints shall conform to ASA Standard B-16.1, Class 125. All fittings shall be mortar lined.

Polyethylene Pipe encasement for Ductile Iron Pipe shall be used at the direction of the City Engineer and shall conform to AWWA Standard C-105.

3. Brass Pipe and Fittings

Where brass pipe is specified, the pipe shall be standard weight, Schedule 40, ASTM B43. Fittings shall be brass or copper.

4. Gate Valves

Shall conform to AWWA C-515 or C-509, be Iron Body, Brass or Bronze trimmed, resilient seat, double “O” ring seal, non-rising stem, for a minimum of 150 PSI working pressure unless other is specified, with standard two (2) inch operating nut and standard opening rotation shall be counter clockwise. Gate valve 3” and larger shall have flange connections for above ground service, or flange or mechanical joint connection for buried service. (See Standard Details.)

5. **Butterfly Valves**
   Shall conform to AWWA Standard C504-74 or latest revision thereof. Unless otherwise specified, valves shall be Class 150 or greater, shaft seals shall be "O" ring type, standard opening rotation shall be counter clockwise and the operating nut shall be standard 2"

6. **Fire Hydrants**
   Fire hydrants shall have 5-1/4 inch main valve opening (MVO) with brass on brass or brass on stainless steel seating as specified for 36-inch trench, unless otherwise designated; break-away flange at ground line; 6-inch M.J. connection with suitable lugs if tie rods are to be used; “O” ring stem seal; two 2-1/2 inch hose connections National Standard Thread; pumper connection shall be 4 inch with Seattle Standard Thread with Stortz fitting. Operating nut shall be 1-1/4 inch pentagon and shall open counter clockwise. Hydrant shall be so constructed that direction of facing of pumper connection may be rotated to face the roadway. Hydrants shall comply with AWWA C-502. Unless otherwise specified, hydrant shall be of traffic type with break-away flange construction.

7. **Valve Boxes**
   Valve boxes shall be cast or ductile iron, two (2) piece, Rich 940. The top section shall be 18” slip type with 2” “deep skirt” cover. (See Standard Details)

8. **Service Saddle**
   Romac type stainless steel saddle. Single strap for pipe sizes under 12” dia., double strap for 12” and larger pipe sizes. (See applicable Standard Details)

9. **Copper Service Pipe**
   Copper service pipe for underground water service 2” or smaller shall be Type K, soft copper, annealed, seamless, and conforming to the requirements of ASTM B88. (See applicable Standard Details)

10. **Plastic Service Pipe**
    Plastic service pipe shall be manufactured from high molecular weight polyethylene defined by ASTM-2737, NSF Standard 14, and AWWA C901Pipe shall be iron pipe or copper size (See Standard Details)

11. **Air and Vacuum Release Valves**
    All piping shall be Type K copper brass pipe. Fittings shall be brass. Valves shall be located outside of traffic areas, behind curb or sidewalk. (See Standard Details)

12. **Hydrant Guard Posts**
    Hydrant guard posts shall be reinforced concrete posts, 6” X 6" X 6' long. Treated Douglas Fir, drilled with two -1" holes each way to provide breakaway safety features. (See Standard Details)

13. **Valve Marker Posts**
    Valve marker posts shall be reinforced concrete posts, 4" X 4” on one end and 6" X 6" on the other end, 42" long. Stenciled in 2-in. letters referencing distance to valve in feet and inches. (See Standard Details)

14. **Concrete Blocking**
    0ne:three:six (1:3:6) mix with six inch (6") maximum slump. (See Standard Details)

15. Bolts in Piping
All bolts shall be of the same type and quality as supplied by the manufacturer of the pipe or fittings and shall conform to WSDOT Standard Spec. 9-30.

16. Flange Gaskets
Ring-type cloth insert rubber gaskets 1/16-inch thick equal to Rainbow or Garlock.

17. Foundation Gravel
Foundation gravel, known as "Ballast", shall be coarse graded gravel or crushed rock that conforms to WSDOT Standard Spec. 9-03.9(1). Bank run passed through a 3-inch screen may be used provided that it is, in the opinion of the Engineer, uniformly graded and otherwise suitable.

18. Bedding Concrete
Bedding concrete shall be mixed from materials acceptable to the Engineer. The mix shall be either Cadman Proflow 11021 CDF or a design mix having a 30-day compressive strength of 2,000 PSI.

19. Bedding Material
Pipe zone bedding material shall consist of crushed, processed, or naturally occurring granular material free from organic materials or other extraneous or objectionable materials. The material shall have such characteristics of size and shape that meet the specifications for grading and quantity as defined in WSDOT Standard Specs. 9-03.12(3).

20. Imported Backfill Material
Imported backfill material, known as "Common Borrow", shall consist of no rocks greater than 3" in any dimension, be free from wood, bark, roots or other extraneous material, and shall meet the specifications as further defined in WSDOT Standard Specs. 9-03.14(3).

21. Asphalt Concrete
Hot Mix Asphalt (HMA) pavement shall conform to the technical requirements of the WSDOT Standard Spec. 5-04 for HMA Cl ½" (wearing) or Cl 1"(other).

22. Crushed Surfacing
For use in the restoration of excavated areas, Base Course, Top Course and Keystone material shall be crushed gravel, free from wood, roots, bark and other extraneous materials and shall conform to WSDOT Standard Specs. 9-03.9(3).

23. Pressure Reducing Valve (PRV) Station
Unless otherwise shown on the construction plans, a standard pressure reducing station shall be sized and located to maintain maximum and minimum pressure limits. Check PRV manufacturer guidelines for maximum pressure differentials. PRV stations shall be located outside of traveled way. (See Standard Detail)

24. Vault Installation
Vaults for water facilities shall be constructed at the locations shown in the plans and in accordance with the plans, Standard Details and as directed by the Engineer.

The vault shall be placed on firm soil. If the material is inadequate, the contractor shall use foundation gravel to support the vault. The vault shall be plumb, watertight, and adjusted to match the finished grade or as directed by the Engineer. All interior walls shall be coated with minimum 20 mils thickness of Tnemec white epoxy paint applied per manufactures specifications. Grading shall direct surface water away from the vault.

Vault floor shall drain to daylight or to location shown on the plan.   Drain pipe shall be minimum 4” diameter. (See Standard Detail)

CONSTRUCTION

A. General

Except as otherwise noted herein, all work shall be done in accordance with the Plans and Specifications approved by the City and as recommended in applicable American Waterworks Association (AWWA) Specifications and/or the Washington State Chapter, American Public Works Association (APWA), and/or Washington State Dept. of Transportation (WSDOT) Standard Specifications for Road, Bridge, and Municipal Construction, and/or Issaquah Water Standards, and according to the recommendations of the manufacturer of the material or equipment used.

All construction covered by these standards shall conform to its specifications. In the event any other standard has been adopted by the City which conflicts with the Standard Specifications adopted in this section, the standard which better protects the public health, safety, and welfare as determined by the City shall control.

The Engineer shall at all times have access to the work for the purpose of inspecting and testing, and the Contractor shall provide proper facilities for such access and such inspection and testing. If any work is covered up without approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for inspection.

Necessary sanitation convenience for the use of workmen on the job, properly secluded from public observation, shall be provided and maintained during the performance of the work.

Before commencing any construction work as described in the plans and specifications, the Contractor shall provide photographs of pre-existing conditions of the area that will be disturbed during construction operations. Photographs will be obtained as follows:

1. Every 25 feet interval in easements.
2. Every 50 feet interval in paved areas, and
3. Any other location as directed by the Engineer.

The photographs shall be taken with a high resolution digital camera.

B. Underground Utilities

The plans show the approximate locations of various existing utilities known to the Engineer, such as gas lines, water mains, storm drainage, power lines, telephone lines, television cables, and other obstructions based on information obtained from various sources. This information is not guaranteed to be accurate, and the Contractor is directed to check for interferences and obstructions by inquiry from the different utilities and by underground exploration ahead of his regular excavation.

The Contractor shall request field locates and notify the owners of underground facilities about the scheduled commencement of excavation through a One-Call number 811, 72 hours before construction for utility locations.

If the Utility is not included in the one-number locator service, notice shall be provided individually to those owners of underground facilities known to or suspected of having underground facilities within the area of proposed excavation.

Notice shall be made to owners of underground utilities not less than two (2) business days or more than ten (10) business days prior to scheduled date of commencement of excavation.

The Contractor shall excavate around and under utilities with special care and shall support and maintain them in service. Where it is necessary to cut, move or reconnect any utility lines, arrangements shall be made with the respective utility.

If a water main has been field marked as unlocatable and cannot be located by hand-digging or hydro excavator, the excavator must contact the City of Issaquah project inspector to arrange for an on-site meeting. City personnel will assess risk of damage and create a mitigation plan that may include throttling a water main or standing-by while reasonable care is taken in the continuance of work.

C. Site Maintenance

The Developer or Contractor shall schedule and control work so as to comply with the applicable provisions of the Right-of-Way Use Code and Procedures, Issaquah Municipal Code (IMC) Section 12.12, Clearing and Grading Ordinances Section 16.26, and Temporary Erosion and Sediment Control, Section 16.30 to prevent any hazards to public safety, health and welfare.

Two-way traffic shall be maintained at all times on existing streets unless detour plans or temporary traffic control plans along with public notification has been approved in advance by the City Engineer.

Streets shall be kept free of dirt, mud, rocks and other debris on a continuous basis in conformance with the Right-of-Way Use Code & Procedures (12.12).

Pedestrian facilities, to and from the fronting of the site, shall be kept free of obstructions, safety hazards and continuity maintained at all times.

Pedestrian and vehicular access to occupied buildings shall be maintained at all times except where prior approval from the building owner and City has been obtained.

Maintenance access shall be provided at all times to all existing City Utility appurtenances that require routine maintenance or emergency access.

Culverts, driveways, roadways, pipelines, or other existing improvements, which are removed or disturbed in the course of the work, shall be restored to their original condition at the expense of the Developer. In cutting through established lawns, the sod shall be removed before trenching and replaced after back filling to the satisfaction of the property owner. A signed release from the affected property owner will be required.

In the case of existing underground utilities, the developer shall ensure that access (valves, manholes, etc.) to said utilities is maintained at all times. Utility access covered by paving operations shall be immediately uncovered and then raised to grade within five (5) days.

The construction site shall be kept clean during the progress of the work. Before the work shall be considered complete, the Contractor shall clean out ditches and pipes that may have been filled during the work, replace damaged surfacing, remove surplus materials and trash and dispose of brush, repair all damages, and otherwise leave the job in a neat, orderly and workmanlike condition.

Protective fences are to be installed (silt, tree protection, slope, wetland, native growth protection easements, limits of clearing) prior to clearing, grading, or excavating. Call for inspections 24 hours (1 Business day) prior to start of work.

Where indicated on the Plans, a bright orange safety fence shall be placed parallel to the silt fence, 2 feet nearer to the construction activity. Top of fence shall be located 3 feet above ground. The fence shall be supported as recommended by the manufacturer and as directed by the Engineer.

The contractor shall apply water in the amounts needed at the locations necessary to provide adequate dust control. The contractor shall also maintain this control for the evening and weekends. Permission to draw water from a city fire hydrant must be granted by a permit available from the City of Issaquah Public Works Operations Department (425) 837-3470.

A Temporary Erosion & Sediment Control (TESC) preconstruction meeting shall be held before any work begins at the project site to review implementation of the TESC plans. The approved TESC plans shall be followed at all times, unless revisions are needed to address construction sequencing, changed site conditions, or unforeseen circumstances. Discharges from the project site shall not exceed 100 NTUs at all times up to the 10 year/24 hour storm event (3.5 inches of rainfall over a 24 hour period)

All work on easements shall be performed strictly in accordance with easement provisions. Easements shall be restored equal to or better than original condition. The Contractor shall do no work on easement areas until specifically authorized by the Engineer. A signed and written release from the easement grantor shall be furnished to the Utility Inspector prior to permit signoff.

D. Alignment

In general, all water mains shall be located 15 feet north or east of centerline in a 40-foot or 50-foot right-of-way and 20 feet north or east of centerline in a 60-foot right-of-way.

E. Trench Excavation

Trenches shall be excavated to the line and depth designated by the Engineer to provide a minimum of thirty-six (36) inch cover over the pipe, unless otherwise shown on the contract drawings. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space. The maximum trench width at the top of the pipe shall be thirty (30) inches for pipes twelve (12) inches and smaller or the outside diameter of the pipe barrel plus sixteen (16) inches for pipe larger than twelve (12) inches. The top width of the trench shall not exceed the outside diameter of the pipe plus thirty-six (36) inches. The trench shall be kept free from water until jointing 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. Gravel required in the bottom of the trench due to action of weather or workers shall be furnished by the Contractor without expense to the City. Boulders, rocks, logs, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth six (6) inches 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 City and thoroughly compacted.

Trenching operations shall not proceed more than 50 feet in advance of pipe lying, except with written approval of the City.

Roadway paving shall be cut ahead of the trenching equipment to prevent excessive tearing up of the surfacing and to eliminate ragged edges.

Where the soil encountered in the bottom of the trench is unstable and unsuitable as a base for pipe, such soil shall be removed to a depth specified by the Engineer to provide uniform and stable bedding for the pipe.

Providing sawcutting, excavation, disposal, hauling, sheeting, shoring, cribbing, cofferdams, and all aspects involved therein shall be the sole responsibility of the Contractor.

F. Sheeting and Shoring

The Contractor shall provide and install sheeting and shoring as necessary to protect workers, the work, and existing buildings, utilities and other properties in compliance with OSHA and WISHA requirements. All sheeting and shoring above the pipe shall be removed prior to backfilling. Removal of sheeting and shoring shall be accomplished in such a manner that there will be no damage to the work or to other properties.

G. Pipe Laying

Ductile Iron pipe work shall be accomplished in accordance with AWWA Standard C600 and the manufacturer’s recommendations unless specifically contradicted by these Specifications. Special care shall be taken in handling pipe to avoid damaging ends, coatings and linings. Pipe shall be carried in slings and shall not be rolled or dragged. The pipe shall be examined for defects and damage while suspended before lowering into trench. Any damage shall be repaired before pipe is lowered into trench.

The pipe shall be cleaned of all foreign material before lowering into the trench. Whenever pipe laying is not in process, the last section of pipe shall be tightly capped or plugged.

H. Bedding, Backfill and Compaction

Selected backfill material shall be placed and compacted around and under the water mains by hand tools, unless otherwise approved by City, to a height of six (6) inches above the top of the water main. The remaining backfill shall be placed and compacted in layers not more than twelve (12) inches thick, except that under roadways all backfill material shall be placed in layers not more than six (6) inches thick, and mechanically compacted. If suitable backfill material, as determined by the City, is not available from trenching operations, the City may order the placing of pipe bedding around the water main, and common borrow for backfilling the trench.

The City may require that an independent laboratory be employed to perform in-place density tests as proof of compaction which meets these Specifications. All costs shall be borne by the Contractor.

Compaction of backfill and backfill procedures in public rights-of-way shall at the minimum conform to the requirements of the governmental agency having jurisdiction thereof.

Backfilling shall be compacted to ninety-five percent (95%) of maximum density in all areas where paved streets, shoulders, driveways, or sidewalks will be placed over the backfill and to eighty-five percent (85%) of maximum density in all other areas. Measurement of compaction density shall be in accordance with ASTM D-1557 Modified Proctor method.

Prior to compaction of trench depths over forty-eight (48) inches, a proven method and pattern of compaction shall be submitted and approved by the City. If, in the judgment of the City, the excavated material cannot be compacted as specified, such material shall be replaced with imported backfill material.

When density tests are required by the City, the City will require that the services of an independent testing laboratory or county testing laboratory be employed to perform in-place density tests to ascertain whether the specified density can be or has been obtained, and the costs thereof shall be borne by the Developer. The maximum space between tests shall not exceed 100 linear feet.

Regardless of the approval by the City as to manner of compaction or testing, acceptance by the City or otherwise, the Contractor shall repair any settlement of trenches and excavations that may occur within one year after completion and acceptance of the work by the city.

I. Tunneling

Tunneling may be ordered by the City. Tunnels shall be not less than four (4) feet high and two (2) feet wide and not less than one (1) foot wider than the outside diameter of the pipe. Tunnels shall be backfilled with materials acceptable to the City and backfill shall be mechanically compacted.

The Contractor shall verify the vertical and horizontal location of existing utilities. If required to avoid conflicts and maintain minimum clearances, adjustment shall be made to the grade of the casing with approval from the City.

Boring pits shall be backfilled with select native or imported material and compacted to 95% maximum dry density as determined by ASTM D-1557. The contractor shall provide sufficient select backfill material to make up for any rejected material. All disturbed ground shall be restored to its original condition or better.

J. Highway Crossings

This item applies only to rigid surface pavements. The Contractor may use any method which provides satisfactory results and is acceptable to the governmental agency having control of the road and to the City, provided that the Contractor restores the roadway to its original condition. Normally, highway crossings require the placing of a steel, cast iron or concrete pipe casing by jacking or tunneling and laying the water mains within this casing. In case of tunneling, subsequent low pressure grouting through the pavement may be required.

K. Fire Hydrant Installation

Hydrant installation shall generally conform to AWWA Standard C600 unless specifically contradicted by the Standard Detail Fire Hydrant Assembly. Guard posts shall be installed where required by the City. Hydrant assembly shall be restrained with an approved system by the City. Pumper nozzle shall be fitted with 5-in. Storz hydrant adapter and cap.

An auxiliary gate valve shall be installed at the main line tee to permit the repair and replacement of the hydrant without disruption of service.

All hydrants shall stand plumb, be set to the finished grade with the lowest outlet of the hydrant no less than 18 inches above the grade and have no less than 36 inches in diameter of clear area about the hydrant for the clearance of hydrant wrenches on both outlets and on the control valve.

The pumper port shall face the street. Where the street cannot be clearly defined or recognized, the port shall face the most likely route of approach and location of the fire truck while pumping, all as determined by the Fire Marshal.

Hydrants shall not be obstructed by any structure or vegetation, or have hydrant visibility impaired within a distance of 150 feet in any direction of vehicular approach to the hydrant. A “blue” reflector will be placed on the centerline of the roadway in line with all hydrants where appropriate.

Fire hydrant installations shall be adequately protected against vehicular damage, in accordance with standards and specifications promulgated by the appropriate water authority.

L. Blow-Off Assemblies

Blow-off assemblies shall be installed at the end of all dead-end lines. Blow-off assemblies shall conform to the Issaquah Standard Details or be approved by the City.

M. Valve Installations

Before installation, valves shall be cleaned of all foreign material as hereinbefore specified for installation of pipe. Such blocking as the City may deem necessary shall be provided. The valve and valve box shall be set plumb with the valve box centered on the valve. The top of the valve box shall be set to grade. Valve boxes shall be set flush with finished roadway pavement or sidewalk. For locations outside of the roadway pavement or sidewalk, an asphalt concrete pad (2' X 2' X 4") shall be placed around the valve box.

N. Concrete Blocking

Concrete Blocking with specified material shall be cast in place and be full size width bearing against the fitting and bearing area against undisturbed soil. Additional bearing area may be required by the City. Blocking shall bear against fittings only and shall be clear of joints so as to permit taking up or dismantling joints. Fittings shall be separated from concrete blocks with 8-mil plastic sheeting. Blocking shall be designed by a licensed civil engineer to withstand full test pressure as well as to continuously stand operating pressures under all conditions of service. Blocks shall be left exposed for inspection.

O. Air and Vacuum Release Valve Installation

Combination Air Valves shall be of the single housing style that combines the operating features of both an Air Release valve and Air/Vacuum valve.

Location of the air and vacuum release valves as shown in the Plans is approximate. The installation shall be set at the high point of the line.

P. Hydrostatic Tests

Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test of 150 psi over static pressure at the high point in the line for a minimum of 15 minutes, before leakage measurement starts. It shall then be held at this pressure, without pumping, and 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 in the presence of the city. The Contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after corporation stops and service lines are installed. Insofar as is practical, tests shall be made with pipe joints, fittings, and valves exposed for inspections. All valves within the section being tested shall be open. A temporary plug or blow-off assembly shall be installed at the end of the new main. This shall include restraint or blocking necessary to withstand pressures encountered during the hydrostatic test.

The quantity of water lost from the main shall not exceed the number of gallons per hour as determined by the formula:

L=(S*D*sqrt P)/266,400

in which

S = gross length of pipe tested, feet
D = nominal diameter of pipe, inches
P = test pressure during leakage test, psi

Typical leakage allowance:

Pipe Size	Allowable Leakage	Pipe Size	Allowable Leakage
4”	0.24	12”	0.71
6”	0.36	14”	0.83
8”	0.36	16”	0.95
10”	0.59	18”	1.07

Note: Allowable Leakage is gallons per hour per 1,000 ft of pipe base on test pressure of 250 psi.

Q. Sterilization of Water Mains

Sterilization of new water mains shall be accomplished by the contractor following AWWA C651-05 standards and in accordance with the requirements of Washington State Department of Health (DOH).

Form of Applied Chlorine
Chlorine shall be applied by one of three methods to give a dosage of not less than 50 mg/l of available chlorine:

Method - 1 Dry Calcium Hypochlorite
As each length of pipe is installed, sufficient high test calcium hypochlorite (65 -70% chlorine) shall be placed in the pipe to yield a dosage of not less than 50 mg/l available chlorine, calculated on the volume of the water to be contained in the pipe and appurtenances. This method may only be used if the pipes and appurtenances are kept clean and dry during construction.

Ounces of calcium hypochlorite granules to be placed in main for each 100-ft installed.

Pipe Diameter		Calcium Hypochlorite Granules	
In.	(mm)	oz	(g)
4	100	0.34	9.6
6	150	0.76	21.6
8	200	1.34	38
10	250	2.1	59.6
12	300	3.02	85.6

14 and larger	(350 and larger)	D/2 X3.02	D/2 X 85.6

Method - 2 100% Gas Chlorine
A chlorine gas-water mixture shall be applied by means of a solution-feed chlorinating device. Chlorinating devices for feeding solutions of the chlorine gas shall provide means for preventing the backflow of water into the chlorine supply.

Method - 3 Sodium Hypochlorite
Sodium Hypochlorite, commercial grade (12.5% Cl_2) or in the form of liquid household bleach (5 - 6% Cl_2), may be substituted for the chlorine gas-water mixture. This liquid chlorine compound may be used full strength or diluted with water and injected into the Water Main with fill water in correct proportion to produce a mixture of at least 50 mg/l available Cl_2.

The Contractor shall be responsible for disposal of treated water flushed from mains and shall neutralize the waste water for protection of aquatic life in the receiving water before disposal into any natural drainage channel.

R. Service Connections

Service installation shall be as shown on the Standard Details.

Service saddles are required on all pipe except class 52 or thicker ductile iron pipe and for taps larger than one (1) inch. When the main is twelve (12) inch diameter or larger, the saddle shall be a double strap type.

Reconnecting existing services, the service connections shall not be transferred to the new main until it has been successfully flushed, disinfected and satisfactory bacteriological sample results are obtained. When transferring services from the existing main to the new main, the Contractor shall take sanitary precautions to protect the potable water supply in both the existing and new mains.

S. Connections to Existing Pipe Lines

The Contractor shall provide to the Engineer a request of utility shut-down a minimum of 8 working days in advance of the need of utility shut-down or connection. No shut-downs or connections shall occur on Mondays, Fridays or the day after a City holiday. The Contractor shall notify impacted customers not less than 2 working days in advance of interruption of water service.

Connection to the existing main shall take place only after the new main is flushed, disinfected, and satisfactory bacteriological sample results are obtained. Final flushing of main shall be at a velocity of 5-7 fps prior to placing in service.

The Contractor shall ensure that all fittings are in accordance with the approved plans and that the connection can be made in accordance with the plans. The Contractor shall immediately notify the Engineer if the connection cannot be made in accordance with the plans.

When tapping existing main lines where service cannot be interrupted, the tap shall be made under pressure with tapping tee and valve assembly. Joints shall be tested using normal test pressure prior to start of tapping existing main. City shall determine where tapping under pressure is required.

Where cut-ins are to be made in existing mains, the work shall be conducted at a time specified by City and in such a manner as to minimize the interruption of service. Necessary pipe, fittings and valves shall be assembled at the site ready for installation prior to the shutting off of water in the existing main. Once the water has been cut off, the work shall proceed continuously without interruptions and as rapidly as possible until completed.

Contractor shall not operate any valves, including fire hydrant valves, in any part of the City's water system, except in the presence of the City. Contractor shall notify the City 24-hours in advance of need to operate valves.

T. Painting

Exposed parts above ground shall be painted as follows:

- Fire hydrants shall be painted with two coats of Hammerite high gloss white paint.

- Hydrant posts and valve markers shall be painted with two coats of Hammerite high gloss white paint. Distance to valve shall be stenciled in black two (2) inch letters on the valve marker.

Appendix A Record Drawing Requirements And Drafting Standards

RECORD DRAWING REQUIREMENTS

Record drawings are required for all construction projects conducted in the City of Issaquah. All Record drawings must be stamped and dated by both a State of Washington Registered Engineer and Surveyor. Record drawing drawings are required prior to request for final inspection and issuance of Certificate of Occupancy.

The following Record Drawing requirements are intended to provide a minimum guide to the engineer of record and should be used along with good engineering practices.

Each sheet of the Record drawing plans shall include the following statement along with the engineer's professional stamp, signed and dated, located at the bottom right-hand corner of the sheet when possible:

> "These plans are Record Drawings and the information shown accurately
>
> reflects existing field conditions as of this date: ____________"

GENERAL:

The Record Drawing Plans should consist of the design plans submitted, approved, and permitted for the construction project. The information shown shall reflect the actual construction completed under the permit with any and all deviations from the design plans. The modified design plans shall not have cross outs.

Horizontal and vertical datum to be used are NAD 83/91 and NAVD 88. Tie monumentation to at least two recognized and approved City monuments on or off site, with x, y, z coordinates for each. AutoCAD drawings are to be drafted utilizing this datum for insertion into the City base maps.

Each utility shall be shown on separate sheets with detailed information. In addition, a composite with all utilities shown together, without detailed information, and focusing on utility crossings, is required. If the project has very limited utility information, request for approval for a composite only with all detailed information may be submitted to the City's Project Manager.

The layering convention and plans symbols shall follow established standards as indicated by the American Public Works Association, Washington State Chapter.

Record drawings are to be drawn on clean sheets and submitted to the Public Works Department with one mylar copy and two (2) sets of blue line copies. AutoCAD drawings are to be submitted on CD and properly labeled with project and drawing names.

SANITARY SEWER:

Record drawing information for sanitary sewer, at minimum, should include, but not be limited to:

Plan and profiles, including line size, slope, and length, location.

All sanitary structures are to be labeled regarding type, size, function and inverts of all pipes connected to the structure.

Manholes - Locations, types, rim/invert elevations inside/outside drops and valving.

Sewer Line - Materials, locations, lengths, slopes, inverts, and sizes

Side Sewers - Materials, locations, lengths, sizes, and inverts at stub

Public Utility Easements - Locations and widths tied to property lines

Details - Details of any unique structures or features

TV Report - Compare TV reports to side sewer locations.

WATER:

Record drawing information for water should include, but not be limited to:

Location of all valves, tee junctions, bends, blocking, size of meters, hydrants, pressure reducing stations, and blow-offs.

Sizes, type and lengths should be shown.

Water Lines - Material, lengths, sizes, and location.

Material, lengths, and sizes

Water Valves - Location, type, size

Water Bends - Location, size, type, blocking

Water Main Blocking - Location

All Fittings - Reducers, Expanders, Sleeves, etc.

Fire Hydrants – Locations w/ valves

Blow-off - Locations and sizes of blow offs and valves

Air & Vacuum Relief Valve - Locations, Size, Valves

Pressure Reducing Valves - Locations and valving, bends, all fittings outside vault

Water Meters – Type, size and locations (Domestic, Irrigation, Fire)

Water Services - Size, locations, material

Public Utility Easements - Locations and widths tied to property lines

Details of Connections

Fire Sprinkler Connections - Locations of line, size of line, type, location of detector vault, location of service valve Any and all unusual fittings or installations deemed applicable by City Inspector/Reviewer

STORM DRAINAGE:

Record drawing survey and volume computations for the retention/detention ponds or compensatory storage systems, if any, must also be prepared and stamped by a Washington Registered Surveyor.

All storm drainage retention/detention systems Record Drawings shall include the following statement:

“The storm drainage (retention/detention) system has been constructed in conformance with the approved plans and is functioning as designed.”

Information for the system, at minimum, should include, but not be limited to:

Plans and profiles, including line size, slope, lengths, and locations.

All storm structures are to be labeled regarding function, material, cast in place or precast with inverts.

Manholes/Catch Basins - Locations, types, rim/inert elevations of all pipes

Storm Lines - Materials, locations, lengths, slopes, sizes and inverts

Materials, lengths, slopes, and sizes

Roof Drains – Size, type and slope

Oil/Water Separators - Location, size, type, all rim/invert elevations

Flow Control Structures - Location, type, size, rim and all invert elevations, discharge control orifice sizes and elevations, overflow elevations

Swales – Plan & profiles, locations, length, width, slope; check dams, trash racks, cleanouts, and valving

Details - All structures required to be shown in detail. Details - any unique structures or features may also be required

Public Utility Easements - Locations and widths tied to property lines

Retention/Detention Systems - Volume of storage provided, storage elevation, storage/ponding limits, pond bottoms elevations, overflow elevations and locations, spillway, emergency overflow, berm elevations, piping w/ inverts

STREETS:

Record drawing information for roads should include, at minimum, but not limited to:

Monument locations, slopes, roadway limits, profiles, and typical & non-standard cross sections.

Center line elevations every 50 feet.

Center line slopes and vertical.

Gutter line elevations every 50 feet if not standard crown.

Gutter line slopes and curve data if not standard crown.

Gutter line elevations at intersections and as applicable.

Driveways - Locations, lengths, and type.

Channelization - Locations and type.

Signage - Locations and type.

Illumination - Locations, type, height, and wattage.

Service Cabinets - Location and type.

Junction boxes - Locations and type.

Conduits/Wire - Locations, type, size, and depth.

Controller Cabinet - Location and type.

Signalization - Locations, type, height, and foundation depths and sizes.

Right-of-Way - Locations and widths.

Easements - Locations and widths tied to property lines.

R.O.W. Center line monument locations (property monuments if a Plat).

BRIDGES & CULVERTS OVER 72"

Foundation: Location, type, elevation, and piling locations.

Structure: Location, type, elevation, load rating for trucks of type (HS-20, Type-3, Type-352, Type 3-3, Military Load). Structural diagram of reinforcement location and elevation of all utilities and conduits.

Earthquake analysis.

Reports:

1) Scour analysis
2) Load calculations
3) Earthquake analysis

SEWER LAYER LIST

LAYER NAME	COLOR	DESCRIPTION
SS-*size/type* (see below for List of pipe types)	GREEN	All sizes and types of sewer pipes. A different layer for each size and type. For example: SS-8PVC = 8" pvc pipe or SS-12DI = 12" ductile iron.
SS-SIDE	GREEN	All side sewers
SS-MH	GREEN	All sewer manholes and cleanouts.
SS-TEXT	WHITE	Size and Type of pipes and side sewers.
SS-DESC	WHITE	All other wording besides size & type. This will include all descriptions.
SS-ESMT**	WHITE	Public utility easements
*ABANDONED	YELLOW	All abandoned lines (size & type will Be under SS-TEXT layer, if we have it)

*Layers for internal city use only
** Linetype should be Hidden2

Sewer Pipe types (size of pipe will precede type abbreviation):

DI = ductile iron	CY = clay	DR = driscopipe	PVC = pvc pipe
AC = Asbestos Cement	RCP = Reinforced Concrete Pipe		

Additional Information:

Linetype = continuous;   Lineweight = default

Any additional abbreviated layers will be accompanied by description

STORM LAYER LIST

LAYER NAME	COLOR	DESCRIPTION
SD-*size/type* (See below for List of pipe types)	MAGENTA	All sizes and types of storm pipes. A different layer for each size and type. For example: SD-8PVC = 8" PVC or SD-12ADS = 12" ADS
SD-CB	MAGENTA	Type 1 Catch Basins
SD-MH	MAGENTA	Type 2 Catch Basins
SD-CO	WHITE	Clean Outs
SD-TEXT	WHITE	Size and Type of each storm pipe.
SD-DESC	WHITE	All other wording besides size & type. This will include all descriptions.
SD-ESMT**	WHITE	Public utility easements
SD-DTCH	MAGENTA	Swales, check dams, trash racks, trench drains, Valving, rockeries, retention walls, etc.
SD-OWS	MAGENTA	All Oil/Water separators
SD-DETN	MAGENTA	Ponds, detention chambers, spillways, overflow, etc.
*ABANDONED	YELLOW	All abandoned lines (size & type will be under WA-TEXT layer, if we have it)
SD-RD	MAGENTA	Roof Drains

*Layers for internal city use only
** Linetype should be Hidden2

Storm Pipe types (size of pipe will precede type abbreviation):

CPP = Corrugated Poly Pipe	N-12 = Corrugated Poly Pipe-smooth bore
RCP = Reinforced Concrete Pipe	VCP = Vitrified Clay Pipe
ADS = Flexible Poly Pipe	HDPE = High Density Polyethylene Pipe
CMP = Corrugated Metal Pipe	

Additional Information:

Linetypes = continuous;   Lineweight = default

Any additional abbreviated layers will be accompanied by description

WATER LAYER LIST

LAYER NAME	COLOR	DESCRIPTION
WA-*size/type* (see below for List of pipe types)	BLUE	All sizes and types of water pipes. A different layer for each size and type. For example: WA-8DI = 8" ductile iron or WA-12CI = 12" cast iron.

WA-TEXT	WHITE	Size and Type of each water pipe.
WA-DESC	WHITE	All other wording besides size & type. This will include all descriptions.
WA-ESMT**	WHITE	Public utility easements
WA-WMET	BLUE	Water meters and water service lines.
WA-VALV	BLUE	All water valves
WA-FHYD	BLUE	All fire hydrants
WA-FIRE	BLUE	All fire sprinkler line connections
WA-FTNG	BLUE	All fittings (bends, blocking, blow offs, PRV, air & vacuum valves, etc.)
ABANDONED	YELLOW	All abandoned lines (size & type will be under WA-TEXT layer, if we have it)
*AC-PIPE	RED	Will be just for the lightning bolt symbol placed over each AC pipe.

*Layers for internal city use only
**Linetype should be Hidden2

Water Pipe types (size of pipe will precede type abbreviation):

DI = ductile iron   CI = cast iron   CO = copper   STL = steel   PVC = pvc pipe

Additional Information:

Linetypes = continuous;   Lineweight = default

Any additional abbreviated layers will be accompanied by description

Appendix B Approved Materials List

(Oct. 14, 2013)

DESCRIPTION	MAKE AND MODEL	REFERENCE	REQUIRED	OR EQUIVALENT (submittals required)
WATER				
Restrained Joint Ductile Iron Pipe 10" & Larger	US Pipe TR Flex System or Griffin Snap Lock	AWWA: C-1501 AWWA: C-111 Minimum Thickness Class 52	X	
Class 52 Cement Lined Ductile Iron 3" & Larger (Mechanical Joint)	Griffin, US Pipe, Pacific States or American Ductile	AWWA: C-151 Minimum Thickness Class 52		X
Restrained Joints Thru 12"	Ebba Iron Mega Lug; 1100 Series, Ford; Uniflange Series 400 W/Uni-Torque; ¾" All Thread-Stainless Steel; Field Lok 350 Gaskets; Romac RomaGrip; TR Flex Gripper Ring; MJ Field Lok; Star Grip 3000	UL Listed and FM Approved	X	
Grooved Coupling Flange Adapter	Victaulic 341 Coupling	AWWA: C-606	X	
Couplings	Romac 511 or Ford Coupler		X	
Flanged Gaskets	Rainbow or Durable Garlock		X	
Gate Valves	Clow/M&H or Mueller	AWWA: C-509 (CI); C-515 (DI)	X	
Tapping "T's"	Romac SST/FTS 420	W-08		X
Air Release/ Vacuum Valves	APCO 140	W-07		X
Check Valves (Spring Loaded)	Cla-Val	AWWA: C-508	X	
Sample Stations	Kupferle Eclipse #88	W-12	X	
Hydrants	M&H 929 or Mueller (Super Centurion 250)	W-02	X	
Casing Spacers	APS #SSI & SI, Uniflange #UFRCS 1300	Water & Sewer		X
Casing End Seals	APS AC End Seal	Water & Sewer	X	

Locate Wire	Copper Clad Steel (CCS) 10 AWG, HDPE or HMWPE, colored jacket	Water, Sewer, Storm		X
Wire Splices	3M D8Y		X	
Pre-Manufactured Concrete Vaults	see WSDOT QPL			X
Double Leaf Full Open Vault Access Door	LW Products	Water, Street, Storm	X	
Ladder Post	Bilco-Ladder Up Post, LU-4	Sewer, Water, Storm, Street		X
Vault Penetration Seals	Link Seal Type C	Water,		X
Above Ground Enclosures	Hot Box/Heated	UL Approved & AWWA Approved		X
Valve Box Top	Olympic 940 18" Valve Box Top	G-15		X
Valve Box Lid	Olympic 940 DS	G-15		X
Valve Box Base	Olympic 940	G-15		X

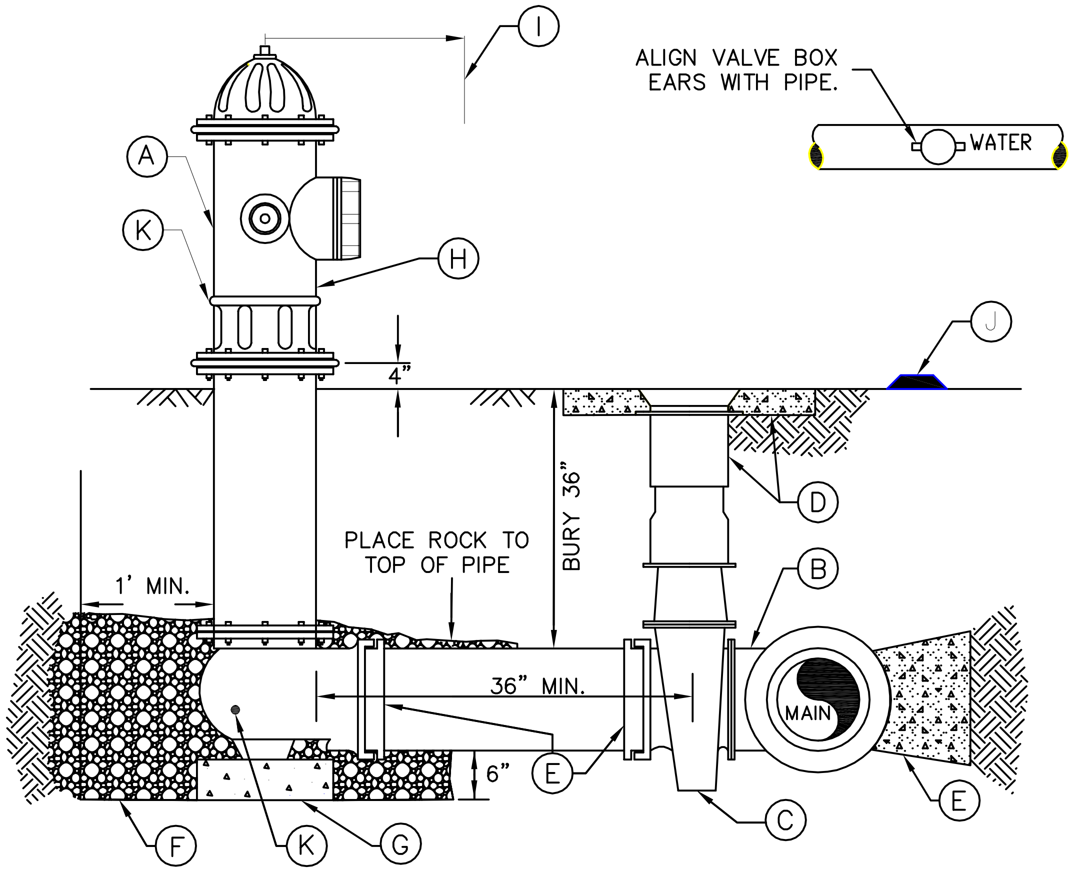
DESCRIPTION	MAKE AND MODEL	REFERENCE	REQUIRED	OR EQUIVALENT (submittals required)
STREET				
Monument Case	EJIW #3695	T-43		X
Tubular Markers	Safe Hit (Multi-Purpose)	T-39	X	
Pre-Cast Curbing	see WSDOT QPL	T-39		X
Pavement Markers-RPM's	see WSDOT QPL	T-18/19		X
Padlocks	Best w/Interchangeable Construction Core	Street?	X	
Controlled Density Fill-CDF	Cadman: Pro Flow 5 Hour 110021; Dry Pac			X
Pre-Manufactured Concrete Vaults	see WSDOT QPL			X
Double Leaf Full Open Vault Access Door	LW Products	Water, Street, Storm	X	
Ladder Post	Bilco-Ladder Up Post, LU-4	Sewer, Water, Storm, Street	X	

DESCRIPTION	MAKE AND MODEL	REFERENCE	REQUIRED	OR EQUIVALENT (submittals required)
STORM WATER				
Storm Water Piping	HDPE; LCPE; DI; PVC, SDR 35; Concrete			X
Concrete No Catch Inlet	see WSDOT QPL			X
Catch Basin Type 1	see WSDOT QPL			X
Catch Basin Type 1L	see WSDOT QPL			X
Catch Basin Type 2	see WSDOT QPL			X
Grate-Vaned	EJIW 7700-M2; OFCO SM50 VG			X
Grate Bi-Directional Vaned	EJIW 7700-M3; OFCO SM50 2VG			X
Cover-Solid	EJIW 7700-Type A; OFCO SM50 S			X
Standard Frame	EJIW 7700; OFCO SM50			X
Through-Curb Inlet Frame	EJIW 7701-M2, -M3; OFCO SM52 VG			X
Rolled Curb Frame & Grate	EJIW 7711-M2, -M3; OFCO SM44RB 2VG			X
Grate-Area Inlet	EJIW 7700-M1; OFCO SM50G			X
Gate Valves-C509	M&H/Clow or Mueller		X	
Manhole Assembly Non-Locking	East Jordan: Lid #3705A DI Frame #3715Z	Sewer, Storm		X
Manhole Assembly Locking (Primarily Used For Easements)	East Jordan: Lid #3715APT DI Frame #3715ZPT			X
Ladders and Steps	Lane #p-13938; MA #PS2-PF	Sewer, Storm	X	
Padlocks	Best w/Interchangeable Construction Core	Street?	X	
Locate Wire	Copper Clad Steel (CCS) 10 AWG, HDPE or HMWPE, colored jacket	Water, Sewer, Storm		X
Pre-Manufactured Concrete Vaults	see WSDOT QPL			X

Double Leaf Full Open Vault Access Door	LW Products	Water, Street, Storm	X	
Ladder Post	Bilco-Ladder Up Post, LU-4	Sewer, Water, Storm, Street	X	
Grass Seed; Wet Mix (Ditch Only)	Mixture of Red Top and Highland Colonial Bent Grass			X
Grass Seed; Dry Mix	Red Fescue			X
Water Quality Treatment Devices ie; Filter Cartridges, Filter Vaults	(See Manual) Contech (provide filter type/model)			X
Tide Valve	Red Valve Co. Tideflex Check Valve TF-1			X
Earth Anchor System	Manta Ray	Spec.		X

DESCRIPTION	MAKE AND MODEL	REFERENECE	REQUIRED	OR EQUIVALENT (submittals required)
SEWER				
PVC Pipe	SDR 35(46PS)	ASTM D3034(4”-15”) ASTM F-679(18”-36”) ASTM D3212		X
HDPE Pipe	DR 21	ASTM D3350		X
Ductile Iron for Pressure Sewers-Protecto 401	Griffin Pipe Co. or U.S. Pipe & Foundry Co. or American Ductile	AWWA Class 52 ASTM A716/A746		X
Concrete Pipe, non-reinforced (<10”)	see WSDOT QPL	ASTM C14, Class 2		X
Concrete Pipe, reinforced (>13”)	see WSDOT QPL	ASTM C76		X
Precast Concrete Sewer Manhole	see WSDOT QPL	S-01, S-02, S-03		X

Clean Out Ring & Cover	EJIW 3671APT	S-07		**X**
Side Sewer Saddle	Romac Style CB	S-08		**X**
Pipe Support Saddle	Romac 101S	S-06	**X**	
Manhole Assembly Non-Locking	East Jordan: Lid #3705A DI Frame #3715Z	Sewer, Storm		**X**
Manhole Assembly Locking (Primarily Used For Easements)	East Jordan: Lid #3705APT DI Frame #3715ZPT	Sewer, Storm		**X**
Ladders and Steps	Lane #p-13938; MA #PS2-PF	Sewer, Storm	**X**	
Casing Spacers	APS #SSI & SI, Uniflange #UFRCS 1300	Water & Sewer		**X**
Casing End Seals	APS AC End Seal	Water & Sewer	**X**	
Locate Wire	Copper Clad Steel (CCS) 10 AWG, HDPE or HMWPE, colored jacket	Water, Sewer, Storm, Fiberoptic		**X**
Ladder Post	Bilco-Ladder Up Post, LU-4	Sewer, Water, Storm, Street	**X**	
Weterproof Manhole Insert	Southwestern Packing and Seals, Inc.- (Rain Stopper)			**X**



LEGEND:

A. AVK 27SM–A2906–0AZJ2–8 OR A MUELLER SP–M423–540627 BOTH HYDRANTS SHIP FROM FACTORY IN 4–6 WEEKS . NOTE: THE PART NUMBERS SPECIFIED ARE FOR A 4' BURY DEPTH. PART NUMBERS WILL CHANGE WITH DIFFERENT HYDRANT BURY DEPTHS. PUMPER PORT TO FACE STREET OR AS DIRECTED BY THE FIRE DEPARTMENT.
B. FLANGE OUTLET ON DUCTILE IRON TEE OR SEE STANDARD DETAIL W–08 (TAPPING TEES).
C. 1–AUXILLARY GATE VALVE–AVK SERIES 45 C509 WITH DIRT SEAL OR MUELLER A2362 C509 WITH STAINLESS STEM AND DIRT SEAL, M.J.xFL. WITH LUGS. DO NOT MIX AVK PARTS WITH MUELLER PARTS OR MUELLER WITH AVK.
D. 1–TWO PIECE CAST IRON VALVE BOX. SEE STANDARD DETAIL G–15 (VALVE BOX INSTALLATION).
E. 1–6" DUCTILE IRON CLASS 52 CEMENT–LINED PIPE, LENGTH UP TO 50'. OVER 50', 8" CLASS 52 DUCTILE IRON IS REQUIRED. RESTRAIN PIPE WITH APPROVED SYSTEM – SEE APPROVED MATERIAL LIST OR STANDARD DETAIL W–01 (TYPICAL HORIZONTAL CONCRETE BLOCKING).
F. ½ YARD WASHED DRAIN ROCK (⅞"), PLACE TO TOP OF PIPE. PLACE GEO FABRIC AROUND TOP AND SIDES OF GRAVEL, DO NOT BLOCK DRAIN HOLES. DEEPER EXCAVATION WITH MORE DRAIN ROCK MAY BE REQUIRED IN POOR DRAINING SOILS.
G. 16"x8"x4" MINIMUM SIZE CONCRETE BLOCK UNDER HYDRANT.
H. FOOTAGE TO VALVE STENCILED ON HYDRANT IN 2" BLACK BLOCK ENAMEL NUMBERS TO THE NEAREST FOOT. LETTERS SHALL FACE HYDRANT VALVE.
I. MINIMUM 3' CLEAR, LEVEL AREA AROUND HYDRANT.
J. TWO WAY 4" SQUARE RAISED PAVEMENT MARKER BLUE. PLACE 4" OFF STREET CENTERLINE – HYDRANT SIDE.
K. DRAIN HOLE

NOTES:

1. HYDRANT SHALL BE VERTICAL (PLUMB).
2. EXTENSION KITS ARE NOT ALLOWED.

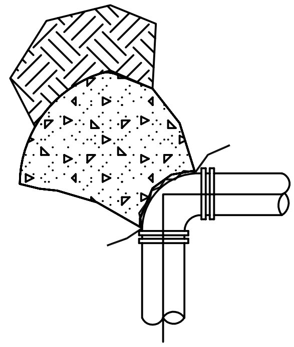
REVISION: MARCH 1, 2018

NO SCALE

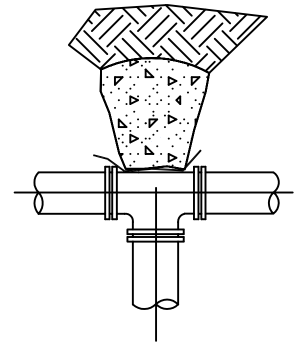
CITY OF ISSAQUAH WASHINGTON PUBLIC WORKS DEPARTMENT - WATER	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**FIRE HYDRANT ASSEMBLY**	STANDARD DETAIL NO. **W-02**

THRUST BLOCK – TABLE						
		MINIMUM BEARING AREA AGAINST UNDISTURBED SOIL SQUARE FEET				
PIPE SIZE	PRESSURE PSI	90°	TEE CAP	45°	22 1/2°	11 1/4°
4"	300	11	3.8	8	4.2	2.1
6"	300	22.4	17	16	8.6	4.4
8"	300	38.6	29	27.3	14.8	7.5
10"	300	58	43.5	41	22.2	11.3
12"	300	82	61.6	58	31.4	16
THIS TABLE IS PROVIDED AS A MINIMUM GUIDELINE ONLY. ALL BLOCKING SHALL BE DESIGNED AND STAMPED BY A LICENSED CIVIL ENGINEER.						

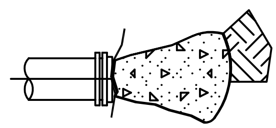
* TABLE CALCULATED AT 1000 LB/SF BEARING AREA.



90° BEND



TEE



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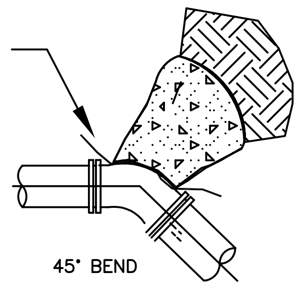
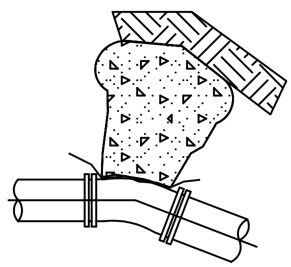
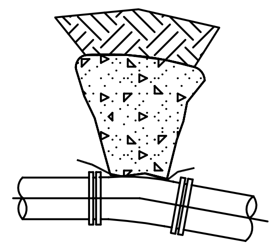


45° BEND



22 1/2° BEND



11 1/4° BEND

NOTES:

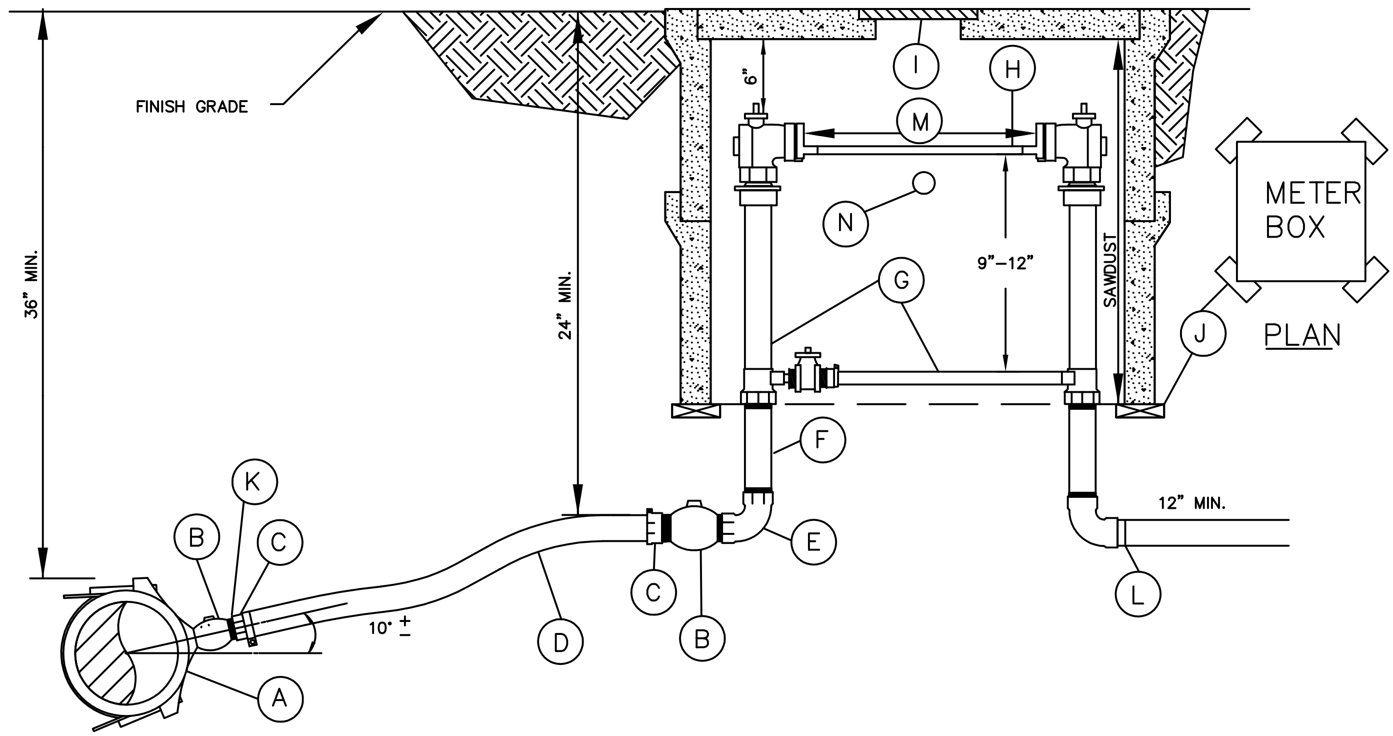
1. ALL BLOCKING SHALL BE DESIGNED AND STAMPED BY LICENSED CIVIL ENGINEER.
2. BLOCKING SHALL CONSIST OF A MINIMUM 3,000 PSI READY MIX CONCRETE W/6" MAXIMUM SLUMP
3. CONCRETE BLOCKING SHALL BE CAST IN PLACE & HAVE MINIMUM OF 1/2 SQUARE FOOT BEARING AGAINST THE FITTING.
4. BLOCK SHALL BEAR AGAINST FITTINGS ONLY & SHALL BE CLEAR OF JOINTS TO PERMIT TAKING UP OR DISMANTLING JOINT.
5. CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.
6. 8 MIL PLASTIC INSTALLED BETWEEN PIPE AND CONCRETE.
7. BLOCKING SHALL BEAR AGAINST FITTING ONLY AND SHALL BE CLEAR OF JOINTS AND BOLTS.
8. VERTICAL BLOCKING SYSTEMS REQUIRE SPECIAL DESIGN BY A LICENSED CIVIL ENGINEER.

* IN SOFT SOIL OR PEAT, ALL THRUSTS BLOCKS SHALL BE RESTRAINED BY PILES OR BY REMOVAL OF MUCK OR PEAT AND REPLACEMENT WITH BALLAST OF SUFFICIENT STABILITY TO RESIST THRUST. (ENGINEERING DESIGN REQUIRED).

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE, STATE OF WASHINGTON, 26132 REGISTERED PROFESSIONAL ENGINEER, EXPIRES	**HORIZONTAL CONCRETE BLOCKING**	**STANDARD DETAIL NO. W-03**



(A) DOUBLE STRAP STAINLESS STEEL SERVICE SADDLE WITH TAPER (CC) TAP, ROMAC 202S, OR EQUAL. SIZE AS REQUIRED.

(B) CORPORATION STOP, MALE IRON PIPE INLET BY MALE IRON PIPE THREAD OUTLET WITH BALL VALVE FORD BALLCORP FB500 MUELLER ORISEAL NO. H–9968.

(C) COUPLING, FEMALE IRON PIPE THREAD BY PACK JOINT (COMPRESSION FITTING) FOR COPPER. FORD C84–66 OR C84–77. (FOR COPPER TUBING CONNECTION.)

(D) COPPER TUBING, TYPE K OR SCHEDULE 40 BRASS PIPE.

(E) STREET ELL, BRASS, MALE IRON PIPE THREAD BY FEMALE IRON PIPE THREAD.

(F) NIPPLE, BRASS, M.I.P.T. X M.I.P.T., 12" LONG OR AS REQUIRED TO MEET PROPER GRADE.

(G) BRASS AND COPPER METER SETTER WITH BYPASS, CHECK VALVE, BALL VALVE WITH PADLOCK WINGS ON INLET, AND BYPASS. VERTICAL INLET AND OUTLET FORD VBH86–12B–11–66/VBH87–12B–11–7

(H) METER: SENSUS 1 1/2" OR 2" SR WITH BRONZE CHAMBER IN CUBIC FEET WITH TOUGH READ REGISTER, PIT LID ADAPTER, AND RADIO READ MODULE. CONTRACTOR TO INSTALL ALL THREAD THROUGH FLANGES TO MAINTAIN METER SET DEMENSIONS PRIOR TO METER INSTALLATION.

(I) TWO (2) CONCRETE METER BOXES (STACKED), FOGTITE OR EQUAL. FOGTITE NO. 2 IN NONTRAVELED AREAS AND SIDEWALK (CONC. LID WITH ALUM. INSPECTION PLATE). FOGTITE NO. 2S DIPPED (TOP BOX ONLY). IN AREAS WITH VEHICULAR TRAFFIC LID DRILLED FOR PIT LID ADAPTER. SET AT, AND LEVEL WITH, GRADE.

(J) BRICK – 3 1/2"X8"X16".

(K) SWING JOINT USED WITH RIGID COPPER OR BRASS PIPE CONNECTION.

(L) PLUG.

(M) FACE TO FACE DIMENSIONS: 1 1/2" METER = 13 3/8" & 2" METER = 17 3/8".

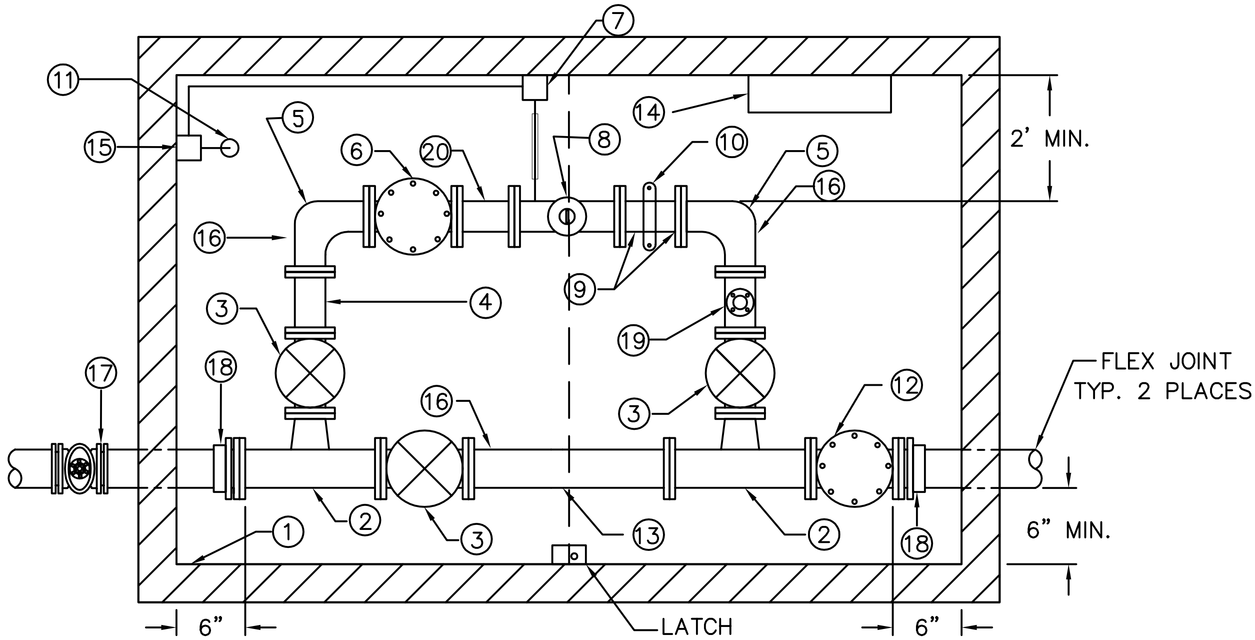
(N) 2" PVC CONDUIT, SEE STANDARD DETAIL W–25 FOR CONDUIT AND MXU DETAILS.

1. SERVICE LINE MUST BE INSTALLED PERPENDICULAR TO THE WATER MAIN. COMPACT TRENCH TO 95% MAX. DRY DENSITY PER ASTM D–1557.
2. SERVICE SADDLES ARE REQUIRED ON ALL PIPE.
3. DOH APPROVED BACK FLOW PREVENTION DEVICES MUST BE INSTALLED ON ALL IRRIGATION AND FIRE SERVICES AND SHALL BE TESTED AND APPROVED BY THE CITY PRIOR TO SERVICE ACTIVATION.
4. OFFSET METER BOX TO LEFT OR RIGHT 5'
5. INSTALL DOUBLE SERVICES WITH SINGLE 2–PORT MXU (model 520) RADIO–READ WITH TOUCH COUPLER CABLE.
6. ON DOUBLE SERVICES PLACE THE MXU IN THE METER BOX WITH THE METER WIRED TO PORT NUMBER 1.
7. DOUBLE SET SERVICES MUST BE NO MORE THAN 2 FEET APART.
8. SINGLE SET SERVICE MUST BE A MINIMUM OF 20' APART.
9. THE CITY SHALL MAKE ALL ELECTRICAL CONNECTIONS.
10. SERVICES SHALL BE INSTALLED BY THE CITY ON CITY OWNED MAINS.
11. METERS SHALL BE SET AT PROPERTY LINES OR IN SIDEWALK, SEE STANDARD DETAIL W–25.
12. AVOID VEHICLE TRAVEL AREAS.
13. SERVICES SHALL NOT BE TAPPED OFF HYDRANT OR FIRE SPRINKLER SYSTEM BRANCHES.
14. BYPASS WILL BE LOCKED OFF BY CONSTRUCTION INSPECTOR WHEN METER SPREADER IS INSTALLED.
15. CITY SHALL INSTALL METER UNLESS OTHERWISE APPROVED.
16. CONTRACTOR SHALL CONNECT HOUSE TO METER PRIOR TO RADIO READ METER INSTALLATION.
17. SEE STANDARD DETAIL W–25 FOR RADIO READ INSTALLATION DEATIL.
18. PROVIDE POSITIVE DRAINAGE AWAY FROM METER BOX.

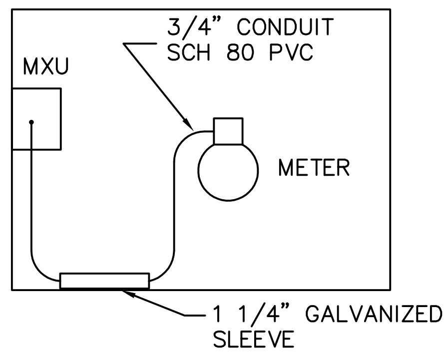
REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**1/2" AND 2" WATER SERVICE**	**STANDARD DETAIL NO.** **W-04**



NUMBER	QUANTITY	DESCRIPTION
1	1	VAULT–SIZE TO FIT, SEE DETAIL G–08
2	2	FLG TEE
3	3	FLG X FLG GATE VALVE WITH HAND WHEEL OP C509
4	4	FLANGED SPOOL MATCH LENGTH OF # 19
5	2	FLANGED 90
6	1	BASKET STRAINER
7	1	J BOX – PLASTIC / WATER–TIGHT
8	1	METER COMPOUND WITH TR TRPL AND RADIO READ MXU W/ 12' WIRE
9	1	FLANGEDxVICTAULIC SPOOL – MADE TO FIT – MIN. 2 PIPE DIAMETERS
10	1	VICTAULIC COUPLING STYLE 31
11	1	VAULT LID – PIT LID ADAPTER HOLE
12	1	SWING CHECK FLG X FLG
13	1	FLANGE SPOOL MADE TO FIT
14	1	LADDER – SEE DETAIL G–08
15	1	MXU – INSTALLED BY CITY
16	3	STANCHIONS – GRINNEL #264
17	1	VALVE AT MAIN CONNECTION
18	2	VICTAULIC 341 COUPLING
19	1	SIZE X 2" FLG TEE WITH 2" BLIND FLG. BLIND FLG SHALL HAVE FIP THREADS,
		2" MIP BALL CORP WITH 2" x 2 1/2" FNST ADAPTER WITH BRASS CAP.
20	1	FLG X FLG SPOOL – MIN. LENGTH = 2 PIPE DIAMETERS



NOTES:

1. ALL MATERIALS, INCLUDING METER SHALL BE FURNISHED BY THE CONTRACTOR.
2. ALL PIPE & FITTINGS 3" & LARGER SHALL BE CEMENT LINED DUCTILE IRON, CLASS 53 MINIMUM.
3. TEE WITH GATE VALVE REQUIRED AT DISTRIBUTION MAIN.
4. VAULTS SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
5. PROVIDE 24" CLEARANCE BETWEEN VAULT FLOOR AND CENTER LINE OF COMPOUND METER. WHERE ELEVATION OF VAULT FLOOR IS TOO LOW TO DRAIN TO DAYLIGHT OR STORM SYSTEM, THIS CLEARANCE CAN BE REDUCED TO A MINIMUM OF 12", IF SUBSTITUTION OF A SHORTER VAULT ALLOWS FLOOR TO DRAIN TO DAYLIGHT OR STORM SYSTEM.
6. ALL FITTINGS OUTSIDE VAULT SHALL INCLUDE THRUST BLOCKING OR JOINT RESTRAINT DEVICES. SEE APPROVED MATERIAL LIST.
7. TOP OF VAULT SHALL BE 3" ABOVE FINISHED GRADE IN LANDSCAPE AREAS.
8. PROVIDE POSITIVE DRAINAGE AWAY FROM VAULT.
9. MOUNT PIT LID ADAPTER IN VAULT LID 4" FROM HINGE – 1 7/8" IN DIAMETER HOLE
10. USE TURBINE METER FOR IRRIGATION (UNLESS OTHERWISE NOTED).
11. 3" METER USES A 4" BYPASS WITH 4" X 3" TEES.
12. ALL MXU CONDUIT SHALL BE 3/4" SCH 80 PVC WITH A NYLON PULL CORD INSIDE.
13. ALL CONDUIT BENDS SHALL USE LONG RADUIS SWEEPS.
14. ALL CONDUIT CONNECTIONS MUST BE WATER TIGHT.
15. 3/4" CONDUIT SHALL BE SUPPORTED WITH STAINLESS STEEL HANGERS AND HARDWARE.
16. PLACE 1 1/4" GALVANIZED SLEEVE AROUND 3/4" COUNDUIT ON BOTTOM OF VAULT WITH TIGHT ENDS.

REVISION:

NO SCALE

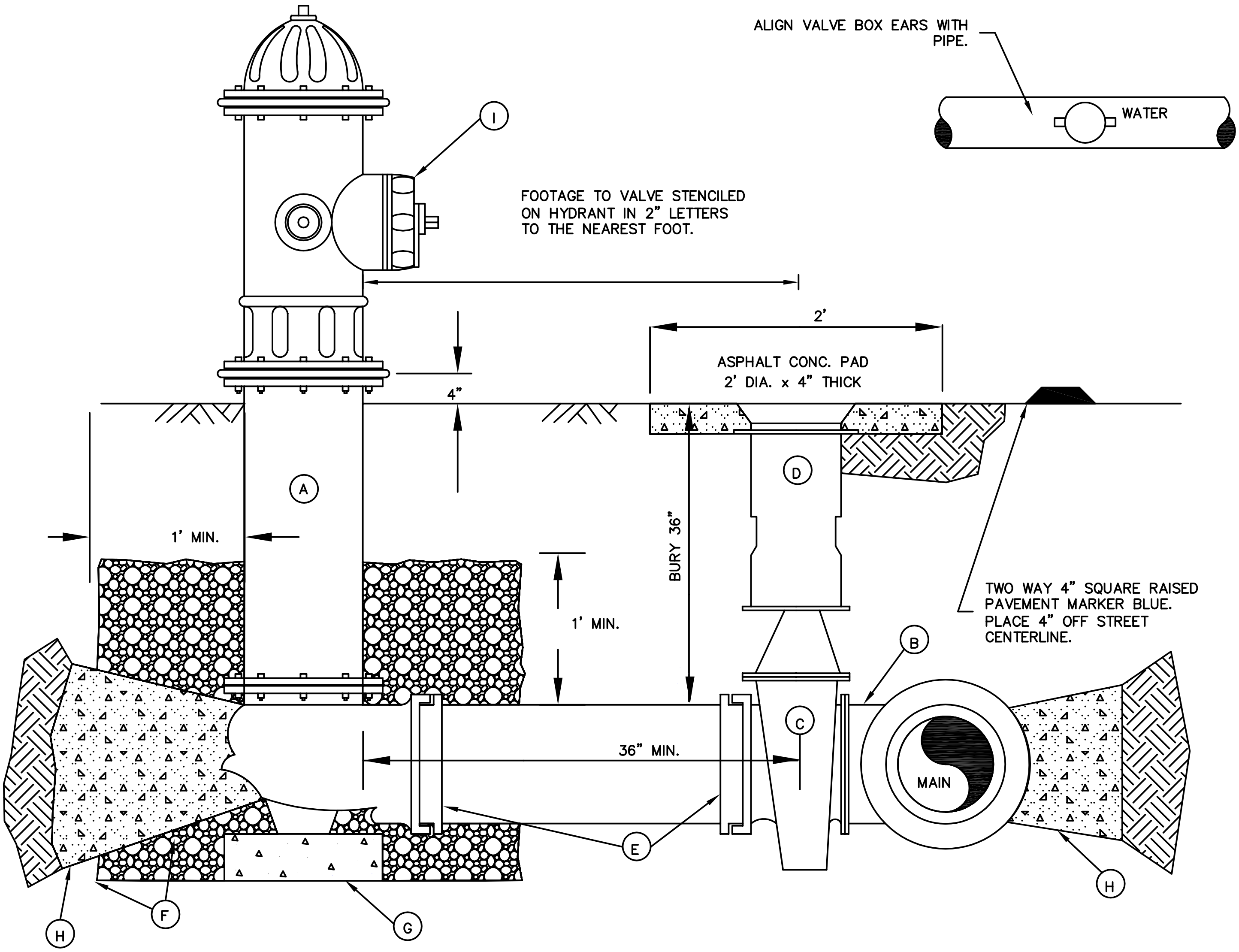
CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT

SHELDON T. LYNNE
STATE OF WASHINGTON
26132
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES

3" AND LARGER METER INSTALLATION

STANDARD DETAIL NO.

W-05



A. M & R/929 OR MUELLER CENTURIAN 1-5 1/4" M.V.O. HYDRANT WITH 2-2 1/2" N.S.T. AND 1-4" PUMPER PORTS, SEATTLE STANDARD THREAD-M.J. INLET, WITH LUGS, BRASS TO BRASS SUB-SEAT. FIRE HYDRANT TO BE PAINTED WITH TWO MIL. 2 COATS OF HAMMERITE HIGH GLOSS WHITE SMOOTH PAINT. PUMPER PORT TO FACE STREET, OR AS DIRECTED BY THE FIRE DEPARTMENT. SEE APPROVED MATERIAL LIST.

B. 6" FLANGE OUTLET ON DUCTILE IRON TEE. OR SEE STANDARD DETAIL W-16.

C. 1-AUXILIARY GATE VALVE: 6" AWWA C509, RESILIENT SEAT, M.J.xFL. WITH LUGS. SEE APPROVED MATERIAL LIST.

D. 1-TWO-PIECE CAST IRON VALVE BOX. SEE STANDARD DETAIL W-18.

E. 1-6" DUCTILE IRON CLASS 52 CEMENT-LINED PIPE, LENGTH UP TO 50'. OVER 50', 8" CLASS 52 DUCTILE IRON IS REQUIRED. RESTRAIN PIPE WITH APPROVED SYSTEM - SEE APPROVED MATERIAL LIST.

F. 1/2 YARD WASHED DRAIN ROCK (7/8"), MIN. 1' ABOVE BOOT FLANGE PLACE 8 MIL POLYETHYLENE FILM AROUND TOP AND SIDES OF GRAVEL DO NOT BLOCK DRAIN HOLES. DEEPER EXCAVATION WITH MORE DRAIN ROCK MAY BE REQUIRED IN POOR DRAINING SOILS.

G. 16"X8"X4" MIN. SIZE CONCRETE BLOCK UNDER HYDRANT.

H. CONC. BLOCKING PER STD DETAIL W-03.

I. 5" STORZ HYDRANT ADAPTER WITH CAP.

J. MINIMUM 3' CLEAR AREA AROUND HYDRANT.

K. HYDRANT SHALL BE EXACTLY VERTICAL (PLUMB).

L. EXTENSION KITS ARE NOT ALLOWED.

M. SPACING - 500' RESIDENTIAL, 300' COMMERCIAL.

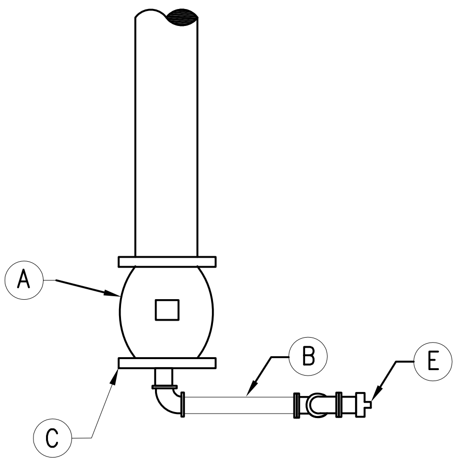
N. MINIMUM 50' FROM BUILDING.

O. HYDRANT MUST BE VISIBLE FOR 150'.

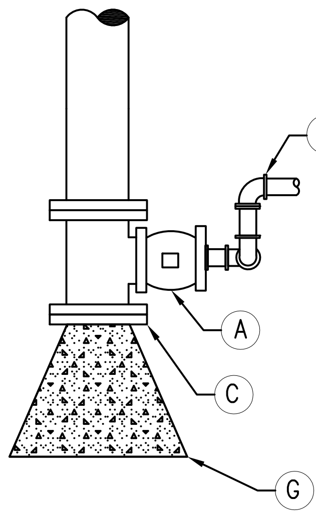
REVISION:

NO SCALE

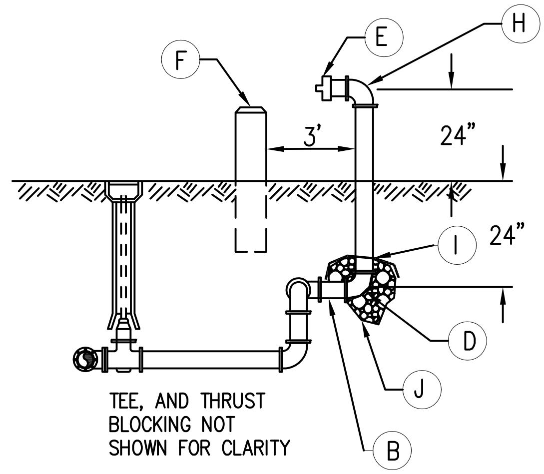
CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**FIRE HYDRANT ASSEMBLY**	**STANDARD DETAIL NO. W-06**



END CONNECTION PLAN VIEW



SIDE CONNECTION PLAN VIEW



ELEVATION VIEW

MAIN SIZE	QUANTITY	BLOW-OFF SIZE
6	1	4"
8	1	4"
10	1	F.H.
12	1	F.H.
≥16	PIG	4"

LEGEND:

A. CAST IRON GATE VALVE, MAIN SIZE x BLOW-OFF SIZE TEE, AVK SERIES 65.
B. BRASS OR DUCTILE IRON PIPE.
C. BLIND FLANGE OR M.J. PLUG x SIZED BLOW-OFF PIPE.
D. 90° ELBOW WITH ⅛" DRAIN HOLE.
E. 4" BRASS CAP WITH SEATTLE STANDARD THREAD.
F. GUARD POSTS WHEN REQUIRED. SEE STANDARD DETAIL G-04 (TYPICAL BOLLARD PLACEMENT – SEE FIXED BOLLARDS).
G. PROVIDE RESTRAINED JOINTS OR THRUSTS BLOCKS FOR DEAD END. (PER DESIGN ENGINEER). SEE STANDARD DETAIL W-01 (TYPICAL HORIZONTAL CONCRETE BLOCKING DETAIL).
H. PAINT ALL ABOVE-GROUND PIPE, FITTINGS AND GUARD POST(S) WHITE PER SHERWIN WILLIAMS RECOMMENDATIONS. BLOW-OFF ASSEMBLY MUST BE CLEANED, SCUFFED SANDED AND PREPARED PER PAINT MANUFACTURE SPECIFICATION. PRIME WITH 1 COAT (6 MILLS) OF SHERWIN WILLIAMS PRO-CRYL ACRYLIC PRIMER (B66 W 310 643-22681) AND THEN TOP COAT WITH 1 COAT (6 MILLS) SHERWIN WILLIAMS CRYL-HPA HIGH PERFORMANCE ACRYLIC GLOSS (B66 W 377 6405-18908) HIGH GLOSS BRIGHT WHITE.
I. PROVIDE GEO-FABRIC AROUND TOP AND SIDES OR ROCK. DO NOT BLOCK DRAIN HOLE.
J. PLACE ⅓ YARD OF ⅞" WASHED ROCK AROUND DRAIN HOLE. DEEPER EXCAVATION WITH MORE DRAIN ROCK MAY BE REQUIRED IN POOR DRAINING SOILS,

NOTES:

1. SEE STANDARD DETAIL G-15 (VALVE BOX INSTALLATION).
2. LOCATION OF BLOW-OFF TO BE DETERMINED BY CITY.
3. STENCIL FOOTAGE TO VALVE ON DISCHARGE PIPE. 2" BLACK BLOCK ENAMEL NUMBERS.
4. HYDRANT ASSEMBLIES MAY BE SUBSTITUTED FOR BLOW-OFF ASSEMBLIES. SEE STANDARD DETAIL W-02 (FIRE HYDRANT ASSEMBLY).
5. VALVE SHALL BE LOCATED AT LEAST 3' FROM GUARD POST OR STAND PIPE.

REVISION: MARCH 1, 2018

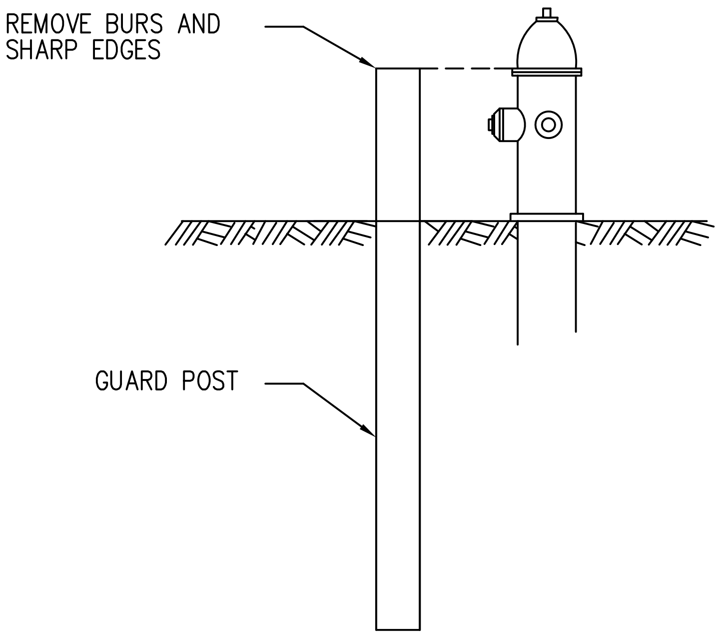
NO SCALE

CITY OF ISSAQUAH WASHINGTON
PUBLIC WORKS DEPARTMENT - WATER

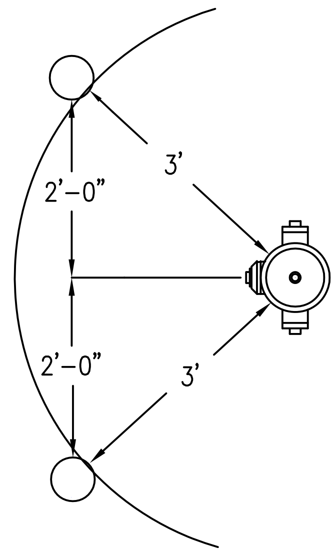
SHELDON T. LYNNE
STATE OF WASHINGTON
26132
REGISTERED PROFESSIONAL ENGINEER
EXPIRES

BLOW-OFF ASSEMBLY

STANDARD DETAIL NO.
W-04



ELEVATION



PLAN

NOTES

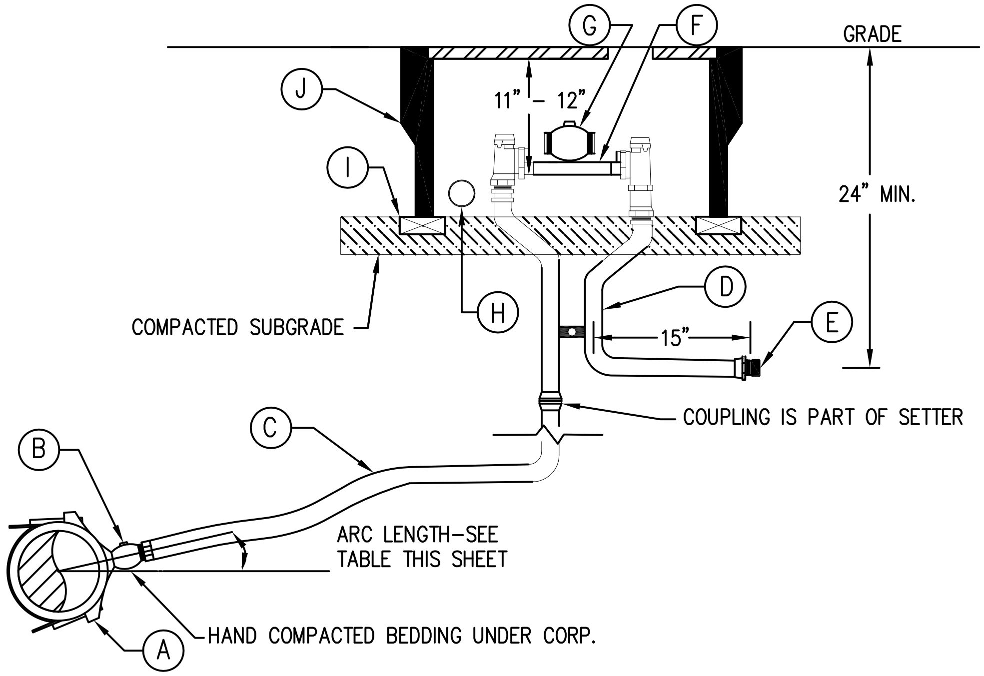
1. GUARD POST SHALL BE 6" CLASS 52 D.I. PIPE, 6' LONG, FILLED WITH CEMENT. GUARD POST MUST BE CLEANED, SCUFFED SANDED AND PREPARED PER PAINT MANUFACTURE SPECIFICATION. PRIME WITH 1 COAT (6MILLS) OF SHERWIN WILLIAMS PRO–CRYL ACRYLIC PRIMER (B66 W 310 643–22681) AND THEN TOP COAT WITH 1 COAT (6MILLS) SHERWIN WILLIAMS CRYL–HPA HIGH PERFORMANCE ACRYLIC GLOSS (B66 W 377 6405–18908) HIGH GLOSS BRIGHT WHITE.
2. D.I. GUARD POSTS SHALL ONLY BE USED IN PARKING LOTS, AS DIRECTED.
3. WOOD GUARD POSTS MAY BE USED IN RIGHT–OF–WAY. SEE STANDARD DETAIL G–04 (TYPICAL BOLLARD PLACEMENT SEE FIXED BOLLARDS).

REVISION: MARCH 1, 2018

NO SCALE

CITY OF ISSAQUAH WASHINGTON PUBLIC WORKS DEPARTMENT - WATER	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**GUARD POST**	STANDARD DETAIL NO. **W-03**

ARC LENGTH TABLE				
MEASURED DISTANCE				
PIPE SIZE	8"	12"	16"	24"
ARC LENGTH	2"	3"	4"	6"



LEGEND

A. ROMAC SADDLE
STAINLESS STEEL (SINGLE STRAP) SERVICE SADDLE WITH TAPER (CC) TAP. DOUBLE STRAP FOR 12" AND LARGER PIPES.
- ROMAC 101NS FOR UP TO 12" DUCTILE & CAST IRON.
- ROMAC 202NS FOR 12" OR LARGER DUCTILE & CAST IRON.
- ROMAC SSI FOR AC.

B. CORPORATION STOP; TAPER (CC) INLET x COMPRESSION FOR COPPER OUTLET.
- FORD FB1000–3–Q FOR 3/4" SERVICE LINE
- FORD FB1000–4–Q FOR 1" SERVICE LINE
- MUELLER B–25008, SPECIFY SIZE

C. TYPE K SOFT COPPER WITH NO JOINTS

D. 5/8"x3/4" OR 1" METER SETTER
- 3/4" = FORD VBH92–15W–4M–33ZAQ
- 3/4"=MUELLER B–24104R2EFF1515
- 1" = MUELLER B–241042G1515
- 1" = FORD VBH94–15W–4M–44ZAQ

E. PLASTIC CAP

F. PVC JUMPER: DRILL – 1/4" HOLES
- 3/4" SETTER – 7 1/2" x 1" THRD PIPE.
- 1" SETTER – 10 3/4" X 1 1/4" THRD PIPE.

G. METER:
- SENSUS 3/4" i–PERL, 7.5" LL, CCF
- SENSUS 1" i–PERL, 10.5" LL, CCF

H. METER BOXES WITHIN 5' OF EACH OTHER MUST BE CONNECTED TOGETHER AND INDIVIDUALLY WITH 2" PVC CONDUIT SCHEDULE 40 WITH ENDS TAPED CLOSED BETWEEN BOXES.

I. 2"x4"x8" BRICKS PLACED UNDER EACH CORNER ON COMPACTED (FIRM) SUBGRADE.

J. METER BOX:
DFW1324CNP4–18 BODY
DFW1324SL–4MA2 LID

NOTES:

1. SERVICE LINE MUST BE INSTALLED PERPENDICULAR TO THE WATER MAIN. BACKFILL WITH ⅝" MINUS TO 1' OVER PIPE. COMPACT TO 95% MAX. DRY DENSITY PER ASTM D–1557.
2. SERVICE SADDLES ARE REQUIRED ON ALL PIPE EXCEPT CLASS 52 OR THICKER DUCTILE IRON. THE CORP. STOP MAY BE TAPPED DIRECTLY INTO CLASS 52 OR THICKER DUCTILE IRON PIPE FOR ¾" AND 1" TAPS. COMPACT TO 95% MAX DRY DENSITY PER ASTM D–1557.
3. SET BOX AT GRADE AND LEVEL WITH GRADE – PROVIDE POSITIVE DRAINAGE AWAY FROM BOX.
4. DOUBLE OR MULTIPLE SERVICES MUST BE NO MORE THAN 2 FEET APART – 6" IN SIDEWALKS (WHERE APPROVED). FOR ¾" DOUBLE METERS USE "Y" FITTING – MUELLER H–15343 ¾" x 1" OR FORD Y44–2430Q. FOR 1" DOUBLE METERS USE "Y" FITTING – MUELLER H–15343 1"x1–1/2" OR FORD Y44–264 PACK JOINT.
5. METER LOCATIONS SHALL BE APPROVED BY CITY. AVOID VEHICLE TRAVEL AREAS WHENEVER POSSIBLE.
6. SERVICES SHALL BE INSTALLED BY THE CITY ON CITY OWNED MAINS.
7. SERVICES SHALL NOT BE TAPPED OFF HYDRANT OR FIRE SPRINKLER SYSTEM BRANCHES.
8. FILL METER BOX TO TOP WITH UN–COMPACTED CEDAR SHAVINGS.
9. CITY SHALL INSTALL METER UNLESS OTHERWISE APPROVED.
10. CONTRACTOR SHALL CONNECT PIPING FROM HOUSE TO METER PRIOR TO RADIO READ METER INSTALLATION.
11. ALL MULTIPLE METER BOXES THREE OR MORE MUST BE INDIVIDUALLY TAGGED. SECURE WITH WIRE–TIE TO LOWER LOCKING EAR OF SETTER. TAG MUST BE STAMPED OR ENGRAVED WITH HOUSE NUMBER. FONT SIZE MINIMUM ½".

REVISION: FEBRUARY 2018

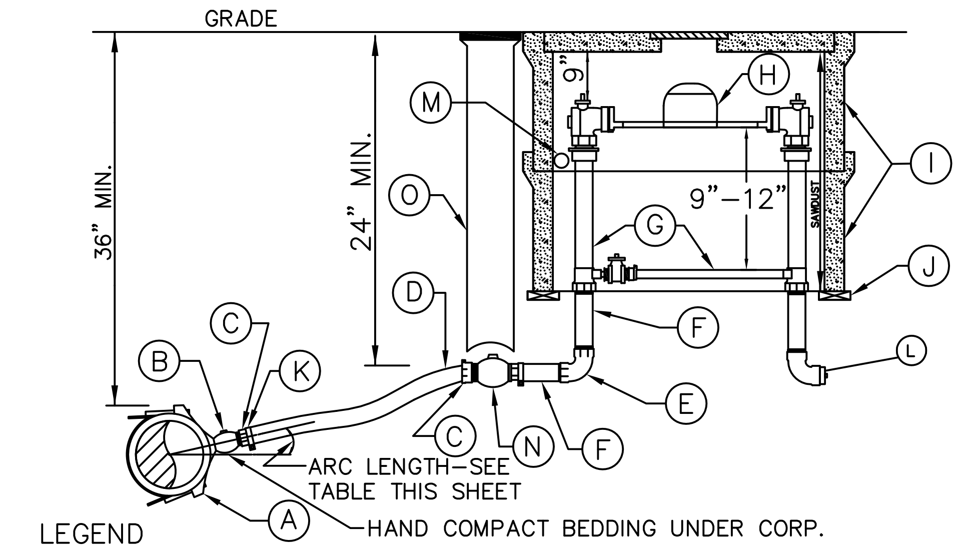
NO SCALE

CITY OF ISSAQUAH WASHINGTON
PUBLIC WORKS DEPARTMENT - WATER

SHELDON T. LYNNE
STATE OF WASHINGTON
26132
REGISTERED PROFESSIONAL ENGINEER
EXPIRES

3/4" AND 1" WATER METER SERVICE

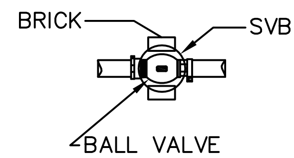
STANDARD DETAIL NO.
W-09



ARC LENGTH TABLE

MEASURED DISTANCE

PIPE SIZE	8"	12"	16"	24"
ARC LENGTH	2"	3"	4"	6"



LEGEND

A. ROMAC SADDLE
   STAINLESS STEEL (DOUBLE STRAP) SERVICE SADDLE WITH CC TAP. DOUBLE STRAP FOR 12" AND LARGER PIPES.
   * ROMAC 202–S FOR DUCTILE OR EQUAL

B. CORPORATION STOP: MALE IRON PIPE BY MALE IRON PIPE THREAD OUTLET
   * FORD FB500–6 FOR 1–1/2"
   * FORD FB500–7 FOR 2"
   * MUELLER B–2969, SPECIFY SIZE

C. COUPLING, FEMALE IRON PIPE THREAD BY COMPRESSION FITTING FOR COPPER TUBING.
   * FORD C84–66 FOR 1–1/2"
   * FORD C84–77–Q FOR 2"
   * MUELLER H–15451, SPECIFY SIZE

D. UNDER 40' USE TYPE K COPPER OR SCHEDULE 40 BRASS. OVER 40' USE POLYETHYLENE WITH TRACER WIRE. SEE STANDARD DETAIL G–02 FOR TRACER WIRE. SERVICE SHALL BE MADE WITH NO JOINTS.

E. 90° ELBOW, BRASS, FEMALE IRON PIPE BY FEMALE IRON PIPE.

F. NIPPLE, BRASS, MIP x MIP, 12" LONG OR AS REQUIRED

G. BRASS OR COPPER METER SETTER WITH BYPASS, CHECK VALVE, BALL VALVE WITH PADLOCK WINGS ON INLET, AND BYPASS.
   VERTICAL INLET AND OUTLET:
   * FORD VBH86–12B–11–66 FOR 1–1/2"
   * FORD VBH87–12B–11–77 FOR 2"
   * MUELLER B–2427–2, SPECIFY SIZE
   FACE TO FACE DIMENSION: 1½" SETTER = 13⅜"
   FACE TO FACE DIMENSION: 2" SETTER = 17⅜"

H. METER: SENSUS OMNI C2 WITH TOUCH READ
   * 1–1/2" SENSUS OMNI C2 WITH 13" LAY LENGTH CCF
   * 2" SENSUS OMNI C2 DRS WITH 17" LAY LENGTH CCF

I. METER BOX W/1–3/4" HOLE IN LID
   1–3/4" HOLE IN LID, 2 HOLES IN LID FOR SINGLE INSTALLATION.
   FOR LOCATIONS W/MORE THAN 1 METER, ONLY 1 LID NEEDS 2 HOLES.
   * TWO CONCRETE BOXES STACKED (FOGTITE # 2 OR EQUAL).
   * NONTRAVELED AREAS AND SIDEWALKS USE FOGTITE # 2 OR EQUAL WITH CONCRETE LID WITH ALUM. INSPECTION PLATE.
   * VEHICULAR TRAFFIC AREAS USE FOGTITE # 2 FOR THE BOTTOM AND A STEEL J–11 TYPE 2 FOR THE TOP BOX WITH STEEL LID # 105.

J. BRICKS – 2"x4"x8" PLACED ON COMPACTED (FIRM) SUBGRADE.

K. INSTALL SWING JOINT FOR BRASS PIPE CONNECTION (3 STREET 90°S) BRASS.

L. BRASS PLUG

M. METER BOXES WITHIN 5' OF EACH OTHER MUST BE CONNECTED TOGETHER AND INDIVIDUALLY WITH 2" PVC CONDUIT SCHEDULE 40 WITH ENDS TAPED CLOSED BETWEEN BOXES.

N. BALL VALVE
   * FORD BALL VALVE B11–666 FOR 1–1/2"
   * FORD BALL VALVE B11–777 FOR 2"

O. STANDARD VALVE BOX SEE STANDARD DETAIL G–18 (VALVE BOX INSTALLATION).

NOTES

1. SERVICE LINE MUST BE INSTALLED PERPENDICULAR TO THE WATER MAIN. BACKFILL WITH ⅝" MINUS TO 1' OVER PIPE COMPACT TO 95% MAX. DRY DENSITY PER ASTM–1557.
2. DOUBLE OR MULTIPLE SERVICES MUST BE NO MORE THAN 2' APART–6" IN SIDEWALKS (WHERE APPROVED).
3. SERVICES SHALL BE INSTALLED BY THE CITY ON CITY OWNED MAINS.
4. METER LOCATIONS SHALL BE APPROVED BY CITY. AVOID VEHICLE TRAVEL AREAS.
6. SERVICES SHALL NOT BE TAPPED OFF HYDRANT OR FIRE SPRINKLER SYSTEM BRANCHES.
7. CITY SHALL INSTALL METER UNLESS OTHERWISE APPROVED.
8. CONTRACTOR SHALL CONNECT SETTER TO METER PRIOR TO RADIO READ METER INSTALLATION.
9. SET BOX AT GRADE AND LEVEL WITH GRADE–PROVIDE POSITIVE DRAINAGE FROM BOX.
10. FILL METER BOX TO TOP WITH UNCOMPACTED CEDAR SHAVINGS.
11. COUPLINGS FOR POLYETHYLENE PIPE REQUIRE STIFFENERS INSIDE PIPE.

REVISION: MAY. 12, 2015

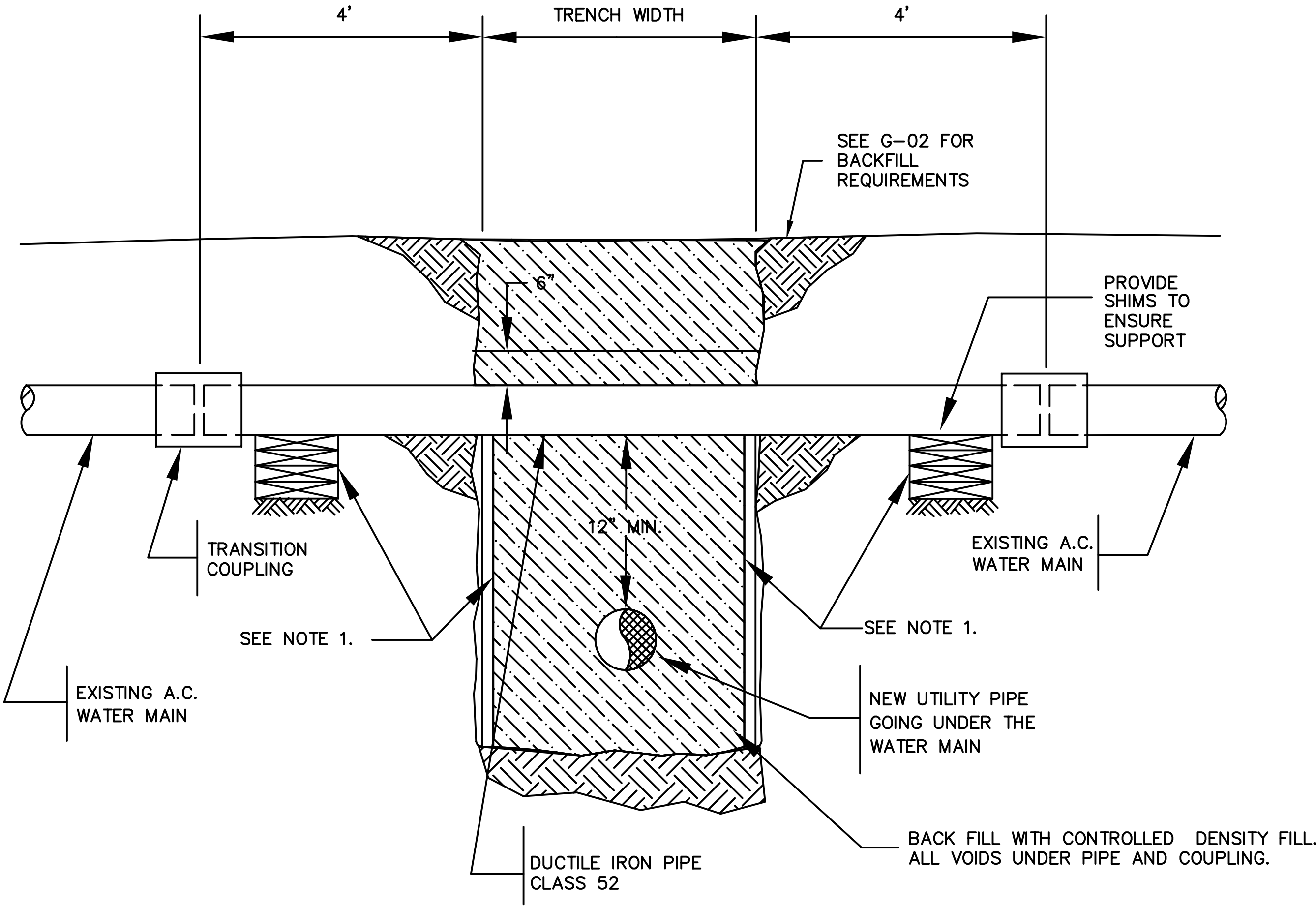
NO SCALE

CITY OF ISSAQUAH WASHINGTON
PUBLIC WORKS DEPARTMENT - WATER

SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER
EXPIRES

1-1/2" AND 2" WATER METER SERVICE

STANDARD DETAIL NO.
W-10



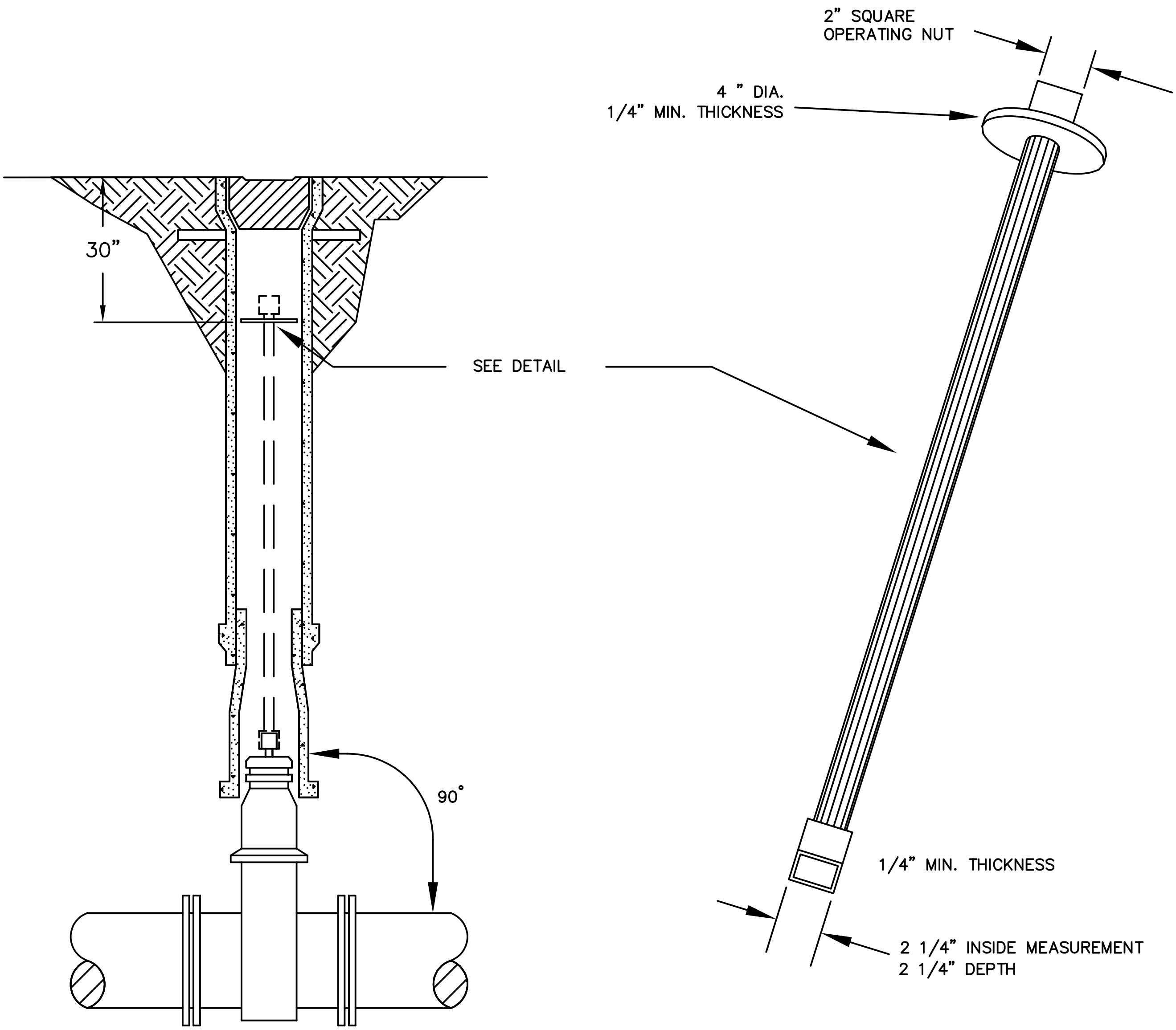
NOTES:

1. D.I. PIPE SHALL REST ON FIRM BEARING EARTH: SHORE TRENCH WALL UNDER WATER MAIN AS SHOWN. SUPPORT PIPE WITH PATIO BLOCKS (8"x16"X 2"). STACK BLOCKS AS REQUIRED TO REST ON FIRM BEARING SOIL.
2. WRAP DUCTILE IRON PIPE AND TRANSITION COUPLINGS WITH 8 MIL POLYETHYLENE CONFORMING TO AWWA C-105 AS REQUIRED BY PUBLIC WORKS.
3. THE CONTRACTOR IS REQUIRED TO FOLLOW ALL REQUIREMENTS FOR ASBESTOS WATER MAIN WORK PRESCRIBED IN WAC 296-62.
4. ALL A.C. PIPE AND CONTAMINATED MATERIALS AND CLOTHING SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN ACCORDANCE WITH STATE REGULATIONS.

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE, STATE OF WASHINGTON, 26132, REGISTERED PROFESSIONAL ENGINEER, EXPIRES	**TYPICAL A.C. WATER MAIN CROSSING REPLACEMENT DETAIL**	**STANDARD DETAIL NO. W-13**



VALVE OPERATING NUT EXTENSION

EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN FOUR (4) FEET BELOW FINISHED GRADE. EXTENSIONS ARE TO BE A MINIMUM OF TWO (2) FEET LONG. ONLY ONE EXTENSION TO BE USED PER VALVE.

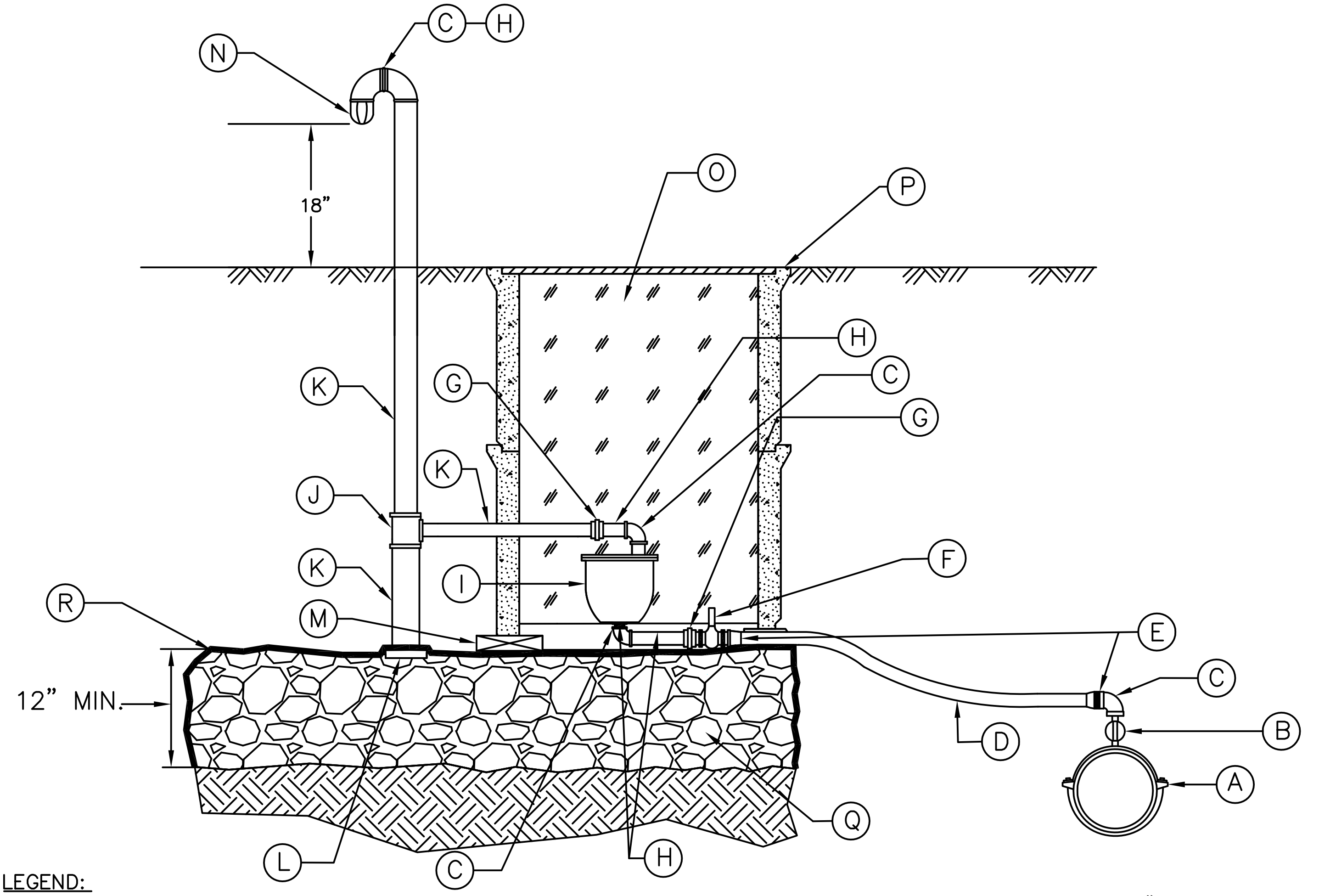
NOTES:

1. ALL EXTENSIONS ARE TO BE MADE OF STEEL, SIZED AS NOTED, AND HOT DIPPED GALVANIZED.
2. EXTENSION SHALL TURN FREELY WITHOUT BINDING.

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE, STATE OF WASHINGTON, 26132 REGISTERED PROFESSIONAL ENGINEER, EXPIRES	**VALVE OPERATING EXTENSION**	**STANDARD DETAIL NO. W-14**



LEGEND:

A. DOUBLE STRAP STAINLESS STEEL SERVICE SADDLE WITH CC TAP, ROMAC 101NS NYLON COATED FOR UP TO 12" DUCTILE & CAST OR ROMAC 202NS NYLON COATED FOR 12" AND LARGER DUCTILE & CAST.
B. CORPORATION STOP, MALE CC THREAD INLET BY MALE IRON PIPE OUTLET. FORD OR MUELLER.
C. 90° BRASS ELBOW FEMALE IRON PIPE BY FEMALE IRON PIPE THREADS.
D. TYPE K SOFT COPPER WITH NO JOINTS. MAINTAIN POSITIVE SLOPE TO AIR VACUUM ASSEMBLY.
E. COUPLING COPPER TO MALE IRON PIPE THREADS: FORD OR MUELLER COMPRESSION FITTINGS.
F. BALL VALVE: FORD OR MUELLER.
G. BRASS UNION, FEMALE IRON PIPE BY FEMALE IRON PIPE.
H. NIPPLES: BRASS, MALE IRON PIPE BY MALE IRON PIPE THREADS, LENGTHS VARY.
I. AIR & VACUUM VALVE ASSEMBLY. SEE APPROVED MATERIAL LIST.
J. BRASS TEE, IRON PIPE THREADS.
K. BRASS PIPE, MALE IRON PIPE THREADS.
L. BRASS CAP WITH ¼" DRILLED HOLE. PLACE BELOW PLASTIC SHEET.
M. BRICKS 4–2"x4"x8" PLACED ON A COMPACTED SUBGRADE UNDER EACH CORNER.
N. BRASS BEEHIVE STRAINER
O. CEDAR SHAVINGS
P. METER BOX (2 SECTIONS REQUIRED) FOGTITE NO. 2T FOR 1" AND SMALLER VALVES. VAULT REQUIRED FOR 1–1/2" AND LARGER VALVES. SEE STANDARD DETAIL G–05 (VAULTS–GENERAL FEATURES).
Q. ⅞" WASHED ROCK
R. GEO FABRIC– ENCLOSE WASHED ROCK ON TOP AND ALL SIDES.

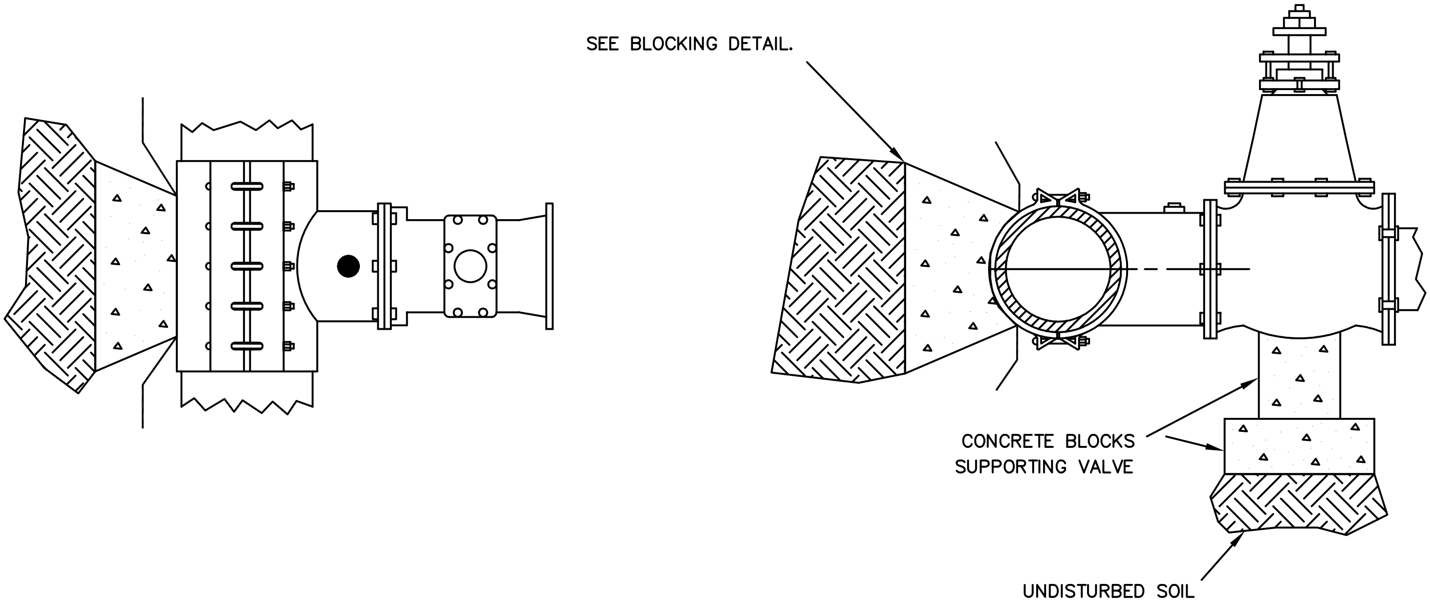
NOTES:

1. ALL PIPE AND FITTINGS TO BE BRASS, DUCTILE IRON OR COPPER.
2. PIPE ABOVE GRADE TO BE PAINTED AIR VACUUM ASSEMBLY MUST BE CLEANED, SCUFFED SANDED AND PREPARED PER PAINT MANUFACTURE SPECIFICATION. PRIME WITH 1 COAT (6 MILLS) OF SHERWIN WILLIAMS PRO–CRYL ACRYLIC PRIMER (B66 W 310 643–22681) AND THEN TOP COAT WITH 1 COAT (6 MILLS) SHERWIN WILLIAMS CRYL–HPA HIGH PERFORMANCE ACRYLIC GLOSS (B66 W 377 6405–18908) HIGH GLOSS BRIGHT WHITE.
3. AIR & VACUUM RELEASE VALVE ASSEMBLY TAP MUST BE INSTALLED AT HIGHEST POINT OF WATER MAIN.
4. LOCATE AIR & VACUUM METER BOX OUTSIDE OF TRAFFIC AREAS, BEHIND CURB OR SIDEWALK.
5. REQUIRED SIZE SHALL BE DESIGNED BY THE ENGINEER.
6. GUARD POST(S) MAY BE REQUIRED PER CITY'S DIRECTION. SEE STANDARD DETAIL G–04 (TYPICAL BOLLARD PLACEMENT – SEE FIXED BOLLARDS).

REVISION: MARCH 1, 2018

NO SCALE

CITY OF ISSAQUAH WASHINGTON PUBLIC WORKS DEPARTMENT - WATER	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**AIR VACUUM RELEASE VALVE ASSEMBLY**	STANDARD DETAIL NO. **W-07**



STAINLESS STEEL OR STEEL
TAPPING TEE

STAINLESS STEEL TAPPING TEE

INSTALLED ON ASBESTOS CEMENT PIPE, CAST IRON PIPE AND DUCTILE IRON PIPE.

STEEL TAPPING TEE

INSTALLED ON DUCTILE IRON PIPE ONLY.

NOTES:

1. STAINLESS STEEL TAPPING TEES SHALL HAVE FULL CIRCLE SEAL. BOLTS AND NUTS SHALL BE STAINLESS STEEL.
2. STEEL TAPPING TEES SHALL BE EPOXY COATED, SEE APPROVED MATERIAL LIST. BOLTS AND NUTS SHALL BE COR–TEN, OR STAINLESS STEEL – SEE APPROVED MATERIAL LIST.
3. ALL TEES AND VALVES TO BE AIR TESTED BEFORE TAP AT 120 PSI FOR 5 MINUTES.
4. NO SIZE ON SIZE TAPS ON ASBESTOS OR CAST IRON. FULL SIZE TAPS ALLOWED ON DI ONLY.
5. VALVES SHALL BE FULL OPENING RESILIENT SEAT O–RING SEALED C 509, SEE APPROVED MATERIAL LIST.

REVISION:

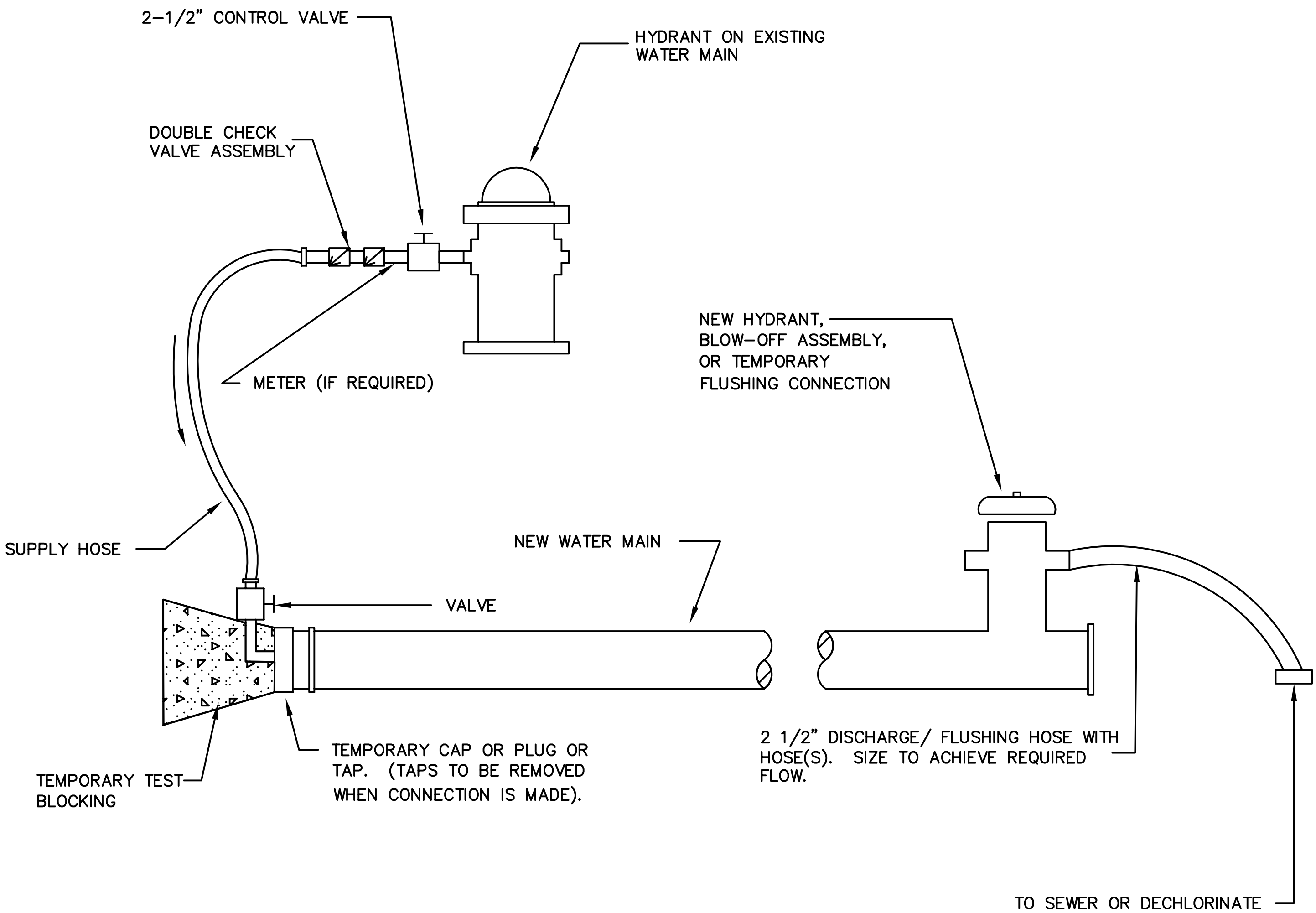
NO SCALE

CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT

SHELDON T. LYNNE
STATE OF WASHINGTON
26132
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES

TAPPING TEES

STANDARD DETAIL NO.
W-16



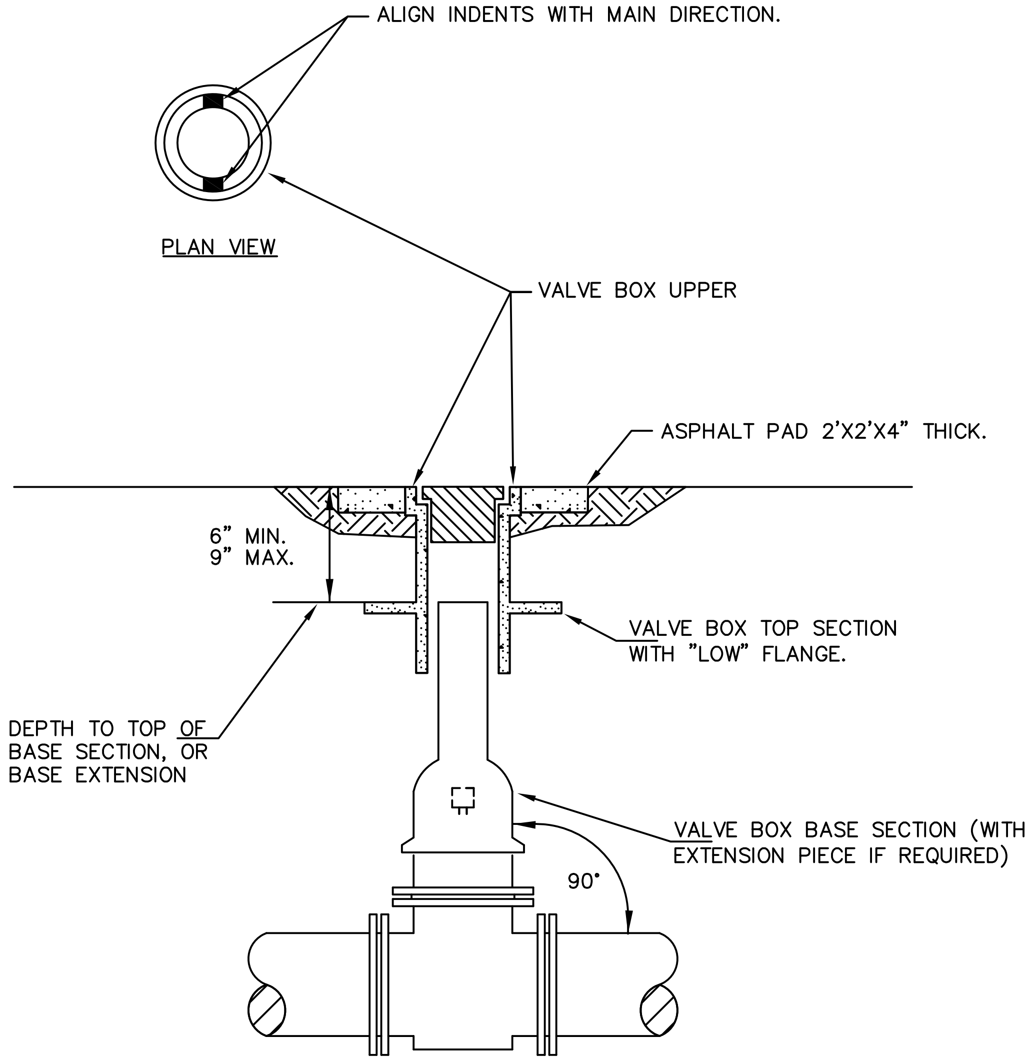
NOTES:

1. AN APPROVED BACK FLOW PREVENTION ASSEMBLY SHALL BE INSTALLED BETWEEN THE EXISTING AND NEW WATER LINES DURING DISINFECTION AND FLUSHING OF NEW WATERMAIN. (OBTAINED FROM ISSAQUAH PUBLIC WORKS).
2. THE BACK FLOW PREVENTION ASSEMBLY AND SUPPLY HOSE MUST BE DISCONNECTED DURING HYDROSTATIC PRESSURE TESTING OF THE NEW MAIN.
3. THE NEW WATER MAIN SHALL BE CONNECTED TO THE EXISTING SYSTEM ONLY AFTER NEW MAIN IS FLUSHED, DISINFECTED AND SATISFACTORY BACTERIOLOGICAL SAMPLE RESULTS ARE OBTAINED.
4. THE INTERIORS OF ALL PIPES AND FITTINGS TO BE USED IN FINAL CONNECTION MUST BE CLEANED AND SWABBED OR SPRAYED WITH A 1% AVAILABLE CHLORINE SOLUTION.
5. AFTER CHLORINE IS FLUSHED AND MAIN CONNECTION IS MADE, THE NEW LINE SHALL BE FLUSHED AT A VELOCITY OF 5 FPS. DISCHARGE SHALL BE SCREENED TO COLLECT ROCKS. FLUSHING DURATION SHALL ENSURE AT LEAST 5 CHANGES OF WATER IN THE PIPE.
6. IF FLOW OR DISCHARGE LIMITATIONS PREVENT ACHIEVING 5 FPS THEN THE PIPE SHALL BE PIGGED.
7. PROVIDE DECHLORINATION DURING FLUSHING WHERE NECESSARY.

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**FILLING AND FLUSHING NEW WATER MAINS**	**STANDARD DETAIL NO. W-17**



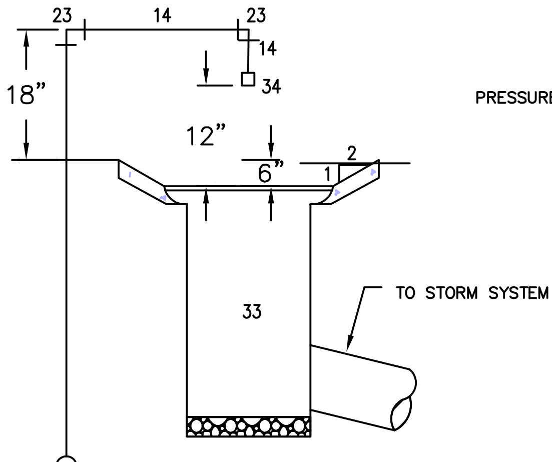
NOTES:

1. BOX SHALL BE PERPENDICULAR TO THE VALVE AND MAIN.
2. BOX SHALL BE CENTERED OVER VALVE NUT.
3. NO DEBRIS WILL BE ALLOWED AROUND THE VALVE NUT.
4. ALL PARTS SHALL BE CAST OR DUCTILE IRON AND COATED WITH ASPHALT VARNISH.
5. VALVE BOX AND LID SHALL BE EAST JORDAN 68/8555.
6. EXTENSIONS FOR DEEP VALVES MAY BE ACCOMPLISHED WITH CAST IRON DRAIN PIPE. BELL END OVER LOWER SECTION.

REVISION: MARCH 1, 2018

NO SCALE

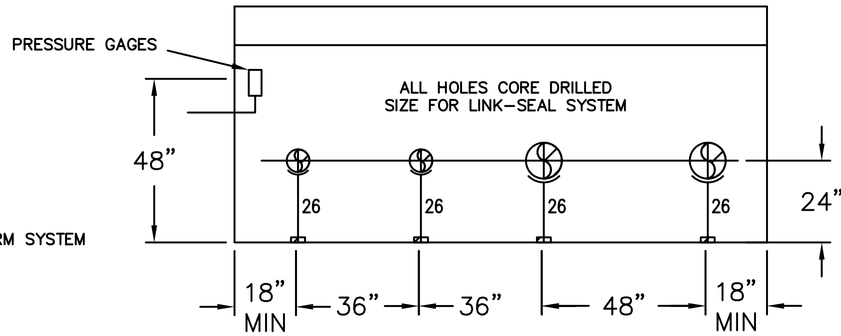
CITY OF ISSAQUAH WASHINGTON PUBLIC WORKS DEPARTMENT - WATER	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**VALVE BOX INSTALLATION**	STANDARD DETAIL NO. **W-18**



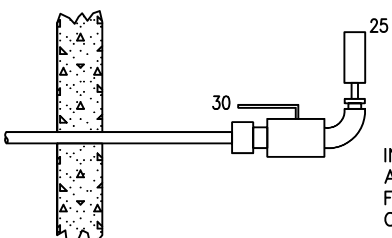
DETAIL A

23

PRESSURE RELIEF AND BLOW-OFF DETAIL

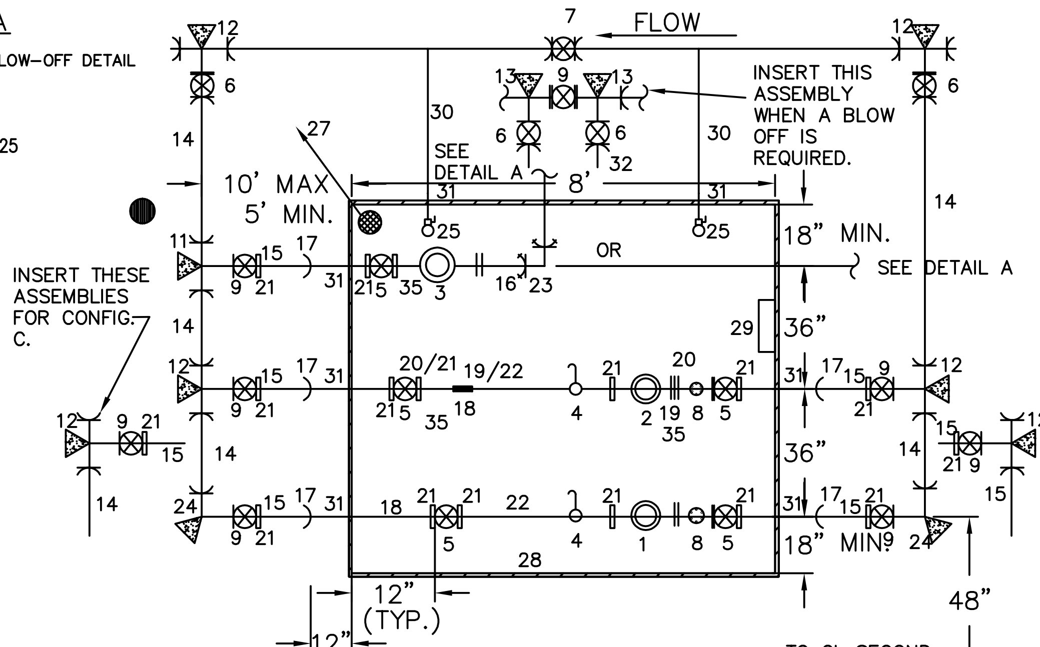


PROFILE DIMENSION DETAIL
CONFIGURATION ’C’



DETAIL B

PRESSURE GAGE DETAIL



TYP.

TYPICAL INSTALLATION WHEN
MAIN IS LOCATED IN STREET
CONFIGURATION ’B’

CONFIGURATION	DESCRIPTION	USE	VAULT SIZING FOR LARGE VALVES UP TO 8”
A	ONE LARGE VALVE AND ONE SMALL VALVE. INCLUDES TWO BLOW-OFF ASSEMBLIES.	1.) NORMALLY CLOSED CONNECTION BETWEEN A RESV OR PRV ZONE AND A RESV ZONE. 2.) SECONDARY PRV STATION.	8” X 6’
B	ONE LARGE VALVE, ONE SMALL VALVE AND ONE PRESSURE RELIEF VALVE.	1.) STANDARD CONFIGURATION OF A PRIMARY STATION.	8’ X 10’
C	TWO LARGE VALVES, ONE SMALL VALVE AND ONE PRESSURE RELIEF VALVE.	1.) PARALLEL STATION. REQUIRED WHEN PRV STATION IS SOLE SUPPLY FOR ZONE.	8’ X 14’
D	ONE LARGE VALVE, ONE SMALL VALVE, ONE PRESSURE RELIEF VALVE AND TWO BLOW-OFF ASSEMBLIES	1.) NORMALLY CLOSED CONNECTION BETWEEN A RESV OR PRV ZONE AND A PRV ZONE W/O A PRESSURE RELIEF ON THE PRIMARY STATION.	8’ X 10’

REVISION:

NO SCALE

CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT

SHELDON T. LYNNE
STATE OF WASHINGTON
26132
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES

STANDARD PRESSURE REDUCING STATION

STANDARD DETAIL NO.
W-19A

ITEM#	DESCRIPTION	QUANTITIES			
		STANDARD		PARALLEL	
		≤ 2"	≥3"	≤ 2"	≥3"
1	LARGE PRESSURE REDUCING VALVE; CLA-VAL MODEL 92G-01 BCSKC W/BRONZE TRIM, X101 AND PRESSURE SUSTAINING CONTROLS.	1	1	2	2
2	SMALL PRESSURE REDUCING VALVE; CLA-VAL MODEL 90G-01 ABSKC W/SS TRIM, X101. THREADED ON 2" AND SMALLER. FLANGED ON 3" AND LARGER.	1	1	1	1
3	PRESSURE RELIEF VALVE; CLA-VAL MODEL 50A-01 BKC W/BRONZE TRIM. SIZE FOR 30% PRESSURE GAIN.	1	1	1	1
4	AIR RELEASE VALVE – APCO MODEL 50-28 – 3/32 – 175 PSI.	2	2	3	3
5	VALVE – FLANGE X FLANGE; C509 W/HAND WHEEL OPERATORS, 4" MINIMUM	5	5	7	7
6	VALVE – FLANGE X MJ; C509 W/2" OPERATING NUT. 4 REQUIRED W/ BLOW OFF.	2 (4)	2 (4)	2 (4)	2(4)
7	VALVE – MJ X MJ ; C509 W/2" OPERATING NUT. NONE REQUIRED W/ BLOW OFF.	1 (0)	1 (0)	1 (0)	1 (0)
8	STRAINER-BASKET OR Y STRAINER W/BALL VALVE	2	2	3	3
9	VALVE – FLANGE X FLANGE; C509 W/2" OPERATING NUT	5 (6)	5 (6)	7 (8)	7 (8)
10	LEFT BLANK.				
11	TEE MJ X FLANGE, SIZE X 4" MIN.	1	1	1	1
12	TEE MJ X FLANGE.	4	4	6	6
13	TEE MJ X FLANGE X FLANGE, SIZE X 4" – ONLY REQUIRED WITH BLOW OFF.	0 (2)	0 (2)	0 (2)	0 (2)
14	SPOOL PE X PE	5 (7)	5 (7)	7 (9)	7 (9)
15	SPOOL – VICTAULIC GROOVE X TR FLEX BEAD, CUT TO FIT.	3	3	5	5
16	SPOOL – FLANGE X PE.	1	1	1	1
17	TR FLEX JOINT – RESTRAINED	3	3	5	5
18	BRASS UNION – 2" AND SMALLER ONLY	1	0	1	0
19	BRASS PIPE – THREADED 2" AND SMALLER, CUT TO FIT.	3	0	3	0
20	BLIND FLANGE X SIZE TAP.	2	0	2	0
21	COUPLING – VICTAULIC #341, 4" AND LARGER.	0	12	0	18
22	DUCTILE IRON PIPE CL 53, GROOVED FOR VICTAULIC #341 BOTH ENDS.	0	2	0	3
23	90 MJ X MJ WITH APPROVED JOINT RESTRAINT SYSTEM.	4	4	4	4
24	90 FLANGE X MJ WITH APPROVED JOINT RESTRAINT SYSTEM.	2	2	2	2
25	GAGES – LIQUID FILLED 4 1/2" SPAN INSTRUMENTS, MODEL #LFS-410 0-200PSI – MOUNT VERTICALLY AT 48".	2	2	2	2
26	PIPE STANCHION – BOLTED TO FLOOR – GRINNEL #264, NUMBER AND PLACEMENT MAY VARY. PLACE AS DIRECTED.	1	1	2	2
27	4" DUCTILE IRON DRAIN. TO DAYLIGHT OR STORM DRAIN.	1	1	1	1
28	VAULT – SIZED TO MAINTAIN SPECIFIED CLEARANCES – SEE SIZING MATRIX. SEE STANDARD DETAIL G-08.	1	1	1	1
29	LADDER – PLACE AS DIRECTED. SEE STANDARD DETAIL G-08.	1	1	1	1
30	3/4" TYPE K COPPER LINE WITH 3/4" COMPRESSION BY MIP FITTING, 3/4" BRASS BALL VALVE, 3/4" BRASS STREET ELL, 3/4" X 1/4" BUSHING, SEE DETAIL B. SEE STANDARD DETAIL W-25A FOR CONNECTION TO MAIN.	2	2	2	2
31	SEAL PENETRATION SEALING SYSTEM – SEE APPROVED MATERIAL LIST.	8	8	10	10
32	BLOW OFF ASSEMBLY – STD DETAIL W-07.	0 (2)	0 (2)	0 (2)	0 (2)
33	18" CONCRETE PIPE CATCH BASIN W/BELL UP AND BOTTOM POURED WITH CONCRETE. OLYMPIC FOUNDRY GRATE #G20. DISCHARGE PIPE SHALL BE 12".	1	1	1	1
34	DIFFUSER.	1	1	1	1
35	3" X 4" REDUCER AS REQUIRED.				
NOTE:	1. ALL JOINTS SHALL BE RESTRAINED WITH APPROVED JOINT RESTRAINT SYSTEM. SEE APPROVED MATERIAL LIST. 2. VAULT SHALL ALWAYS BE LOCATED OUT OF TRAFFIC. IN SHOULDER, TYPICALLY BEHIND SIDEWALK. 3. QUANTITIES IN () INDICATE FOR BLOW OFF ASSEMBLY ONLY. 4. ALL PIPING AND FITTINGS SHALL BE COATED WITH 2 COATS OF TNEMEC MEDIUM BLUE EPOXY. 5. CONTRACTOR TO VERIFY ALL QUANTITIES. QUANTITIES PROVIDED AS A GUIDELINE ONLY.				

REVISION:

NO SCALE

CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT

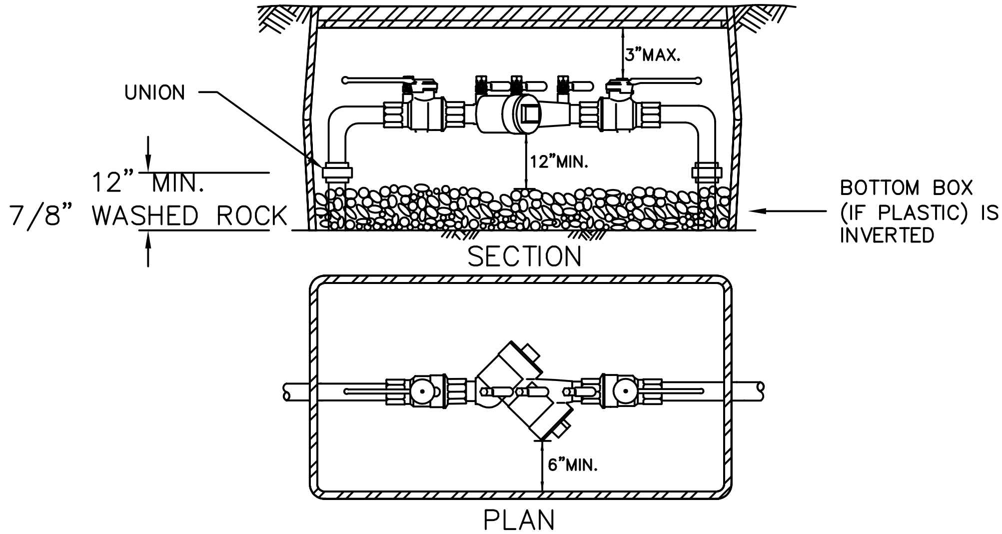
SHELDON T. LYNNE
STATE OF WASHINGTON
26132
REGISTERED PROFESSIONAL ENGINEER
EXPIRES

STANDARD PRESSURE REDUCING STATION NOTES

STANDARD DETAIL NO.

W-19B

DRAWING APPLIES TO OUTSIDE UNDERGROUND ONLY



INSTALLATION PROCEDURES AND SPECIFICATIONS FOR DOUBLE CHECK VALVE ASSEMBLIES 2" AND SMALLER

THE DOUBLE CHECK VALVE ASSEMBLY (DCVA) CONSISTS OF TWO INTERNALLY LOADED CHECK VALVES, EITHER SPRING LOADED OR INTERNALLY WEIGHTED, TWO RESILIENT SEATED SHUTOFF VALVES, AND FOUR PROPERLY LOCATED RESILIENT SEATED TEST COCKS. THIS ASSEMBLY IS EFFECTIVE AGAINST BACKFLOW CAUSED BY BACKPRESSURE AND BACKSIPHONAGE, AND IS USED TO PROTECT THE WATER SYSTEM FROM OBJECTIONABLE SUBSTANCES, WHICH MAY CONSTITUTE A LOW HAZARD. THIS ASSEMBLY SHALL BE IN INSTALLED AS A UNIT AS FURNISHED BY THE MANUFACTURER IN ACCORDANCE WITH THE UNIFORM PLUMBING CODE, MANUFACTURER'S SPECIFICATIONS, AND THE GUIDELINES LISTED BELOW.

1. OBTAIN PLUMBING PERMIT FROM THE PERMIT CENTER.
2. THE DCVA MUST BE A WASHINGTON STATE APPROVED DEVICE.*
3. PROVIDE ADEQUATE CLEARANCE FOR TESTING AND REPAIRS:
   A. THERE MUST BE AT LEAST 12" CLEARANCE FROM BOTTOM OF DEVICE TO GROUND, BUT NOT MORE THAN 60" IN HEIGHT.
   B. THERE MUST BE AT LEAST 6" CLEARANCE ON EITHER SIDE OF DEVICE.
   C. THERE MUST BE AT LEAST 12" CLEARANCE FROM END OF TEST COCKS TO WALL/STRUCTURE.
4. SIZE DCVA HYDRAULICALLY TO AVOID EXCESSIVE PRESSURE LOSS. (SEE MANUFACTURER'S SPECIFICATIONS).
5. INSTALL TWO UNIONS, ONE ON EITHER SIDE OF RESILIENT SEATED SHUTOFF VALVES.
6. INSTALL DCVA IN THE HORIZONTAL POSITION UNLESS PRIOR APPROVAL IS GAINED FROM ISSAQUAH PUBLIC WORKS OPERATIONS DEPARTMENT.
7. INSTALL PLUGS IN TEST COCKS.
8. THERE WILL BE NO DCVA INSTALLATIONS IN AREAS ACCESSIBLE TO VEHICLE TRAFFIC UNLESS PRIOR APPROVAL IS GAINED FROM ISSAQUAH PUBLIC WORKS OPERATIONS DEPARTMENT.
9. PROVED ADEQUATE FREEZE PROTECTION.
10. THE USE OF GALVANIZED WATER FITTINGS AND PIPING IS PROHIBITED. USE COPPER, BRASS OR PLASTIC FITTINGS AND/OR PIPING.
11. ONCE DEVICE IS INSTALLED:
    A. HAVE THE DEVICE TESTED BY A STATE CERTIFIED BACKFLOW ASSEMBLY TESTER OF YOUR CHOOSING.*
    B. HAVE THE DEVICE INSPECTED BY ISSAQUAH PUBLIC WORKS OPERATIONS DEPARTMENT.
12. THIS DEVICE WILL REQUIRE AN ANNUAL TEST TO ASSURE ITS PROPER FUNCTION IN PREVENTING WATER BACKFLOW. THE ANNUAL TEST IS TO BE PERFORMED BY A WASHINGTON STATE CERTIFIED BACKFLOW ASSEMBLY TESTER. THE CITY OF ISSAQUAH OPERATIONS DEPARTMENT, WATER QUALITY SECTION WILL SEND THE NECESSARY FORM(S) AS THE DEVICE COMES DUE.

DCVA'S INSTALLED BELOW GROUND LEVEL MUST ALSO COMPLY WITH THE FOLLOWING

13. PROVIDE ADEQUATE SIZED BOXES FOR TESTING AND REPAIRS:
    A. FOR 3/4" & 1" DEVICES, INSTALL TWO "JUMBO" SIZED IRRIGATION BOXES: (TOP = 12 3/4"X18 3/4"; BOTTOM = 24"X 18"X12" HIGH). LARGER BOXES MAY BE USED. INSTALL BOXES SUCH THAT THE BOTTOM BOX IS INVERTED (UPSIDE DOWN). IF DEVICE IS INSTALLED IN A CONCRETE OR PAVED AREA, THEY MUST BE REINFORCED CONCRETE BOXES OF SAME SIZE OR LARGER WITH INSPECTION LID.
    B. FOR 1 1/2" & 2" DEVICES, INSTALL TWO "FOG-TITE #2" REINFORCED CONCRETE BOXES WITH INSPECTION LID OR OTHER COMPARABLE CONCRETE BOX OF EQUAL OR GREATER SIZE.
14. INSTALL A MINIMUM OF 12" OF DRAIN ROCK (WASHED ROCK), 7/8" SIZE, BELOW DEVICE, STILL ALLOWING 12" CLEARANCE FROM DEVICE BOTTOM TO ROCK.
15. DRAIN TO DAYLIGHT ALSO IF STANDING WATER INSIDE BOXES IS EVIDENT.
16. TEST COCKS MUST FACE UPWARD AND WITHIN 6" FROM END OF TEST COCKS TO BOTTOM OF LID.
17. MAINTAIN ALL OTHER CLEARANCES AS STATED ABOVE.

* THIS ITEM/INFORMATION MAY BE OBTAINED FROM THE CITY OF ISSAQUAH PERMIT CENTER OR PUBLIC WORKS OPERATIONS DEPARTMENT, WATER QUALITY SECTION.

NOTES:

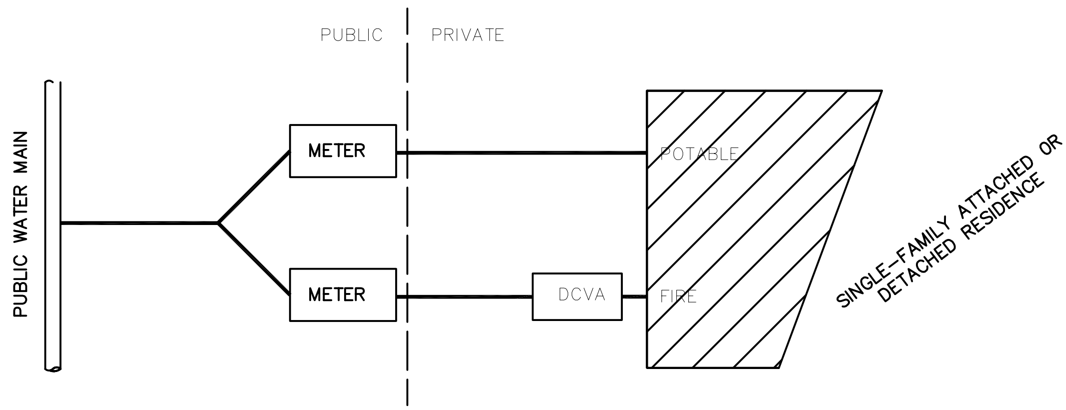
1. INSTALL ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
2. ALL INSTALLATIONS MUST MEET MINIMUM STANDARDS OF THE UNIFORM PLUMBING CODE.
3. ASSEMBLY REQUIRES TESTING AND CERTIFICATION PRIOR TO USE, AND ANNUALLY THEREAFTER. FOR INFORMATION CONTACT WATER QUALITY SECTION.

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**1/2" TO 2" DOUBLE CHECK VALVE ASSEMBLY(OUTSIDE INSTALLATION)**	**STANDARD DETAIL NO. W-20**

A



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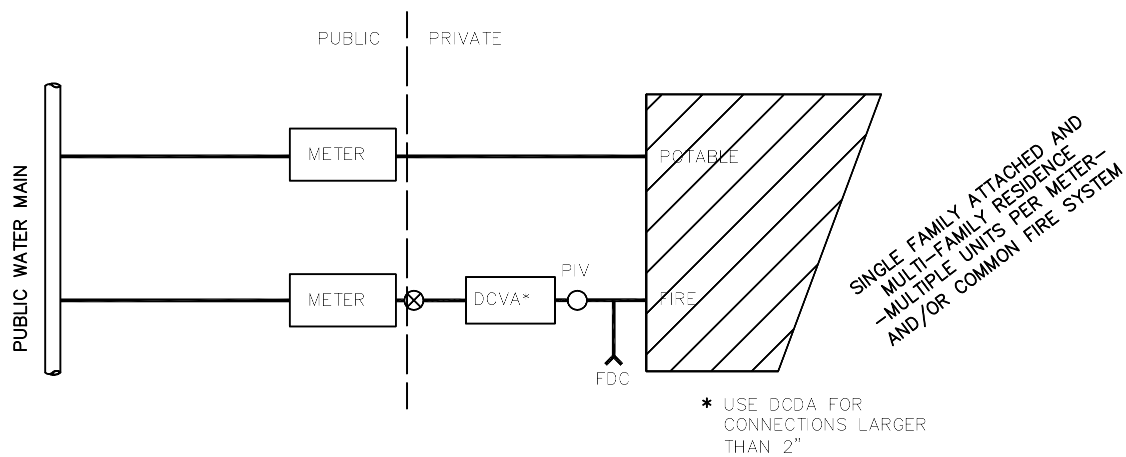

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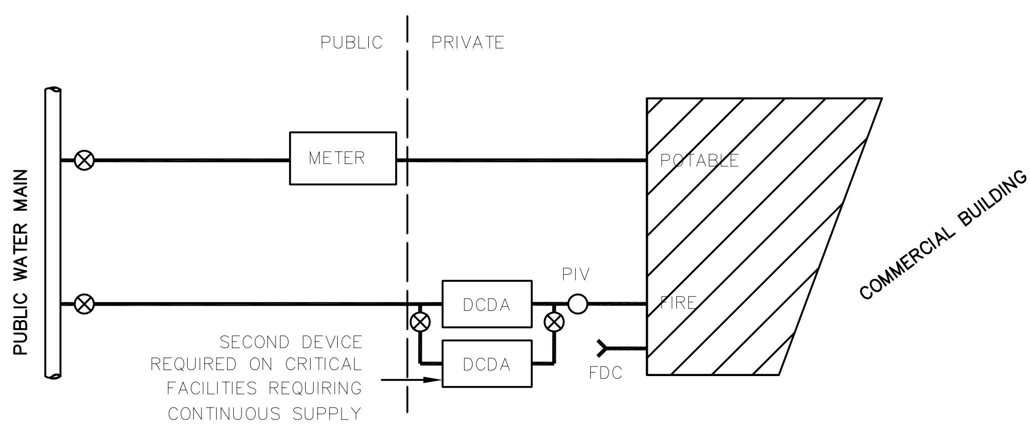


REVISION:

ALLOWABLE CONNECTION OPTIONS

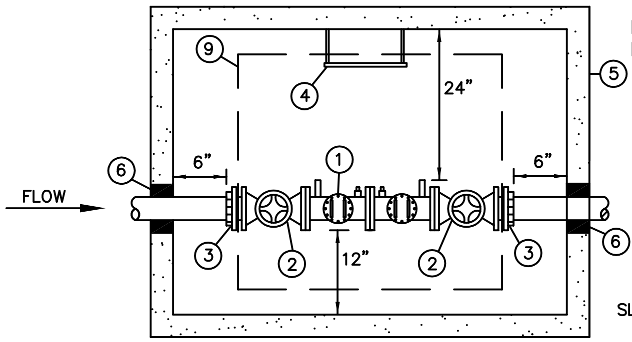
NO SCALE

CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT

SHELDON T. LYNNE
STATE OF WASHINGTON
26132
REGISTERED PROFESSIONAL ENGINEER
EXPIRES

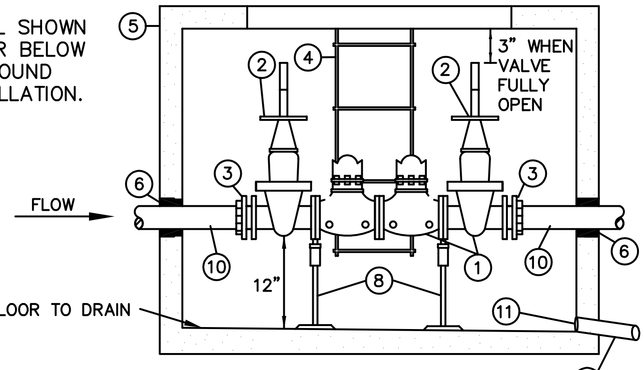
WATER SERVICE SCHEMATIC FOR DOMESTIC SERVICE AND FIRE PROTECTION SYSTEM

STANDARD DETAIL NO.
W-21



PLAN

DETAIL SHOWN IS FOR BELOW GROUND INSTALLATION.



ELEVATION

1. STATE APPROVED DOUBLE CHECK VALVE ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y. VALVES AND (4) RESILIENT SEATED TEST COCKS.*
2. EACH VALVE SHALL BE MARKED WITH MODEL NUMBER WITH DESIGNATION OF RESILIENT SEAT: SUCH AS "RS" OR "R", WHICH MUST BE CAST, MOLDED, OR AFFIXED ONTO THE BODY OR BONNET OF THE VALVE. ALL FERROUS BODIED VALVES SHALL BE COATED WITH A MINIMUM OF 4MLS. OF EPOXY OR EQUIVALENT POLYMERIZED COATING.
3. UNI-FLANGED WITH SETSCREWS.
4. ONE GALVANIZED STEEL LADDER TO BE SECURED TO VAULT.
5. CONCRETE VAULT WITH A MINIMUM OF 2. 3'X3' DIAMOND PLATE DOORS RATED FOR H20 LOADING, MARKED "WATER". VAULT SHALL BE EQUAL TO UTILITY VAULT CO. MODELS.
6. WATER TIGHT GROUT. RESTRAIN INLET/OUTLET PIPE WITH WELDED FLANGE OR ANCHOR BLOCKS.
7. DRAIN, SLOPE TO DAYLIGHT, 4" MINIMUM DIAMETER.
8. TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR.
9. ACCESS TO BE CENTERED OVER ASSEMBLY.
10. CL 52. D.I.
11. INSTALL WIRE MESH RODENT SCREEN OVER DRAIN OUTLET.

NOTES:

1. ASSEMBLY TO BE MAINTAINED BY OWNER AND ANNUAL CERTIFICATION REQUIRED.
2. WATERLINE SHALL NOT BE PUT INTO SERVICE UNTIL THE BACKFLOW PREVENTION ASSEMBLY IS APPROVED BY THE CITY OF ISSAQUAH WATER QUALITY INSPECTOR
3. VALVE ASSEMBLY TO BE CENTERED IN VALUT.
4. TEE AND GATE VALVE REQUIRED ON MAIN.
5. ALL CLEARANCES SHOWN ARE MINIMUM.
6. VAULTS SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
7. THIS DEVICE/SPECIFICATION IS NOT INTENDED TO BE USED FOR A FIRE SUPPRESSION SYSTEM.

INSTALLATION PROCEDURES AND SPECIFICATIONS FOR DOUBLE CHECK VALVE ASSEMBLIES 2 1/2" AND LARGER

THE DOUBLE CHECK VALVE ASSEMBLY (DCVA) CONSISTS OF TWO INTERNALLY LOADED CHECK VALVES, EITHER SPRING LOADED OR INTERNALLY WEIGHTED, TWO RESILIENT SEATED GATE VALVES, AND FOUR PROPERLY LOCATED RESILIENT SEATED TEST COCKS. THIS ASSEMBLY IS EFFECTIVE AGAINST BACKFLOW CAUSED BY BACKPRESSURE AND BACKSIPHONAGE, AND IS USED TO PROTECT THE WATER SYSTEM FROM OBJECTIONABLE SUBSTANCES WHICH MAY CONSTITUTE A LOW HAZARD. THIS ASSEMBLY SHALL BE INSTALLED AS A UNIT AS FURNISHED BY THE MANUFACTURER IN ACCORDANCE WITH THE UNIFORM PLUMBING CODE, MANUFACTURER'S SPECIFICATIONS, AND THE GUIDELINES LISTED BELOW.

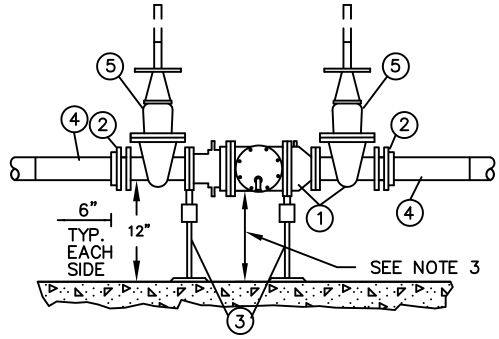
1. OBTAIN PLUMBING PERMIT FROM PERMIT CENTER.
2. THE DCVA SHALL BE NO HIGHER THAN 60" FROM FLOOR OR GROUND TO HIGHEST POINT OF DEVICE.
3. SIZE DCVA HYDRAULICALLY TO AVOID EXCESSIVE PRESSURE LOSS. (SEE MANUFACTURER'S SPECIFICATION).
4. INSTALL DCVA IN THE HORIZONTAL POSITION.
5. INSTALL PLUGS IN TEST COCKS.
6. IF INSTALLED OUTDOORS AND ABOVE GROUND, ADEQUATE FREEZE PROTECTION MUST BE PROVIDED.
7. STANCHIONS SHALL BE INSTALLED TO PREVENT FLANGE DAMAGE.
8. THERE WILL BE NO DCVA INSTALLATIONS IN AREAS ACCESSIBLE TO VEHICLE TRAFFIC UNLESS PRIOR APPROVAL IS GAINED FROM ISSAQUAH PUBLIC WORKS OPERATIONS DEPARTMENT.
9. THE USE OF GALVANIZED WATER FITTINGS AND PIPING IS PROHIBITED.
10. ONCE DEVICE IS INSTALLED:
    A. HAVE THE DEVICE TESTED BY A STATE CERTIFIED BACKFLOW ASSEMBLY TESTER.*
    B. HAVE THE DEVICE INSPECTED BY ISSAQUAH PUBLIC WORKS O&M DEPARTMENT.
11. ALL OUTSIDE, UNDERGROUND DCVA INSTALLATIONS MUST ALSO COMPLY WITH VAULT SPECIFICATIONS.
12. ALL DCVA'S INSTALLED FOR FIRE PROTECTION MUST HAVE FACTORY INSTALLED BYPASS FEATURE (TYPICALLY 3/4") TO INCLUDE AN APPROVED DCVA AND METER. SEE W-09
13. THIS DEVICE WILL REQUIRE AN ANNUAL TEST TO ASSURE IT'S PROPER FUNCTION IN PREVENTING WATER BACKFLOW. THE ANNUAL TEST IS TO BE PERFORMED BY A WASHINGTON STATE CERTIFIED BACKFLOW ASSEMBLY TESTER. THE CITY OF ISSAQUAH OPERATIONS DEPARTMENT, WATER QUALITY SECTION WILL SEND THE NECESSARY FORMS) AS THE DEVICE COMES DUE.

* THIS ITEM/INFORMATION MAY BE OBTAINED FROM THE CITY OF ISSAQUAH PERMIT CENTER OR PUBLIC WORKS OPERATIONS DEPARTMENT, WATER QUALITY SECTION.

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE, STATE OF WASHINGTON, 26132 REGISTERED PROFESSIONAL ENGINEER, EXPIRES	**2 1/2" TO 10" DOUBLE CHECK VALVE ASSEMBLY**	**STANDARD DETAIL NO. W-22**



PROFILE

① STATE APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y. GATE VALVES AND (4) RESILIENT SEATED TEST COCKS. *SEE NOTES.
② RESTRAINED FITTINGS
③ TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR.
④ CL. 52 D.I.
⑤ EACH VALVE SHALL BE MARKED WITH MODEL NUMBER WITH DESIGNATION OF RESILIENT SEAT: SUCH AS "RS" OR "R", WHICH MUST BE CAST, MOLDED, OR AFFIXED ONTO THE BODY OR BONNET OF THE VALVE. ALL FERROUS BODIED VALVES SHALL BE COATED WITH A MINIMUM OF 4MLS. OF EPOXY OR EQUIVALENT POLYMERIZED COATING.

NOTES:

1. IF INSTALLED OUTDOORS, DRAIN MUST BE INSTALLED ABOVE MAXIMUM FLOOD LEVEL, AND BE ABLE TO HANDLE THE VOLUME OF WATER THAT CAN BE DISCHARGED FROM THE RELIEF VALVE PORT.
2. WHEN THE REDUCED PRESSURE ASSEMBLY IS LOCATED INSIDE A BUILDING A SIZED DRAIN LINE SHALL BE PROVIDED FOR RELIEF PORT. THERE MUST BE AN APPROVED AIR GAP BETWEEN THE RELIEF PORT AND DRAIN.
3. ASSEMBLY TO BE MAINTAINED BY OWNER AND ANNUAL CERTIFICATION REQUIRED.
4. WATERLINE SHALL NOT BE PUT INTO SERVICE UNTIL THE BACKFLOW PREVENTION ASSEMBLY IS APPROVED BY A CITY OF ISSAQUAH WATER QUALITY INSPECTOR.
5. MINIMUM CLEARANCE BETWEEN ASSEMBLY AND WALL IS 24". MAXIMUM HEIGHT SHALL BE 60" FROM FLOOR OR GROUND TO HIGHEST POINT OF DEVICE.
6. TEE AND GATE VALVE REQUIRED ON MAIN.

INSTALLATION PROCEDURES AND SPECIFICATIONS FOR REDUCED PRESSURE BACKFLOW ASSEMBLY (ALL SIZES)

THE REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) CONSISTS OF TWO INDEPENDENTLY ACTING, INTERNALLY SPRING LOADED CHECK VALVES SEPARATED BY A SPRING LOADED DIFFERENTIAL PRESSURE RELIEF VALVE, TWO RESILIENT SEATED SHUTOFF VALVES, AND FOUR PROPERLY LOCATED, RESILIENT SEATED TEST COCKS. THIS ASSEMBLY IS EFFECTIVE AGAINST BACKFLOW CAUSED BY BACKPRESSURE AND BACKSIPHONAGE, AND IS USED TO PROTECT THE POTABLE WATER SYSTEM FROM SUBSTANCES THAT CONSTITUTE A HIGH HAZARD. THIS ASSEMBLY SHALL BE INSTALLED AS A UNIT FURNISHED BY THE MANUFACTURER IN ACCORDANCE WITH THE UNIFORM PLUMBING CODE, MANUFACTURER'S SPECIFICATIONS, AND THE GUIDELINES LISTED BELOW.

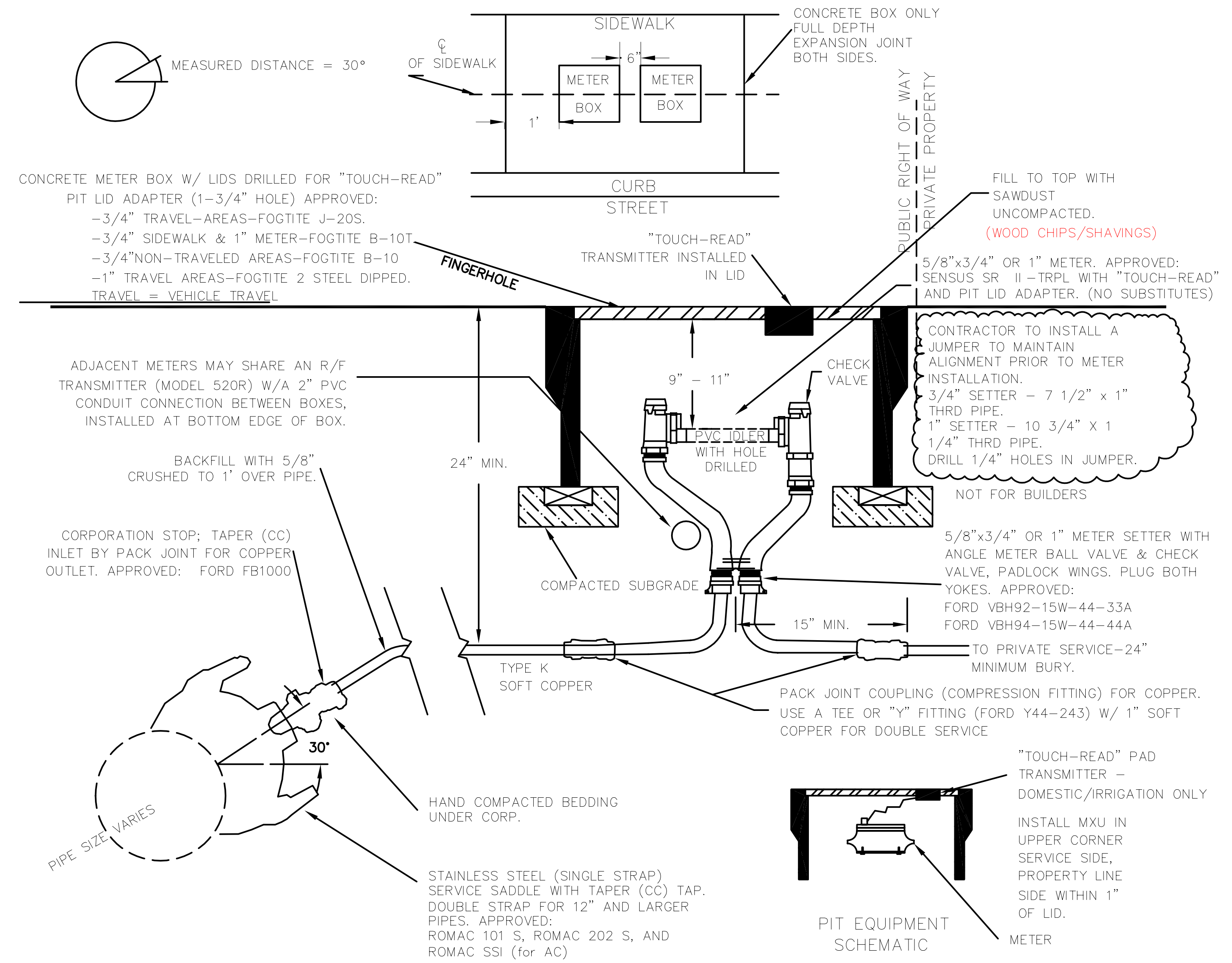
1. OBTAIN PLUMBING PERMIT FROM THE CITY OF ISSAQUAH PERMIT CENTER.
2. THE RPBA MUST BE A WASHINGTON STATE APPROVED DEVICE.*
3. THE RPBA MUST BE INSTALLED ABOVE GROUND LEVEL WHERE THERE IS NO CHANCE OF FLOODING.
4. PROVIDE ADEQUATE FREEZE PROTECTION FOR DEVICE.
5. PROVIDE ADEQUATE CLEARANCE FOR TESTING AND REPAIRS:
   A. RPBA MUST BE AT LEAST 12" FROM GROUND TO BOTTOM OF DEVICE, BUT NOT MORE THAN 60" IN HEIGHT FROM GROUND TO HIGHEST POINT OF DEVICE.
   B. RPBA MUST HAVE AT LEAST 12" CLEARANCE ON ALL SIDES.
   C. ADEQUATE SPACE MUST BE PROVIDED TO ALLOW IN-LINE REPAIRS TO CHECK VALVES OR RELIEF VALVE.
6. PROVIDE ADEQUATE DRAINAGE; DRAIN(S) MUST ALLOW FOR MAXIMUM DISCHARGE FROM RPBA RELIEF VALVE AT FULL MAIN PRESSURE. (SEE MANUFACTURER'S SPECIFICATIONS REGARDING DISCHARGE RATES).
7. THERE MUST BE AN APPROVED AIR GAP BETWEEN THE RELIEF PORT AND DRAIN.
8. WHENEVER POSSIBLE, DRAIN RPBA DISCHARGE INTO SEWER; DISCHARGE LINE MUST BE TRAPPED TO SEWER.
9. INSTALL RPBA IN THE HORIZONTAL POSITION ONLY.
10. SIZE THE RPBA HYDRAULICALLY TO AVOID EXCESSIVE PRESSURE LOSS.
11. INSTALL PLUGS IN ALL TEST COCKS.
12. ASSEMBLIES 2 1/2" AND LARGER MUST HAVE STANCHIONS INSTALLED TO PREVENT FLANGE DAMAGE. (SEE RPBA DETAIL_).
13. ASSEMBLIES 2" AND SMALLER MUST HAVE TWO UNIONS, ONE ON EITHER SIDE OF RESILIENT SEATED SHUTOFF VALVES.
14. THERE WILL BE NO RPBA INSTALLATIONS IN AREAS WHERE VEHICLE TRAFFIC IS ACCESSIBLE UNLESS PRIOR APPROVAL IS GAINED FROM ISSAQUAH PUBLIC WORKS O&M DEPARTMENT.
15. THE USE OF GALVANIZED WATER FITTINGS AND PIPING IS PROHIBITED. USE COPPER, BRASS OR PLASTIC FITTINGS AND/OR PIPING.
16. ONCE DEVICE IS INSTALLED.
   A. HAVE TESTED BY A STATE CERTIFIED BACKFLOW ASSEMBLY TEST OF YOUR CHOOSING.*
   B. HAVE INSPECTED BY ISSAQUAH PUBLIC WORKS O&M DEPARTMENT.
17. ALL RPBA'S (2 1/2" AND LARGER) INSTALLED FOR FIRE PROTECTION MUST HAVE FACTORY INSTALLED BYPASS FEATURE (TYPICAL 3/4") TO INCLUDE AN APPROVED RPBA AND METER. (SEE FIRE SYSTEM RPDA INSTALLATION SPECIFICATIONS).
18. THIS DEVICE WILL REQUIRE AN ANNUAL TEST TO ASSURE IT'S PROPER FUNCTION IN PREVENTING WATER BACKFLOW. THE ANNUAL TEST IS TO BE PERFORMED BY A WASHINGTON STATE CERTIFIED BACKFLOW ASSEMBLY TESTER. THE CITY OF ISSAQUAH O&M DEPARTMENT, WATER QUALITY SECTION WILL SEND THE NECESSARY FORM(S) AS THE DEVICE COMES DUE.

* THIS ITEM/INFORMATION MAY BE OBTAINED FROM THE CITY OF ISSAQUAH PERMIT CENTER OR PUBLIC WORKS O&M DEPARTMENT, WATER QUALITY SECTION.

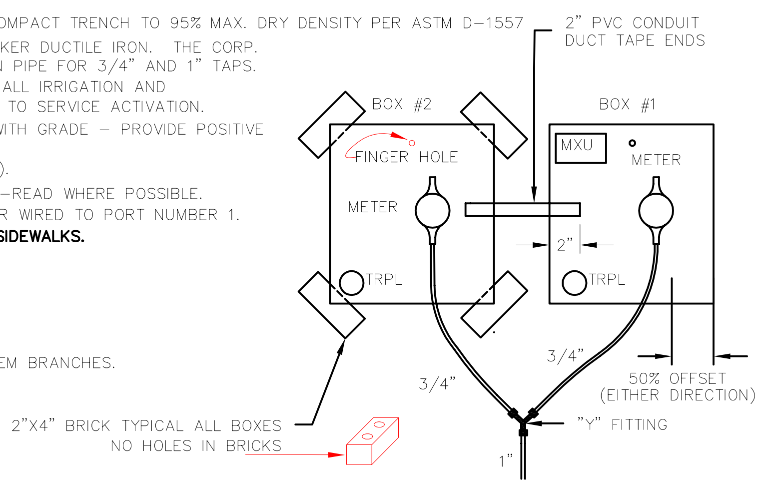
REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE, STATE OF WASHINGTON, 26132, REGISTERED PROFESSIONAL ENGINEER, EXPIRES	**2 1/2" TO 10" REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY**	**STANDARD DETAIL NO. W-23**



1. SERVICE LINE MUST BE INSTALLED PERPENDICULAR TO THE WATER MAIN. COMPACT TRENCH TO 95% MAX. DRY DENSITY PER ASTM D-1557
2. SERVICE SADDLES ARE REQUIRED ON ALL PIPE EXCEPT, CLASS 52 OR THICKER DUCTILE IRON. THE CORP. STOP MAY BE TAPPED DIRECTLY INTO CLASS 52 OR THICKER DUCTILE IRON PIPE FOR 3/4" AND 1" TAPS.
3. DOH APPROVED BACK FLOW PREVENTION DEVICES MUST BE INSTALLED ON ALL IRRIGATION AND FIRE SERVICES AND SHALL BE TESTED AND APPROVED BY THE CITY PRIOR TO SERVICE ACTIVATION.
4. OFFSET METER BOX TO LEFT OR RIGHT 50%. SET AT GRADE AND LEVEL WITH GRADE - PROVIDE POSITIVE DRAINAGE AWAY FROM BOX.
5. ALL METERS SHALL BE CONNECTED TO A METER TRANSMITTER UNIT (MXU).
6. INSTALL DOUBLE SERVICES WITH SINGLE 2-PORT MXU (model 520R) RADIO-READ WHERE POSSIBLE.
7. ON DOUBLE SERVICES PLACE THE MXU IN THE METER BOX WITH THE METER WIRED TO PORT NUMBER 1.
8. **DOUBLE SET SERVICES MUST BE NO MORE THAN 2 FEET APART - 6" IN SIDEWALKS.**
9. SINGLE SET SERVICE MUST BE A MINIMUM OF 20' APART.
10. THE CITY SHALL MAKE ALL ELECTRICAL CONNECTIONS.
11. SERVICES SHALL BE INSTALLED BY THE CITY ON CITY OWNED MAINS.
12. METERS SHALL BE SET AT PROPERTY LINES OR IN SIDEWALK.
13. AVOID VEHICLE TRAVEL AREAS.
14. SERVICES SHALL NOT BE TAPPED OFF HYDRANT OR FIRE SPRINKLER SYSTEM BRANCHES.



REVISION:

NO SCALE

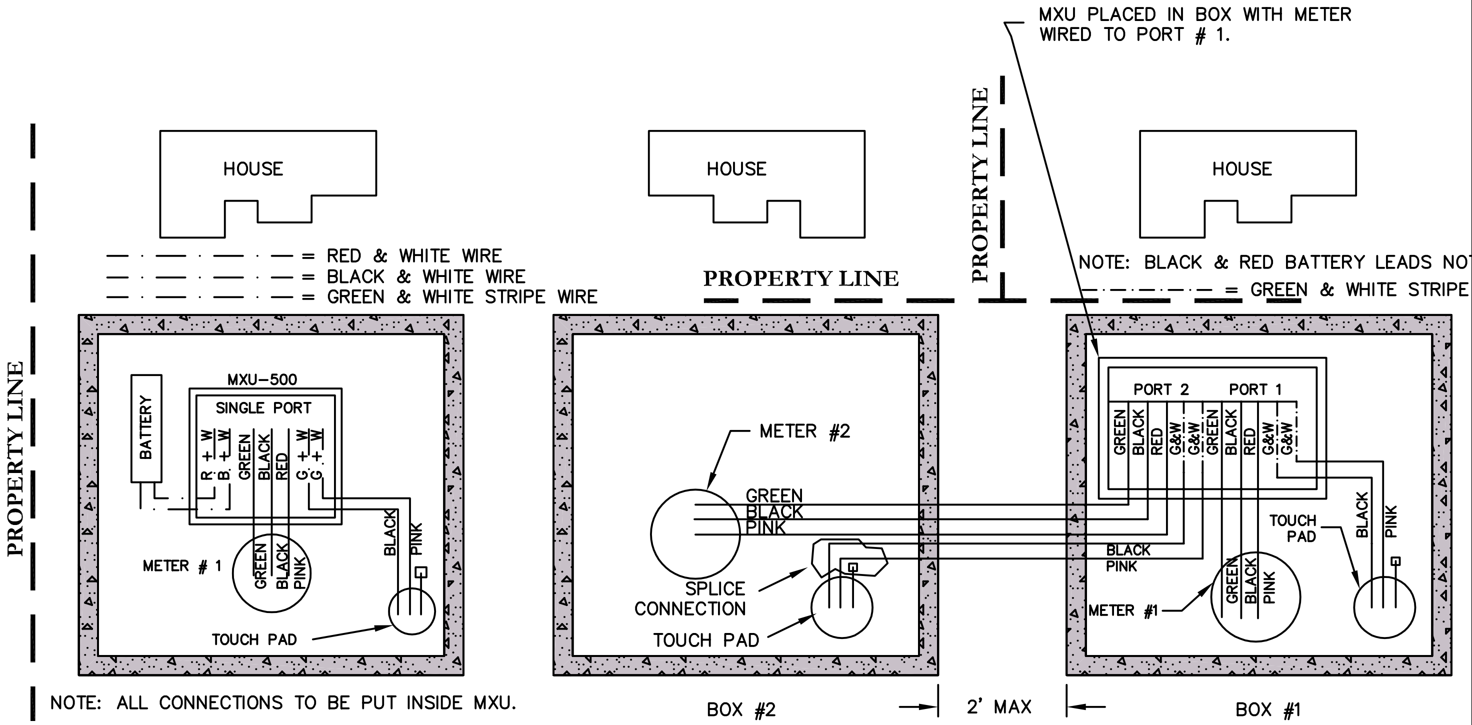
CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT

SHELDON T. LYNNE
STATE OF WASHINGTON
26132
REGISTERED PROFESSIONAL ENGINEER
EXPIRES

3/4" AND 1" WATER SERVICE FOR DOMESTIC, IRRIGATION & FIRE

STANDARD DETAIL NO.

W-25A



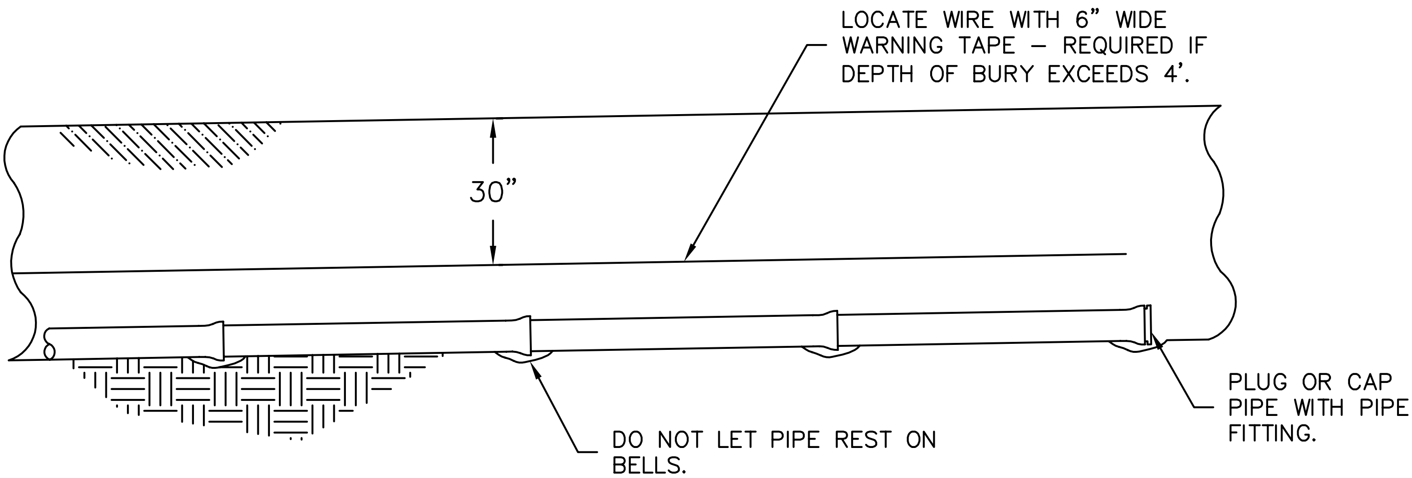
METER INSTALLATION FOR SINGLE PORT MXU

CONNECTION SCHEMATIC DOUBLE MXU (505 SERIES)

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE, STATE OF WASHINGTON, 26132, REGISTERED PROFESSIONAL ENGINEER, EXPIRES	**3/4" AND 1" WATER SERVICE "RADIO-READ" WIRING DETAILS**	**STANDARD DETAIL NO. W-25B**



1. LAY PIPE WITH BELLS UPGRADE.
2. PREPARE TRENCH BOTTOM SO PIPE IS SUPPORTED FULL LENGTH.
3. PLUG OR CAP PIPE WHENEVER NOT ACTIVELY WORKING ON PIPE SECTION. USE MJ OR TYTON JOINT PLUG OR CAP. BOARDS, BUCKETS, ETC. ARE NOT ALLOWED.
4. EXTREME CARE SHALL BE TAKEN INSTALLING POLY ENCASEMENT TO PREVENT TEARS AND TO ENSURE PROPER SEAL.
5. PIPE THAT IS ROLLED OFF A TRUCK OR TRAILER OR IS DROPPED OR OTHERWISE MISHANDLED WILL BE REJECTED.
6. CUT ENDS SHALL BE BEVELED PER MANUFACTURER SPECS PRIOR TO ASSEMBLY.
7. GASKETS SHALL BE LUBRICATED WITH APPROVED GASKET LUBRICANT.
8. VALVES ON LIVE MAINS SHALL ONLY BE OPERATED BY CITY PERSONNEL.
9. NEW MAINS SHALL BE ISOLATED FROM LIVE MAINS WITH A DCVA UNTIL SATISFACTORY BACTERIOLOGICAL TESTS ARE OBTAINED.
10. NEW MAINS SHALL BE FLUSHED AT A MINIMUM VELOCITY OF 5 FPS. CONTRACTOR SHALL PAY $5.00 PER ROCK LARGER THAN 1/4" DISCHARGED FROM MAIN.
11. DISINFECTING SHALL BE ACCOMPLISHED BY PUMPING A CHLORINE SOLUTION INTO THE MAIN UNTIL 50 PPM IS ACHIEVED IN ALL SECTIONS OF THE PIPE. THIS CONCENTRATION SHALL REMAIN IN THE PIPE FOR 24 HOURS. CHLORINATED WATER SHALL NOT BE DISCHARGED TO STORM WATER SYSTEM OR SURFACE WATERS.
12. SHORT SECTIONS OF PIPE MAY BE SWABBED WITH A 500 PPM CHLORINE SOLUTION INSTEAD OF THE ABOVE. CARE SHALL BE TAKEN NOT TO GET CHLORINE ON THE OUTSIDE OF THE PIPE OR FITTINGS.
13. TRENCH WATER OR DEBRIS SHALL NOT BE ALLOWED TO ENTER THE PIPE.
14. A TORQUE WRENCH SHALL BE USED TO PROPERLY TORQUE BOLTS AND NUTS.
15. ISSAQUAH'S WATER SYSTEM IS NOT CHLORINATED. EXTREME CARE SHALL BE TAKEN TO AVOID CONTAMINATION.
16. TRAFFIC CONTROL PER THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) SHALL BE MAINTAINED AT ALL TIMES.
17. RESTRAINED JOINTS SHALL BE FULLY EXTENDED WHEN SPECIFIED BY THE ENGINEER.
18. JOINT ASSEMBLY SHALL ALLOWED FOR THERMAL EXPANSION AND CONTRACTION WITHOUT BINDING THE PIPE.

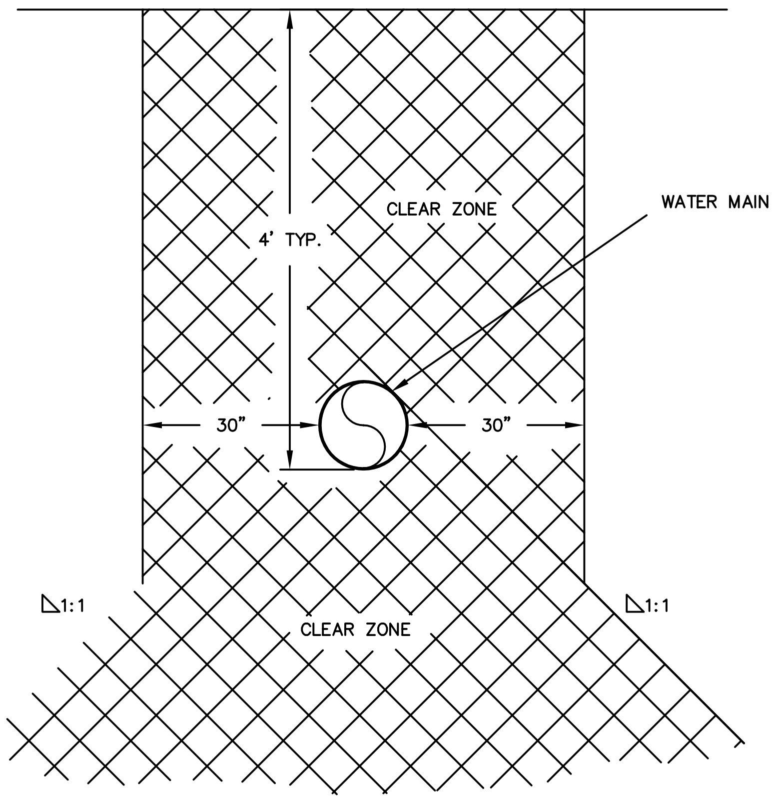
PIPE LAYING OPERATIONS VIOLATING ANY SECTION OF THIS DETAIL SHALL BE IMMEDIATELY SUSPENDED UNTIL THE CITY HAS BEEN SATISFIED OF THE CONTRACTOR'S ABILITY TO MEET THESE REQUIREMENTS.

NOTE:

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**PIPE LAYING DETIAL**	**STANDARD DETAIL NO. W-27**

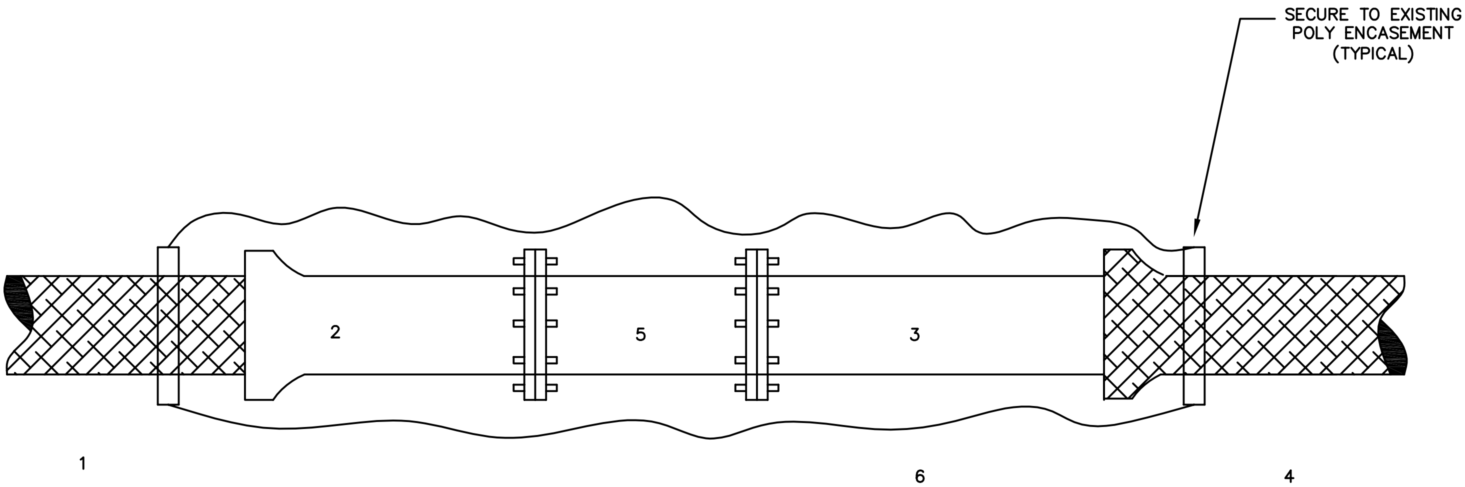


NO PIPES OR UTILITIES SHALL BE INSTALLED IN THE WATER MAIN CLEAR ZONE.

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	CLEAR ZONE DETAIL	STANDARD DETAIL NO. W-28



MATERIALS LIST

1)	EXISTING PIPE, RJ – SPIGOT END
2)	RJ – BELL x FLG (MANUFACTURED TO FIT)
3)	FLG X RJ – PE (MANUFACTURED TO FIT)
4)	EXISTING PIPE, RJ – BELL END
5)	FLG X FLG SPOOL 4'
6)	POLYETHELENE ENCASEMENT

REVISION:

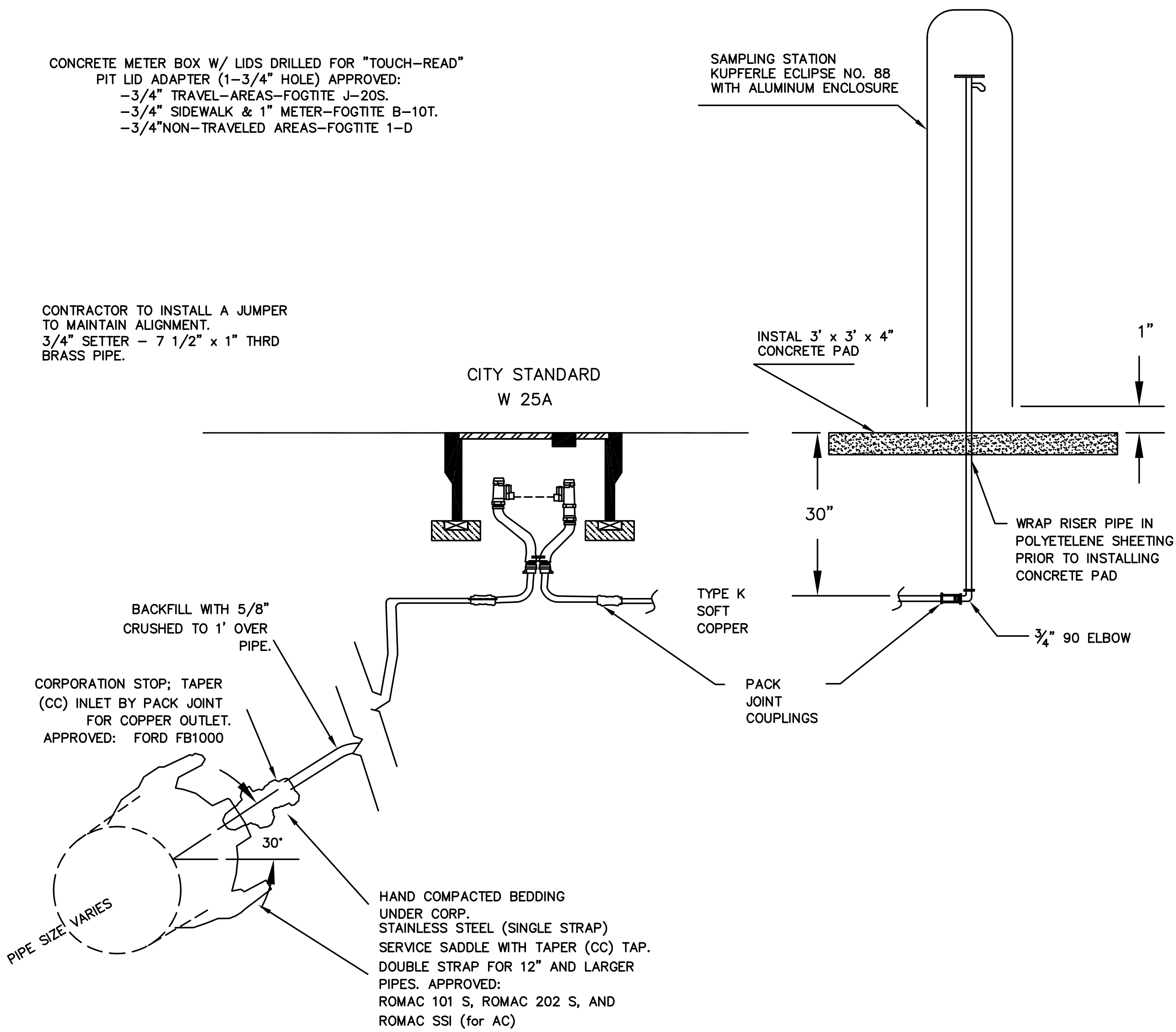
NO SCALE

CITY OF ISSAQUAH
PUBLIC WORKS DEPARTMENT

SHELDON T. LYNNE
STATE OF WASHINGTON
26132
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES

RESTRAINED JOINT PIPE REPAIR
12" AND LARGER

STANDARD DETAIL NO.
W-29



1. SERVICE LINE MUST BE INSTALLED PERPENDICULAR TO THE WATER MAIN. COMPACT TRENCH TO 95% MAX. DRY DENSITY PER ASTM D-1557
2. SERVICE SADDLES ARE REQUIRED ON ALL PIPE EXCEPT, CLASS 52 OR THICKER DUCTILE IRON. THE CORP. STOP MAY BE TAPPED DIRECTLY INTO CLASS 52 OR THICKER DUCTILE IRON PIPE FOR 3/4" AND 1" TAPS.
3. SET AT GRADE AND LEVEL WITH GRADE - PROVIDE POSITIVE DRAINAGE AWAY FROM BOX.
4. SERVICES SHALL BE INSTALLED BY THE CITY ON CITY OWNED MAINS.
5. METER BOX SHALL BE SET AT PROPERTY LINES OR IN SIDEWALK.
6. AVOID VEHICLE TRAVEL AREAS.
7. SERVICES SHALL NOT BE TAPPED OFF HYDRANT OR FIRE SPRINKLER SYSTEM BRANCHES.
8. SUPPLY BEST LOCK WITH IP-1 CORE.

REVISION:

NO SCALE

CITY OF ISSAQUAH PUBLIC WORKS DEPARTMENT	SHELDON T. LYNNE STATE OF WASHINGTON 26132 REGISTERED PROFESSIONAL ENGINEER EXPIRES	**SAMPLING STATION**	**STANDARD DETAIL NO.** **W-30**

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Appendix F. Population and Household Projections: Comprehensive Plan Table L-3

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Table L-3 Population and Household Projection

				Current Population[1] and Households (HH)			Estimated Population & Household Growth[2,3,4,8] - April 2, 2017, to April 1, 2031 (current growth target)								
OFM Average				As of April 1, 2017			Estimated April 1, 2020			Estimated April 1, 2025			Estimated April 1, 2031		
Area	Occup. Rate	Persons/ HH	Acreage[5]	**Units**	HH	Population	**Units**	HH	Population	**Units**	HH	Population	**Units**	HH	Population
					Units x Occup.	HH X Persons/HH		Units x Occup.	HH X Persons/HH		Units x Occup.	HH X Persons/HH		Units x Occup.	HH X Persons/HH
Issaquah minus Villages & CI Area[8]	0.95	2.31	5,093	9,130	8,695	20,082	9,547	9,092	20,999	10,132	9,650	22,288	11,245	10,710	24,736
Central Issaquah Outside Urban Core	0.95	2.31	383	1,094	1,042	2,406	1,751	1,668	3,852	1,896	1,805	4,170	2,085	1,986	4,586
Central Issaquah Urban Core and Rowley[4,7]	0.95	2.31	1,154	0	0	0	0	0	0	100	95	220	200	190	440
Highlands[2]	0.95	2.31	78	4,287	4,083	9,430	4,518	4,303	9,938	4,837	4,607	10,640	4,837	4,607	10,640
Talus[3]	0.95	2.31	918	1,394	1,328	3,066	1,394	1,328	3,066	1,581	1,506	3,478	1,581	1,506	3,478
Lakeside[9]	0.95	2.31	116	298	284	656	298	284	656	323	307	710	355	338	781
Issaquah Total	0.95	2.31	**7,742**	**16,203**	**15,431**	**35,640**	**17,508**	**16,674**	**38,511**	**18,869**	**17,971**	**41,505**	**20,303**	**19,337**	**44,660**
Estimated Group Quarters[6]						**390**			**396**			**429**			**511**
Total Estimate						**36,030**			**38,511**			**41,505**			**44,660**
2017 Official OFM Population						**36,030**									
Population History / Projection															
OFM & Census	**1995**	**2000**	**2010**	2010 - 2017			2018 - 2020			2020 - 2025			2025 - 2031		
	9,530	11,212	30,434	Approx. % increase		18.39%	6.88%			7.77%			7.60%		
				Avg. yearly %change		5.79%	3.39%			1.51%			0.67%		
Potential Annexation Areas (PAAs)															
PAA'S	Occup. Rate	Persons/ HH	Acreage	**Units**	HH	Population	**Units**	HH	Population	**Units**	HH	Population	**Units**	HH	Population
					Units x Occup.	HH X Persons/HH		Units x Occup.	HH X Persons/HH		Units x Occup.	HH X Persons/HH		Units x Occup.	HH X Persons/HH
East Cougar Mtn.	0.95	2.31	588	89	85	195	90	86	198	93	88	204	98	93	215
PAA Subtotal	--	--	588	89	85	195	90	86	198	93	88	204	98	93	215
Issaquah and the PAAs				**16,292**	**15,516**	**36,225**	**17,598**	**16,760**	**38,708**	**18,962**	**18,059**	**41,709**	**20,401**	**19,430**	**44,875**

1. The Washington State Office of Financial Management (OFM) provided the 2017 Population figures as of July 1, 2017, including the estimated Occupancy Rate and Persons/Household.

2. Issaquah Highlands includes the WSDOT TDR (excluding Bellevue College), Zero Energy (Z-home), TOD (YWCA) Development Agreement areas. Unit numbers for 2017 are based on existing conditions. Unit projections after 2017 are based on unbuilt residential entitlement that will be developed after the Development Agreement is terminated.

3. Talus units numbers for 2017 are based on existing conditions. The Development Agreement is slated to be terminated in 2017. Unit projections after 2017 are based on unbuilt residential entitlement that will be developed after the Development Agreement is terminated.

4. Rowley unit projections are for planning purposes only and may not reflect the intentions of Rowley Properties, Inc. The entitled total is 1,060 units over the 30-year buildout (2043). The minimum number of units is 500, required if a certain amount of commercial is developed, and is forecasted to be built between 2025 and 2031, near the end of the build out period. There are no units projected for Rowley.

5. Citywide Right-of-way areas are not included in the acreage calculations. Recent annexations of McCarry Woods, Issaquah Middle School, Lake Sammamish State Park, Bellevue Utility Island and King County Island are included.

6. Group Quarters include facilities such as dormitories, nursing homes etc. Estimate is updated annually and includes the Urban Villages. Projections are based on an average 1.6 % yearly increase.

7. 6,900 dwelling units needed for Regional Growth Center Designation (15 DU/acre). Central Issaquah Planned Action EIS assumes 6,125 units in Urban Core, outside Rowley DA. Rowley DA is allocated approximately 1,060 units. Approximately 7,185 total dwelling units allocated to the Urban Core and 1,315 outside the Urban Core in Central Issaquah.

8. Future estimates reflects a rate of growth in Issaquah (minus Central Issaquah and the Urban Villages) and in Central Issaquah outside the Urban Core of 1.6% per year. There are no units currently in Central Issaquah Urban Core and Rowley and no units are in the pipeline, so projections are based on the assumption that there could be 100 units by 2025 and 200 units by 2031. Refer to footnote 2 for information regarding Issaquah Highlands projections. Refer to footnote 3 for information regarding Talus projections. Refer to foot note 4 for informaiton regarding Rowley projections.

9. Lakeside unit projections are forecasted to grow by 1.6% beginning 2025. The entitled number of units is a maximum of 1,200 units over the 30-year buildout (2043).

Appendix G. Certificates of Water Rights and Existing Water Rights Status Worksheets

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Risdon Well 1

Certificate G1-*08632CWRIS

S. F. No. 370-B—OS—3-62—75C.

$10.00 examination fee should accompany each application.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
Division of Water Resources

Priority
Date ~~1-30-67~~ 3-30-67
Time ~~9:30 AM~~ 11:30 AM
Accepted ~~[illegible]~~ WPL

APPLICATION FOR A PERMIT

To Appropriate Public Ground Waters
OF THE STATE OF WASHINGTON

Application No. G. W. 8632 ~~8510~~

I, City of Issaquah, Washington
(Name of applicant)
of Box M City Hall, Issaquah, Washington 98027
(Complete post office address)

do hereby make application for a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights. This application is made under the provisions of Chap. 263 of the Session Laws of 1945, and amendments thereto of the State of Washington and subject to the rules and regulations of the Department of Conservation, Division of Water Resources.

1. *The proposed appropriation will be from* Well
(Well, tunnel, infiltration trench)

located In City of Issaquah
(Give approximate distance and direction from nearest city or town)

Area .... (Leave blank) *Sub-area* .... (Leave blank)

Zone .... (Leave blank)

Applicant's name or number of well or other works, if any ....

2. *The quantity of water which applicant intends to withdraw for beneficial use is* 2,000 *gallons per minute;* 3,220 *acre feet per year.*

3. *The use or uses to which water is to be applied* Municipal supply
(Domestic supply, irrigation, municipal, manufacturing, industrial use, etc.)

4. *The time during which water will be required each year* ~~12 months~~ continuously

5. *Location of well or other works for withdrawal of water: In county of* King

(a) 1190'E & 720'S from west quarter corner of Sec 27
(Give distance and bearing from nearest corner of section or legal subdivision)

being within the ~~NW¼~~ SW¼ *of Sec.* 27, *Twp.* 24 *N., Rge.* 6E
(Give smallest legal subdivision) (E. or W.)
Right-of-way of State Hwy No. 2, within Issaquah City Limits, within NW¼ SW¼

or (b) If within limits of recorded platted property, town or city: Lot ...., *Block* ....,

of .... ~~Issaquah~~
(Give name of plat or addition) (If within town or city, give name)

(c) Show this location on accompanying section plat. Other adequate maps or drawings will be acceptable.

6. Description of Works:

(a) Well will be drilled *(Dug or drilled) and have a diameter of* 12 *inches and an estimated depth of* 150 *feet.*

(b) Tunnels or trenches to be described: (Attach additional sheets if needed for full description.)

(c) Distribution system to be described:

Distribution system consists of 12" to 6" mains and smalled branches. 1,000,000 gal. service reservoir.

(d) If pumps are to be used, give size and type:

8" Turbine Type

(e) Give capacity and type of motor or engine to be used:

25 HP Electric

(f) If the location of the well, tunnel, or other works is less than one-fourth mile from a natural stream or stream channel, give the distance to the nearest point on each of such channels and the difference in elevation between the stream bed and the ground surface at the source of development:

720' to East fork of Issaquah Creek stream bed is about 10 ft. below ground at proposed well site.

(g) Ownership of each existing well or other works from which ground water is withdrawn within a radius of one-quarter mile and the distance and direction from well or other works being reported herein:

(Name)	(Direction)	(Distance)
Darigold Company	West	1,220 ft.
Dan Risdon	North	230 ft.

Supply the Following Information According to Use Proposed:

7. *For Municipal Supply: To supply the city, town, or community of* Issaquah*, in the county of* King*, having a present population of* 4,000*, and an estimated population of* 12,000*, in 19*76.

8. *For Irrigation: Number of acres to be irrigated* .... *acres.*

Fees for Filing and Recording Permits: There is a minimum fee of $5.00 for filing and recording a permit.

For irrigation, permit fees are as follows:

40¢ per acre-up to and including 100 acres;

20¢ per acre over 100 acres to 1,000 acres, inclusive;

10¢ per acre over 1,000 acres.

Permit fee for other uses: Twice the examination fee.

Fee for filing and recording certificate: There is a minimum fee of $5.00.

9. *Legal Description of Property on which water is to be used for all purposes other than municipal supply:*

(Copy legal description from deed)
(If more space is required, attach separate sheet)

City of Issaquah

(On accompanying plat show location of the existing wells or works)

10. *What interest do you have in the above described property?*

(Owner, lessee, contract buyer, etc.)

11. *Do you have any other water rights appurtenant to the above described property?*

If so, from what source? Springs SW Cert 1087

12. *Construction work will begin on or before* March 1, 1967

13. *Construction work will be completed on or before* April 1, 1967

14. *Water will be put to complete beneficial use on or before* May 1, 1967

HAMMOND, COLLIER & ISAAC
By: George Hammond City Engineer
(Signature of applicant)

15. *Name and address of owner of land on which well or works are located:*

City of Issaquah (Name) (Address)

(Signature of legal landowner)

Signed in the presence of us as witnesses:

(Name) (Address of witness)

(Name) (Address of witness)

STATE OF WASHINGTON, } ss.
COUNTY OF THURSTON.

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for correction or completion as follows:

In order to retain its priority, this application must be returned to the State Supervisor of Water Resources, with corrections, on or before................, 19.....

WITNESS my hand this........*day of*................, 19.....

State Supervisor of Water Resources.

S. F. No. 7361—OS—6-67.

CERTIFICATE RECORD NO. 13 PAGE NO. 6343-A

STATE OF WASHINGTON, COUNTY OF King

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 Department of Water Resources thereunder.

THIS IS TO CERTIFY *That* CITY OF ISSAQUAH

of Issaquah, Washington, *has made proof to the satisfaction of the Department of Water Resources of Washington, of a right to the use of the ground waters of a* well

located within right-of-way of State Highway #2, within Issaquah City Limits, within NW¼SW¼ of

Sec. 27, *Twp.* 24 *N., R.* 6 E. *W.M.,*

for the purpose of Municipal supply

under and subject to provisions contained in Ground Water Permit No. 8181 *issued by the Department 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 Department of Water Resources of Washington and entered of record in Volume* 13 *at page* 6343-A; *that the right hereby confirmed dates from* March 30, 1967; *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* 630 gallons per minute, 1000 acre-feet per year for municipal supply continuously during entire year for the City of Issaquah

Special provisions required by the Department of Water Resources:

A description of the lands to which such ground water right is appurtenant:

The City of Issaquah

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 ground 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 28th *day of* February, 1969

Glen H. Fiedler

Assistant Director
Division of Water Management
Department of Water Resources

ENGINEERING DATA
O.K. ELL

Risdon Well 2

Certificate G1-*10071CWRIS

S.P. No. 219-B—OS—6-67.

$10.00 examination fee should accompany each application.

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
Division of Water Management

PRIORITY
Date 3-11-69
Time 2 PM
Accepted C.E.L.

APPLICATION FOR A PERMIT

To Appropriate Public Ground Waters
OF THE STATE OF WASHINGTON

Application No. G. W. 10071

I, City of Issaquah
(Name of applicant)

of Issaquah, Washington
(Complete post office address)

do hereby make application for a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights. This application is made under the provisions of Chap. 263 of the Session Laws of 1945, and amendments thereto of the State of Washington and subject to the rules and regulations of the Department of Water Resources.

1. *The proposed appropriation will be from* a well
(Well, tunnel, infiltration trench)

located in the city of Issaquah
(Give approximate distance and direction from nearest city or town)

Area ____ (Leave blank) *Sub-area* ____ (Leave blank)

Zone ____ (Leave blank)

Applicant's name or number of well or other works, if any ____

2. *The quantity of water which applicant intends to withdraw for beneficial use is* 2,000 *gallons per minute;* 2,116 *acre feet per year.*

3. *The use or uses to which water is to be applied* municipal ~~for municiple~~ water supply
(Domestic supply, irrigation, municipal, manufacturing, industrial use, etc.)

4. *The time during which water will be required each year* continuously ~~year around, 24 hours a day.~~

5. *Location of well or other works for withdrawal of water: In county of* King

To be verified by field examiner

(a) 950 ~~1100~~ feet ~~east and~~ 545 ~~700~~ feet south from west quarter corner of section 27
(Give distance and bearing from nearest corner of section or legal subdivision)

being within the NE¼ NW 1/4 SW 1/4 (Give smallest legal subdivision) *of Sec.* 27, *Twp.* 24 *N., Rge.* 6E (E. or W.)

or (b) *If within limits of recorded platted property, town or city: Lot* ____, *Block* ____,

of ____ (Give name of plat or addition) (If within town or city, give name)

(c) *Show this location on accompanying section plat. Other adequate maps or drawings will be acceptable.*

Application Referred
3-5-69 – C.E.L.

6. DESCRIPTION OF WORKS:

(a) Well will be drilled *(Dug or drilled)* *and have a diameter of* 12 *inches and an estimated depth of* 135 *feet.*

(b) Tunnels or trenches to be described: (Attach additional sheets if needed for full description.)

(c) Distribution system to be described:

(d) If pumps are to be used, give size and type:

8 inch turbine

(e) Give capacity and type of motor or engine to be used:

50 HP Electric

(f) If the location of the well, tunnel, or other works is less than one-fourth mile from a natural stream or stream channel, give the distance to the nearest point on each of such channels and the difference in elevation between the stream bed and the ground surface at the source of development:

800' to East Fork of Issaquah Creek. Stream bed is about

12' (feet) above the ground surface at the proposed site.

(g) Ownership of each existing well or other works from which ground water is withdrawn within a radius of one-quarter mile and the distance and direction from well or other works being reported herein:

(Name)	(Direction)	(Distance)
Risdon	North	230 feet
Darigold	West	1100 feet
Issaquah	Same Location	

SUPPLY THE FOLLOWING INFORMATION ACCORDING TO USE PROPOSED:

7. *For Municipal Supply: To supply the city, town, or community of* Issaquah*, in the county of* King*, having a present population of* 4,000*, and an estimated population of* 12,000*, in 19* 79. City limits only

8. *For Irrigation: Number of acres to be irrigated* .... *acres.*

9. *Legal Description of Property on which water is to be used for all purposes other than municipal supply:*

(Copy legal description from deed)
(If more space is required, attach separate sheet)

AREA SERVED BY CITY of ISSAQUAH

(On accompanying plat show location of the existing wells or works)

10. *What interest do you have in the above described property?*

(Owner, lessee, contract buyer, etc.)

11. *Do you have any other water rights appurtenant to the above described property?* Yes

If so, from what source? City well and springs

12. *Construction work will begin on or before* May 1, 1969

13. *Construction work will be completed on or before* August 1, 1969

14. *Water will be put to complete beneficial use on or before* August 1, 1969

Hammond, Collier & Wade, and Associates
Chas. W. P. McMullen
(Signature of applicant)

15. *Name and address of owner of land on which well or works are located:*

City of Issaquah (Name) | Issaquah, Washington (Address)

Doris McGinn, City Clk.
(Signature of legal landowner)

Signed in the presence of us as witnesses:

Raymond Lulip (Name) | 724 Bush St Issaquah, Wn (Address of witness)

(Name) | (Address of witness)

STATE OF WASHINGTON, }
COUNTY OF THURSTON. } ss.

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for correction or completion as follows:

In order to retain its priority, this application must be returned to the Department of Water Resources, with corrections, on or before , 19

WITNESS my hand this day of , 19

Division of Water Management,
Department of Water Resources.

Report of Examination on Ground Water

Received date March 11, 1969 Date of exam. June 19, 1969 Appl. No. 10071

Name City of Issaquah Address Issaquah, Washington

Type of works well Dimensions 12" x 135'

Progress of works well drilled and capped (project started)

Quantity applied for 2000 g.p.m. 2116 acre-feet per year

Legal sub. NE¼NW¼SW¼ Sec. 27 Twp. 24 N., Rge. 6 E. County King

Use municipal water supply

Irrigation-acreage: Present Planned - Feasible

Municipal: Population 12,000 as of 1976

Industrial

Time pump will be operated continuously

Other water rights appurtenant to this land Surface Water Cert. No. 1087 and Ground Water Cert. No. 6343

Proximity to existing works, springs, wells, or streams Risdon, north 230'; Buriguld, west 1100'; Issaquah, Ground Water Cert. No. 6343, northeast 20'

Area Sub-area Zone

RECOMMENDATIONS

Approved for 2000 g.p.m. 1600 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, 306 Public Health Building, Olympia, with regard to the need for compliance.

In 1968 applicants utilized 203,000,000 gallons and had an average of 1200 services. Assuming an average of four persons per service, applicants 1968 demand was 117 gallons per capita per day. Allowing for an increase in the water usage, this application is based on a per capita demand of 130 gallons per day. For the projected population of 12,000 persons to be served by this system, the estimated water need will be 1748 acre-feet.

The recommended quantity of 1600 acre-feet per year is based on pumping this well at 2000 gallons per minute up to 50 per cent of the time each year.

Applicants have Surface Water Certificate No. 1087 for 0.50 cubic foot per second, 363 acre-feet per year, and Ground Water Certificate No. 6343 for 630 gallons per minute, 1000 acre-feet per year comprising combined rights of 1363 acre-feet per year.

Therefore, permit will issue as follows: "Issued as a primary right for 385 acre-feet and as a supplemental right for 1215 acre-feet, the total annual withdrawal shall not exceed 1600 acre-feet, less any amount in excess of 148 acre-feet utilized under existing rights."

This application is approved for 2000 gallons per minute as requested. Applicant is reminded that the final water right certificate, when issued, will be reduced, if necessary, commensurate with the capacity of the completed system.

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.

Applicants attention is invited to the fact that their surface water rights on the springs are inadequate. The highest yield in one day in 1968 from the springs was 1,468,000 gallons. A continuous diversion at the rate of 2.27 cubic feet per second for 24 hours would be required to attain 1968's peak demand. Any diversion in excess of 0.50 cubic foot per second is unauthorized.

Signed at Olympia, Washington
this 15 day of Aug, 1969.

Dean Wood
DEAN WOOD
Water Resources Inspector
Division of Water Management

S. P. No. 7384—C8—8-69.

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

Permit to Appropriate Public Waters of the State of Washington

Book No. 13 of Ground Water Permits, on page [illegible] under Application No. [illegible]

CITY OF ISSAQUAH

of Issaquah, Washington

is, pursuant to the Report of Examination which has been accepted by the applicant, 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 March 11, 19[illegible]

Source(~~s~~) of the proposed ground water appropriation is/~~are~~ a well

The quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 2000 gallons per minute; 1600 acre-feet per year, to be used for the following purposes: municipal water supply

, as more definitely set out below.

Approximate location(~~s~~) of the point(~~s~~) of withdrawal is/~~are~~ 950 feet east and 345 feet south from west quarter corner of Sec. 27

being within [illegible]

of Sec. 27, Twp. 24 N., Rge. 6 E. W.M., King County,

The use, or uses, to which water is to be applied:

~~Domestic~~/municipal supply: 2000 gallons per minute; 1600 acre-feet per year, during entire year.

Irrigation: ______ gallons per minute; ______ acre-feet per year from ______ to ______, each year, for the irrigation of ______ acres.

Other use(s): ______ gallons per minute; ______ acre-feet per year, from ______ to ______ each year, for ______

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Issaquah

ADDITIONAL LIMITATIONS AND PROVISIONS: The installation and maintenance of an access port as described in Ground Water Bulletin No. 1 shall be required prior to issuance of final Certificate of Water Right.

Issued as a primary right for [illegible] acre-feet and as a supplemental right for [illegible] acre-feet, the total annual withdrawal shall not exceed 1600 acre-feet, less any amount in excess of 140 acre-feet utilized under existing rights.

As provided under RCW 43.21.130, 90.03.360, 90.44.250 and 90.44.[illegible], a [illegible] shall be installed in this system to measure the total amount of the withdrawal.

DESCRIPTION OF PROPOSED WORKS:

The well will be drilled (Dug or drilled) and have a diameter of 12 inches, and depth of 135 feet.

Description of tunnel or infiltration trench: ....

DEVELOPMENT SCHEDULE:

Construction work shall begin on or before Started

and shall thereafter be prosecuted with reasonable diligence and completed on or before September 1, 1970

and complete application of water to proposed use shall be made on or before September 1, 1971

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Water Resources on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Olympia, Washington, this 27th day of August, 19 69

Assistant Director
Division of Water Management
Department of Water Resources

ENGINEERING DATA
OK

S. F. No. 7361—(Rev. 6-70).

CERTIFICATE RECORD No. 15, PAGE No. 7031-A

STATE OF WASHINGTON, COUNTY OF King

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 Department of Ecology thereunder.)

THIS IS TO CERTIFY *That* CITY OF ISSAQUAH *of* Issaquah, Washington, *has made proof to the satisfaction of the Department of Ecology of a right to the use of the public ground waters of the State of Washington from* a well *located within* NE¼NW¼SW¼ *Sec.* 27, *Twp.* 24 *N., R.* 6 E. *W.M., for the purpose(XX) of* municipal water supply *under and specifically subject to provisions contained in Ground Water Permit No.* 9292 *issued by the Department of Ecology 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 Department of Ecology and entered of record in Volume* 15 *at page* 7031-A *that the priority of the right hereby confirmed dates from* March 11, 1969 *; that the quantity of ground water under the right hereby confirmed for the aforesaid purposes, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 1200 gallons per minute; 1600 acre-feet per year, continuously during the entire year, for municipal supply.

A description of the lands to which such ground water right is appurtenant is as follows:

Area served by City of Issaquah.

The right to use of 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 ground water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and seal of this office at Olympia, Washington, this 8th *day of* October, 19 70.

JOHN A. BIGGS, *Director*
Department of Ecology

Engineering Data
OK [initials]

by Glen H. Fiedler
Glen H. Fiedler

Ground Water Permit No.................................

Certificate of Ground Water Right

Recorded in the Department of Ecology, Olympia, Washington, in Book No................ .... of Ground Water Right Certificates, on page..........................., on the ....day of.. 19..........

STATE OF WASHINGTON, } ss.
County of ....

I certify that the within was received and duly recorded by me in **Volume** *.............. of Book of Water Right Certificates, at page........................ on the .... day of ...., 19..........*

....

STATE PRINTING PLANT, OLYMPIA, WASHINGTON

9-1-91
pr

Progress Sheet—Ground Water Application

NAME City of Issaquah
Issaquah, Washington 98027 Assigned to

G. W. APPLI. NO. 10371 PERMIT NO. 9292 CERT. NO. 7031 A

AMENDED CANCELLED

Application received 3-11-69 Initial $10.00 fee received 3-11-69
Statement of additional examination fee $ Sent Received
Application returned for completion or correction Received

TEMPORARY PERMIT: Approved by Issued

PUBLICATION:
O.K.'d by Sm Date 3-14-69 Notice sent 3-18-69 Amended Notice 4-22-69
Protests
Filed
Affidavit received and checked 4-25-69 Time expired 5-9-69
Amended notice sent Affidavit received
Time expires

DEPT. OF GAME REPORT

EXAMINATION Made 6-19-69 by
O.K.'d for permit 8-22-69 by
Statement of permit fee sent 8-18-69 Amount $20.00 Received 8-22-69

PERMIT NO. 9292 ISSUED 8-27-69

BEGINNING OF CONSTRUCTION: Notice sent Started Filed --
Extension fee $ Extended to
Extended to

WELL DRILLER'S REPORT: Sent 8-28-69 Filed 9-8-69

COMPLETION OF CONSTRUCTION: Notice sent 8-28-69 Filed
$2.00 extension fee Extended to
To

PROOF OF APPROPRIATION: Sent Filed
$2.00 extension fee Extended to

Statement of certificate fee sent $ Received 10-5-70

CERTIFICATE OF GROUND WATER RIGHT NO. 7031 A ISSUED 10-8-70

Gun Club Well 3a

Certificate G1-22733C

S. F. No. 370-B—OS—8-67.

$10.00 examination fee should accompany each application.

No other DOE ~~Permits required~~ TBH

PRIORITY
Date 9/1/76
Time 1600 9/3/76
Accepted TBH

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
Division of Water Management

APPLICATION FOR A PERMIT

To Appropriate Public Ground Waters
OF THE STATE OF WASHINGTON

WRIA = 8

Application No. G. W. G1-22733

I, CITY OF ISSAQUAH, WASHINGTON
(Name of applicant)

of 130 E. Sunset Way (P.O. Box M), Issaquah, Washington 98027
(Complete post office address)

do hereby make application for a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights. This application is made under the provisions of Chap. 263 of the Session Laws of 1945, and amendments thereto of the State of Washington and subject to the rules and regulations of the Department of Water Resources.

1. *The proposed appropriation will be from* well
(Well, tunnel, infiltration trench)

located within the city limits of Issaquah, Washington.
(Give approximate distance and direction from nearest city or town)

Area ______ (Leave blank) *Sub-area* ______ (Leave blank)

Zone ______ (Leave blank)

Applicant's name or number of well or other works, if any #3

2. *The quantity of water which applicant intends to withdraw for beneficial use is* 300 *gallons per minute;* 119 *acre feet per year.*

3. *The use or uses to which water is to be applied* municipal
(Domestic supply, irrigation, municipal, manufacturing, industrial use, etc.)

4. ~~*The time during which water will be required each year*~~ May through October

5. *Location of well or other works for withdrawal of water: In county of* King

(a) ~~From N.W. Corner of the N.W. Quarter of Section 34, T24N, Range 6E, W.M., S51°16'29"E for 3049.1 ft.~~
(Give distance and bearing from nearest corner of section or legal subdivision)
250' W $ 1150' N of center of sec 34

being within the SE 1/4 of NW1/4 (Give smallest legal subdivision) *of Sec.* 34, *Twp.* 24 *N., Rge.* 6E (E. or W.)

or *(b) If within limits of recorded platted property, town or city: Lot* ______, *Block* ______,

of ______ (Give name of plat or addition) ______ (If within town or city, give name)

(c) Show this location on accompanying section plat. Other adequate maps or drawings will be acceptable.

6. Description of Works:

(a) Well will be drilled *(Dug or drilled)* *and have a diameter of* 8 *inches and an estimated depth of* 168 *feet.*

(b) Tunnels or trenches to be described: (Attach additional sheets if needed for full description.)

(c) Distribution system to be described:

Water from said well shall be pumped through a 12" transmission main, which in turn enters the existing city water distribution system.

(d) If pumps are to be used, give size and type:

Pumping system has not been designed at this time. Design is awaiting well testing as to its capacity.

(e) Give capacity and type of motor or engine to be used:

(f) If the location of the well, tunnel, or other works is less than one-fourth mile from a natural stream or stream channel, give the distance to the nearest point on each of such channels and the difference in elevation between the stream bed and the ground surface at the source of development:

(g) Ownership of each existing well or other works from which ground water is withdrawn within a radius of one-quarter mile and the distance and direction from well or other works being reported herein:

(Name)	(Direction)	(Distance)
City of Issaquah	North	200 feet

Supply the Following Information According to Use Proposed:

7. *For Municipal Supply: To supply the city, town, or community of* Issaquah*, in the county of* King*, having a present population of* 4,850*, and an estimated population of* 10,000*, in 19*90.

8. *For Irrigation: Number of acres to be irrigated* .... *acres.*

RECEIVED SEP 1 1976 DEPT. OF ECOLOGY REGIONAL OFFICE REDMOND, WA. 98052

9. *Legal Description of Property on which water is to be used for all purposes other than municipal supply:*

(Copy legal description from deed)
(If more space is required, attach separate sheet)

Well #3 is located in a portion of the southeast quarter of the northwest quarter of Section 34, Township 24 North, Range 6 East, W.M., described as follows:

Beginning at the northwest corner of the northwest quarter of Section 34, thence South 2°00'11" west along the west line thereof 1823.2 feet; the south 87°59'49" east, at right angles, 2444.0 feet to the center of the casing of said well. Bearings refer to the Washington State Coordinate System, North Zone, as established by the King County Aerial Survey.

Area served by City of Issaquah

(On accompanying plat show location of the existing wells or works)

10. *What interest do you have in the above described property?* Owner

(Owner, lessee, contract buyer, etc.)

11. *Do you have any other water rights appurtenant to the above described property?* Yes

If so, from what source? Well #4 (groundwater) Concurrent application (G1-22734) for municipal - 600 gpm 9/14/76 JJ

12. *Construction work will begin on or before* September 1976

13. *Construction work will be completed on or before* November 1976

14. *Water will be put to complete beneficial use on or before* November 1976

City of Issaquah

By: H G Herrington
(Signature of applicant)

15. *Name and address of owner of land on which well or works are located:*

City of Issaquah
(Name)

130 E. Sunset Way (P.O. Box M) Issaquah, WA
(Address)

By: H G Herrington
(Signature of legal landowner)
H. G. HERRINGTON, MAYOR

Signed in the presence of us as witnesses:

Linda Ruehle
Linda Ruehle, (Name) City Clerk

City of Issaquah; P.O.Box M; Issaquah, WA 98027
(Address of witness)

Jerald L. Osterman
Jerald L. Osterman, (Name) Admin. Assistant

City of Issaquah; P.O.Box M; Issaquah, WA 98027
(Address of witness)

STATE OF WASHINGTON,
COUNTY OF THURSTON. } ss.

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for correction or completion as follows:

In order to retain its priority, this application must be returned to the Department of Water Resources, with corrections, on or before ...., 19......

WITNESS my hand this .... *day of* ...., 19......

Division of Water Management,
Department of Water Resources.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

APPLICATION NO.	PRIORITY DATE OF APPLICATION
G1-22733	September 1, 1976

NAME
CITY OF ISSAQUAH

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 East Sunset Way (P.O. Box M)	Issaquah	Washington	98027

Examination Date: January 20, 1977

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	300.0	119.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal Supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWL
250 feet west and 1150 feet north of center of Sec. 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼NW¼	34	24	6 E.	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Area served by City of Issaquah

DESCRIPTION OF PROPOSED WORKS

Well drilled 8" diameter, 168' deep.
Detailed plans will be supplied prior to final Certificate.

DEVELOPMENT SCHEDULE

BEGINNING DATE	COMPLETION DATE	DATE COMPLETE APPLICATION OF WATER TO BE MADE
Started - well drilled	3 yrs from permit issuance	4 yrs from permit issuance

PROVISIONS AND RECOMMENDATIONS

Evaluation:

This Report of Examination began with a site visit on January 20, 1977, followed by a review of your current water rights, a review of your Comprehensive Water Plan and finally a review of the Ground Water Study and pump test results for the wells in question.

The City of Issaquah currently has two (2) certificates of water rights in good standing from the Risdon Wells Numbers 1 and 2 - Certificates Numbers 6343 and 7031 respectively. Your Comprehensive Water Plan also shows a certificate of water right No. 1087 from your water shed. This was relinquished by the City on October 2, 1970. Also, a pending 1970 Surface Water Application from seven springs on the East Water Shed is scheduled to be cancelled once these present applications are approved.

Recognizing that your system requirements are based on peak demands using instantaneous withdrawals and storage as key factors, we will normally approve a realistic request for additional instantaneous withdrawals, assuming no overriding factors occur. Our management of the resource, however, requires that we restrict your total annual permitted use from all sources to a quantity compatible with projected population growth. For example, you show a projected population of 10,000 by the year 1990. Using our standard maximum allowable daily average of 200 gallons per day/person or 0.224 acre-feet per year/person x 10,000 = 2,240 acre-feet per year (Maximum annual total from all your water rights). Quantities granted on your current two (2) ground water certificate exceeds this by 360 acre-feet per year; primarily due to past over estimation of population growth. This should create no major problem, however, as any annual quantities granted on these current requests would be supplemental to that presently approved.

A graphic look at your past, present and proposed water rights is as follows:

WATER RIGHT CERTIFICATES

Source	W.R.C. No.	Inst. Q	Annual Q. Primary	Annual Q. Supplemental
Water Shed	S.W. 1087	- Relinquished by the City October 2, 1970		
Risdon Wells				
No. 1	G.W. 6343	630 GPM	1000 AF/YR	
No. 2	G.W. 7031	1200 GPM	1600 AF/YR	

PENDING APPLICATIONS

Source	Application No.	Inst. Q.	Annual Q. Primary	Annual Q. Supplemental
East Water Shed			To be canceled pending approval of Ground Water Application	
7 springs	21981	2.5 CFS		
Well #3	G1-22733	300 GPM		119 AF/YR
Well #4	G1-22734	600 GPM		645 AF/YR

Conclusions

The pump tests substantiate availability of water in quantities requested. No evidence was found to show that this withdrawal, if approved, would have any effect on existing rights nor prove detrimental to the public interest. Therefore, having due regard to the highest feasible development of the use to public waters, I recommend this application should go to permit subject to existing rights and the following conditions.

Special Conditions:

To be included on Permit and final Water Right Certificate -

"Instantaneous withdrawal shall not exceed 300 gallons per minute and the annual withdrawal shall not exceed 119 acre-feet per year" (Quantity approved based on quantity requested).

When approved "This is a supplemental right to primary Ground Water Certificates 6343 and 7031. Total annual withdrawals from all sources shall not exceed the 2600 acre-feet per year previously approved on primary rights." (Annual quantity calculated from estimated 1990 population of 10,000. Future increase to this annual quantity must be justified by population increase, or other unusual circumstances, and approved by this office.)

To be included on permit -

"All new water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

"The 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 airline and gage in addition to the access port."

"A suitable measuring device shall be installed and maintained in accordance with WAC 508-64-020 through WAC 508-64-040." (Installation, operation and maintenance requirements attached hereto.)

"Prior to issuance of a Certificate of Water Right, the applicant will be required to furnish information to this office as part of his Proof of Appropriation as to the size and type of equipment installed and the rate at which water is withdrawn in gallons per minute."

Other Comments and Recommendations:

Applicant is advised that notice of proof of appropriation of water (under which final certificate of water right issues) should not be filed until the permanent diversion facilities have been installed together with a mainline system capable of delivering the recommended quantity of water to an existing or proposed distribution system within the area to be served.

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 Assistant Secretary, Division of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Division of Health, Public Health Building No. 4, Thurston Airdustrial Center, Olympia, with regard to the need for compliance.

Upon approval of this application G1-22733 and/or accompanying application G1-22734 we shall initiate final action for cancellation of pending Surface Water Application No. 21981.

Signed at Redmond, Washington,

this 31 day of January, 1977.

Roy C. Bishop

ROY C. BISHOP
Resource Management
Department of Ecology

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

APPLICATION NO.	PRIORITY DATE OF APPLICATION
G1-22733	9-1-76

NAME
CITY OF ISSAQUAH

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
P.O. Box M - 130 East Sunset Way	Issaquah	Washington	98027

1/20/77 Ron B

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	300	119

QUANTITY, TYPE OF USE, PERIOD OF USE
municipal - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
250 feet west and 1150 feet north of center of SEC 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE 1/4 NW 1/4	34	24	6 E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Fee 2002

Health

DESCRIPTION OF PROPOSED WORKS

Well drilled

8" dia 168' deep

Detailed plans will be supplied prior to final certificate

DEVELOPMENT SCHEDULE

BEGINNING DATE	COMPLETION DATE	DATE COMPLETE APPLICATION OF WATER TO BE MADE
started - well drilled	3 yrs from P.2.	4 yrs from P.2.

PROVISIONS AND RECOMMENDATIONS

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

PERMIT NUMBER	APPLICATION NUMBER	PRIORITY DATE
G1-22733P	G1-22733	September 1, 1976

NAME
CITY OF ISSAQUAH

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 East Sunset Way (P.O. Box M)	Issaquah	Washington	98027

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	300.0	119.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal Supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
250 feet west and 1150 feet north of center of Sec. 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼NW¼	34	24	6 E.	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Area served by City of Issaquah

ECY 040-1-20

PERMIT

DESCRIPTION OF PROPOSED WORKS

DEVELOPMENT SCHEDULE

BEGINNING DATE	COMPLETION DATE	DATE COMPLETE APPLICATION OF WATER TO BE MADE
Started - well drilled	March 15, 1980	March 15, 1981

PROVISIONS

Instantaneous withdrawal shall not exceed 300 gallons per minute and the annual withdrawal shall not exceed 119 acre-feet per year.

This is a supplemental right to primary Ground Water Certificates 6343 and 7031. Total annual withdrawals from all sources shall not exceed the 2600 acre-feet per year previously approved on primary rights.

All new water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

The 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 airline and gage in addition to the access port.

A suitable measuring device shall be installed and maintained in accordance with WAC 508-64-020 through WAC 508-64-040.

Prior to issuance of a Certificate of Water Right, the applicant will be required to furnish information to this office as part of his Proof of Appropriation as to the size and type of equipment installed and the rate at which water is withdrawn in gallons per minute.

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Olympia, Washington, this 15th *day of* March, *19*77

~~JOHN A. BIGGS, Director~~
Department of Ecology

ENGINEERING DATA
OK [signature]

by [signature]
ROBERT K. McCORMICK, Regional Manager

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
September 1, 1976	G1-22733	G1-22733P	G1-22733C

NAME
CITY OF ISSAQUAH

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 East Sunset Way (P.O. Box M)	Issaquah	Washington	98027

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
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	300.0	119.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal Supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
250 feet west and 1150 feet north of center of Sec. 34.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼NW¼	34	24	6 E.	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Issaquah.

ECY 040-1-2 (Rev. 4-77)

(SEE REVERSE SIDE)

CERTIFICATE

PROVISIONS

Instantaneous withdrawal shall not exceed 300 gallons per minute and the annual withdrawal shall not exceed 119 acre-feet per year.

This is a supplemental right to primary Ground Water Certificates 6343 and 7031. Total annual withdrawals from all sources shall not exceed the 2600 acre-feet per year previously approved on primary rights.

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508-64-020 through WAC 508-64-040 (Installation, operation and maintenance requirements attached hereto).

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 Redmond *Washington, this* 31st *day*

of August, *19* 81

Department of Ecology

ENGINEERING DATA

OK JJ

by Robert K. McCormick

ROBERT K. McCORMICK, Regional Manager

FOR COUNTY USE ONLY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

COMPUTER INPUT
- [ ] APPLICATION
- [ ] PERMIT
- [ ] CERTIFICATE
- [ ] OTHER

PROGRESS SHEET

[ ] SURFACE WATER [X] GROUND WATER

NAME: CITY OF ISSAQUAH
TELEPHONE NO.:
ADDRESS: 130 E. Sunset Way (P.O. Box M) (CITY) Issaquah (STATE) Washington (ZIP CODE) 98027
ASSIGNED TO:
TELEPHONE NO.:
DATE ASSIGNED:
ADDRESS: (CITY) (STATE) (ZIP CODE)

APPLICATION NO. G122733
PERMIT NO. G-122733
CERTIFICATION NO. G-122733
DATE AMENDED:
DATE CANCELLED:
W.R.I.A.:

APPLICATION

DATE APPLICATION RECEIVED: 9-1-76
INITIAL $10.00 FEE RECEIVED: [X] YES [ ] NO
DATE FEE RECEIVED: 9-7-76
STATEMENT OF ADDITIONAL EXAMINATION FEE $
DATE SENT:
DATE RECEIVED:
DATE RETURNED FOR COMPLETION OR CORRECTION:
DATE RECEIVED:

TEMPORARY PERMIT

APPROVED BY:
DATE ISSUED:

PUBLICATION

APPROVED BY: TT
DATE APPROVED: 9/15/76
DATE NOTICE SENT:
PROTESTED BY AND DATE:

Returned as not original

DATE AFFIDAVIT RECEIVED: 11-29-76 12-8-76
CHECKED BY: B
TIME EXPIRED: 10-29-76
DATE AMENDED NOTICE SENT:
DATE AFFIDAVIT RECEIVED:
TIME EXPIRED:

DEPARTMENT OF GAME AND FISHERIES REPORT

APPROVED:
PROVISO:
PROTEST:

EXAMINATION

DATE EXAMINATION MADE: 1/20/77
MADE BY: Ron B
DATE REPORT OF EXAM. WRITTEN: 1/28/77
WRITTEN BY: Ron B
CHECKED BY: [illegible]
DATE PERMIT FEE REQUESTED: 2/3/77
AMOUNT DUE: 20.00
DATE RECEIVED: 2-10-77

OK TO PERMIT. 2-14-77

PERMIT

PERMIT APPROVED BY: TT
DATE APPROVED: 3/11/77
PERMIT NO. G122733
DATE ISSUED: 3/15/77

BEGINNING OF CONSTRUCTION

DATE NOTICE SENT:
DATE FILED:
EXTENSION FEE:
EXTENDED TO:
EXTENDED TO:

WELL DRILLER'S AND/OR CONSTRUCTION REPORT

DATE SENT: 3-16-77
DATE FILED: In File

COMPLETION OF CONSTRUCTION

DATE NOTICE SENT: 3-16-77
DATE FILED: 3/31/80
EXTENSION FEE:
EXTENDED TO:
EXTENDED TO:

PROOF OF APPROPRIATION

DATE SENT:
DATE FILED: 6-12-81
EXTENSION FEE:
EXTENDED TO:
DATE CERTIFICATE FEE REQUESTED:
AMOUNT DUE:
DATE RECEIVED: 6-12-81
DATE APPROVED FOR CERTIFICATE: 7-14-81
APPROVED BY: TT

CERTIFICATION

PROOF EXAM. REQUIRED: [ ] YES [ ] NO
CERTIFICATE NUMBER: G122733
DATE ISSUED: 7-30-81

REMARKS:

ECY 070-17

PROGRESS

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

RECEIVED
APR 30 1997

Accepted By: [illegible]
Date: 5-21-97
Is Field Exam Required? ☐ YES ☐ NO
Determined By:

APPLICATION FOR CHANGE OF WATER RIGHT

☐ PURPOSE ☐ DIVERSION OR WITHDRAWAL
☒ PLACE ☐ ADDITIONAL POINT OR POINTS

DENIED

NAME: CITY OF ISSAQUAH — Bus. Tel. 391-1004; Home Tel.; Other Tel.

OF ECOLOGY

ADDRESS	(CITY)	(STATE)	(ZIP CODE)
PO Box 1307	Issaquah	Washington	98027

APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
G1-22733	G1-22733P	G1-22733C

DECREED RIGHT (TITLE OF CASE)

APPROPRIATIONS MADE (GIVE DATE IF PRIOR TO JUNE 7, 1917 IF SURFACE WATER, OR JUNE 7, 1945 IF GROUND WATER)

IS THE WATER RIGHT RECORDED IN YOUR NAME? ☒ YES ☐ NO | IF NO, GIVE NAME RECORDED UNDER

1. RIGHT CONSISTS OF

WATERS USED FROM (STREAM, LAKE, WELL, OR TRENCH, ETC.)	GALLONS PER MINUTE OR CUBIC FEET PER SECOND
Well	300 gpm

WATER CURRENTLY USED FOR	TIME OF USE
Municipal Supply	Continuously

2. LOCATION OF PRESENT POINT OF DIVERSION OR WITHDRAWAL

ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.

250 feet west and 1150 feet north of center of Section 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
SE 1/4 NW 1/4	34	24	6E	King

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, COMPLETE THIS SECTION

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

3. LEGAL DESCRIPTION OF LANDS WATER IS USED ON

Within the corporate limits of the City of Issaquah

SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
			King

(ATTACH SEPARATE SHEET IF NECESSARY)

ARE YOU THE LEGAL OWNER OF THE ABOVE DESCRIBED LANDS ☐ YES ☐ NO | IF NO, EXPLAIN YOUR INTEREST

REASONS FOR THE PROPOSED CHANGE

Well capacity dropped due to poor construction and City no longer owns property where well was sited.

A MINIMUM FEE OF $10.00 MUST ACCOMPANY THIS APPLICATION

CONTINUE ON REVERSE SIDE

CHANGE

ECY 040-1-97
Rev. 3/96

4. **CHANGE REQUESTED**

CHANGE WATER USE TO	TIME OF USE	GALLONS PER MINUTE OR CUBIC FEET PER SECOND
N/A	N/A	N/A

5. **LOCATION OF PROPOSED POINT OF DIVERSION OR WITHDRAWAL**

ON ACCOMPANYING SECTION MAPS, ACCURATELY MARK AND IDENTIFY EACH POINT OF DIVERSION. SHOW NORTH-SOUTH AND EAST-WEST DISTANCES FROM NEAREST SECTION CORNER OR PROPERTY CORNER.

ALSO, ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.

920 feet west and 110 north of SE corner of NW 1/4 of Section 21

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
SE 1/4 NW 1/4	21	24	6E	King

6. **IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, COMPLETE THIS SECTION**

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

ARE YOU THE OWNER OF THE LAND ON WHICH THE PROPOSED POINT OF DIVERSION OR WITHDRAWAL IS TO BE LOCATED

☐ YES ☐ NO

LEGAL DESCRIPTION OF LANDS WATER IS USED ON

Within the corporate limits of the City of Issaquah

SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
			King

(ATTACH SEPARATE SHEET IF NECESSARY)

ARE YOU THE LEGAL OWNER OF THE ABOVE DESCRIBED LANDS	IF NO, EXPLAIN YOUR INTEREST
☐ YES ☐ NO	

* PLEASE NOTE LEGAL LAND OWNER SIGNATURE AND APPLICANT SIGNATURE ARE BOTH REQUIRED. IF THE LEGAL LAND OWNER AND APPLICANT ARE THE SAME, PLEASE SIGN IN BOTH PLACES. THANK YOU.

LEGAL LANDOWNER (PLEASE PRINT)

[signature]

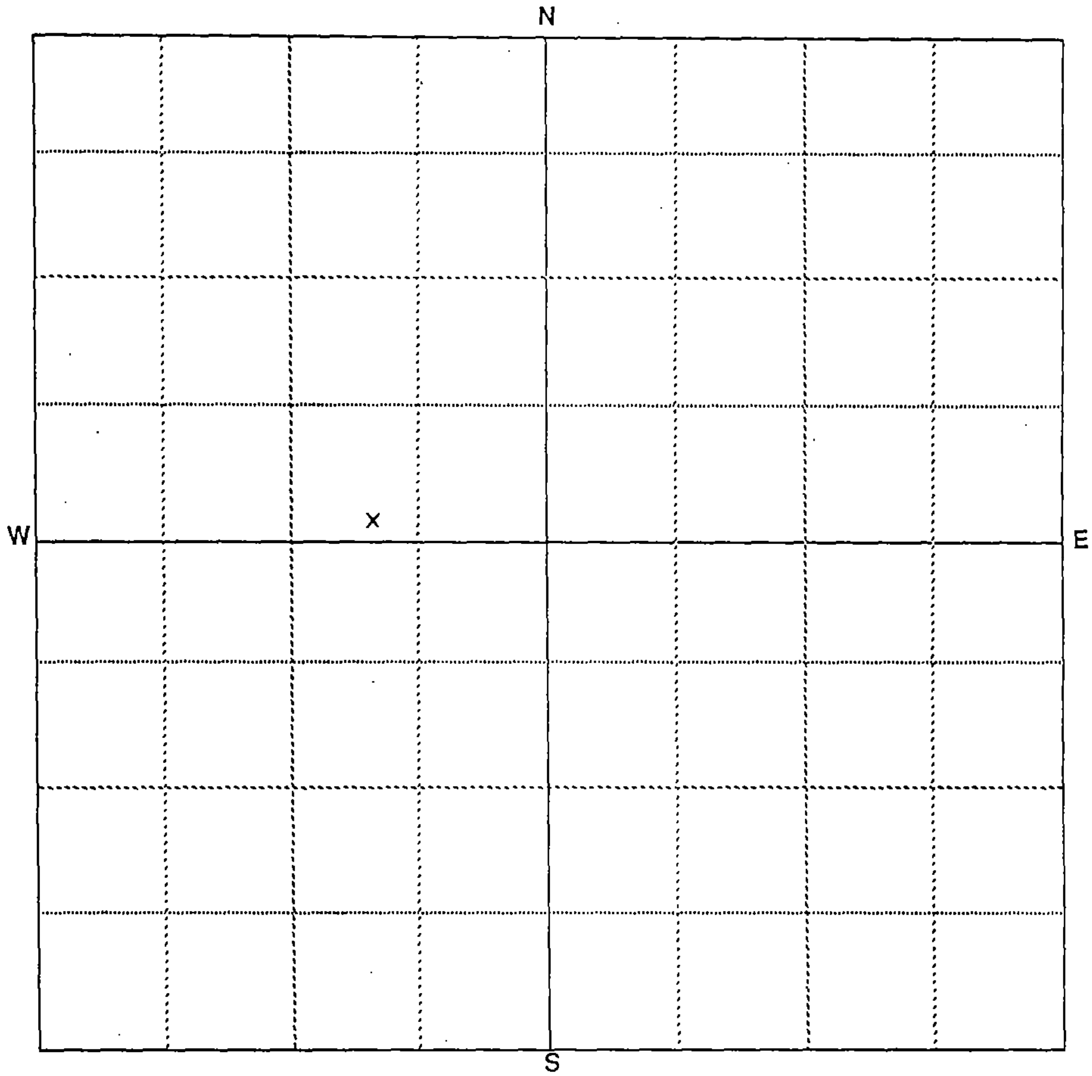
APPLICANT'S SIGNATURE

LEGAL LANDOWNER SIGNATURE (OWNER OF PROPERTY DESCRIBED IN ITEM NUMBER 3)

LEGAL LANDOWNER'S ADDRESS

SECTION MAP

Sec. 21 Twp. 24 N. R. 6E



Scale: 1 inch = 800 feet (each small square = 10 acres)

Show by a cross (X) the location of point of diversion (surface water source) or point of withdrawal (ground water source). For ground water applications, show by a circle (O) the locations of other wells or works within a quarter of a mile.
Indicate traveling directions from nearest town in space below.

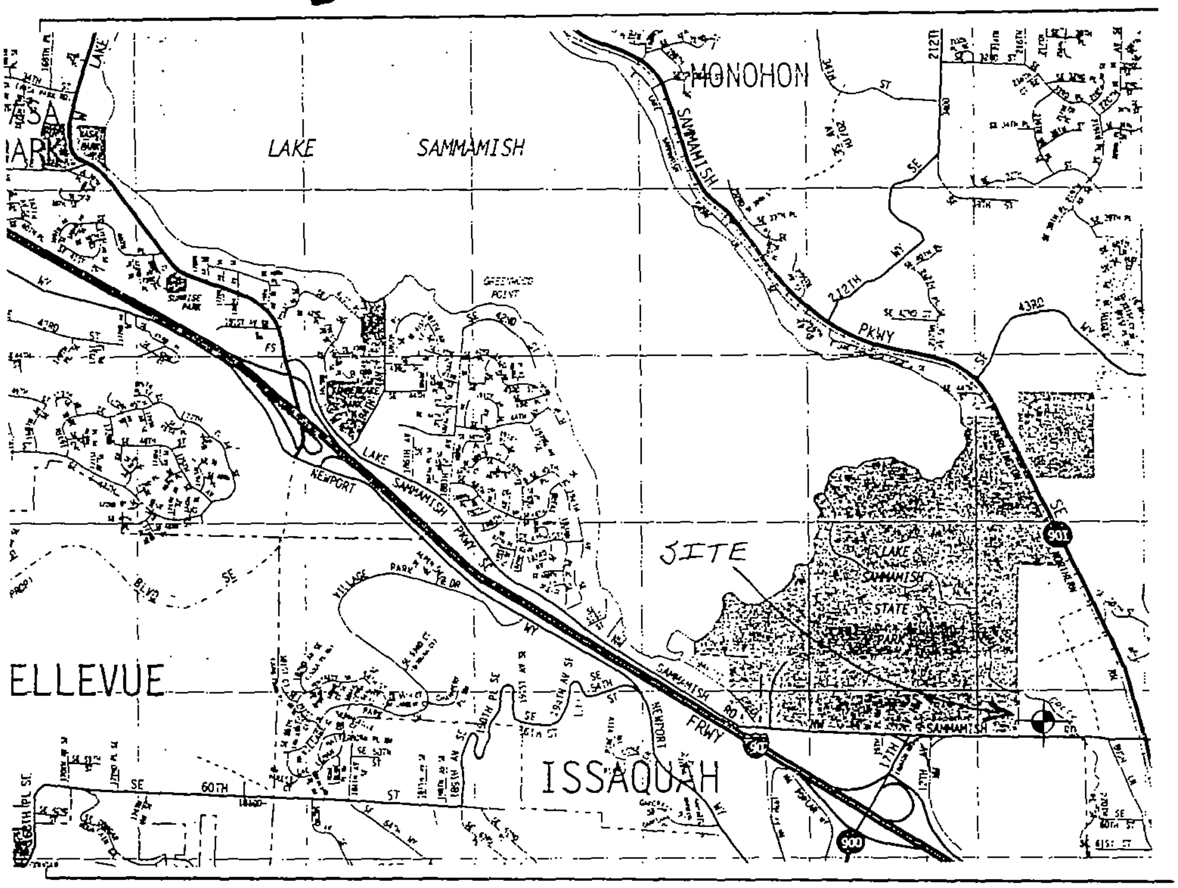
From Bellevue, Washington; take I-90 eastbound, exit off I-90 at Exit 15; go north to NW Sammamish Road (SE56th St.); go east on NW Sammamish Road approximately 3/4 mile. The site is located on the north side of NW Sammamish Road west of the retention ponds.

Detach here

Fold along scale

0 400 800 1,200 1,600 2,000 2,400 2,800 3,200 3,600 4,000 4,400 4,800 5,200

Detach this scale at the perforation, fold excess paper under or cut off excess by cutting along the scale line. This scale corresponds to the SECTION MAP above. You can read feet directly from this scale to outline property and locate points of diversion or withdrawal on the SECTION MAP. Enclose this map along with the application and $10.00 examination fee.



Your water right application will be processed by the Regional Office of the Department of Ecology having jurisdiction in the area in which your water works are located. Please submit your **completed application form, maps, sketches, and $10.00 examination fee to the appropriate Regional Office.**

Northwest Regional Office
3190 - 160th Avenue S.E.
Bellevue, WA 98008-5452
Tel. (206) 649-7000
TDD (206) 649-4259

Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902-3401
Tel. (509) 575-2490
TDD (509) 454-7673

Southwest Regional Office
PO Box 47775
Olympia, Washington 98504-7775
300 Desmond Drive
Lacey, WA 98503
Tel. (360) 407-6300
TDD (360) 407-6306

Eastern Regional Office
N. 4601 Monroe, Suite 100
Spokane, Washington 99205-1295
Tel. (509) 456-2926
TDD (509) 458-2055

The appropriate Regional Office will be happy to answer any further questions you may have.

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs please contact the appropriate Regional Office from above.

RECEIVED

APR 30 1997

DEPT. OF ECOLOGY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

APPLICATION FOR CHANGE OF WATER RIGHT

RECEIVED
APR 29 1997
DEPT. OF ECOLOGY

☐ PURPOSE ☐ DIVERSION OR WITHDRAWAL
☒ PLACE ☐ ADDITIONAL POINT OR POINTS

Accepted By:
Date:
Is Field Exam. Required? ☒ YES ☒ NO
Determined By:

$10.00
FEE PAID
4/30/97

NAME: CITY OF ISSAQUAH

Bus. Tel. 391-1004
Home Tel.
Other Tel.

ADDRESS	(CITY)	(STATE)	(ZIP CODE)
PO Box 1307	Issaquah	Washington	98027

APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
G1-22733	G1-22733P	G1-22733C

DECREED RIGHT (TITLE OF CASE)

APPROPRIATIONS MADE (GIVE DATE IF PRIOR TO JUNE 7, 1917 IF SURFACE WATER, OR JUNE 7, 1945 IF GROUND WATER)

IS THE WATER RIGHT RECORDED IN YOUR NAME? ☒ YES ☐ NO
IF NO, GIVE NAME RECORDED UNDER

1. RIGHT CONSISTS OF

WATERS USED FROM (STREAM, LAKE, WELL, OR TRENCH, ETC.)	GALLONS PER MINUTE OR CUBIC FEET PER SECOND
Well	300 gpm

WATER CURRENTLY USED FOR	TIME OF USE
Municipal Supply	Continuously

2. LOCATION OF PRESENT POINT OF DIVERSION OR WITHDRAWAL

ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.

250 feet west and 1150 feet north of center of Section 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
SE 1/4 NW 1/4	34	24	6E	King

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, COMPLETE THIS SECTION

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

3. LEGAL DESCRIPTION OF LANDS WATER IS USED ON

Within the corporate limits of the City of Issaquah

SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
			King

(ATTACH SEPARATE SHEET IF NECESSARY)

ARE YOU THE LEGAL OWNER OF THE ABOVE DESCRIBED LANDS ☐ YES ☐ NO
IF NO, EXPLAIN YOUR INTEREST

REASONS FOR THE PROPOSED CHANGE

Well capacity dropped due to poor construction and City no longer owns property where well was sited.

A MINIMUM FEE OF $10.00 MUST ACCOMPANY THIS APPLICATION

CONTINUE ON REVERSE SIDE

CHANGE

ECY 040-1-97
Rev. 3/96

4. CHANGE REQUESTED

CHANGE WATER USE TO	TIME OF USE	GALLONS PER MINUTE OR CUBIC FEET PER SECOND
N/A	N/A	N/A

5. LOCATION OF PROPOSED POINT OF DIVERSION OR WITHDRAWAL

ON ACCOMPANYING SECTION MAPS, ACCURATELY MARK AND IDENTIFY EACH POINT OF DIVERSION. SHOW NORTH-SOUTH AND EAST-WEST DISTANCES FROM NEAREST SECTION CORNER OR PROPERTY CORNER.

ALSO, ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.

1346 feet north and 1780 feet west of the Center of Section 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
SE 1/4 NW 1/4 NW 1/4	34	24	6E	King

6. IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, COMPLETE THIS SECTION

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

ARE YOU THE OWNER OF THE LAND ON WHICH THE PROPOSED POINT OF DIVERSION OR WITHDRAWAL IS TO BE LOCATED

☐ YES ☐ NO

LEGAL DESCRIPTION OF LANDS WATER IS USED ON

Within the corporate limits of the City of Issaquah

SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
			King

(ATTACH SEPARATE SHEET IF NECESSARY)

ARE YOU THE LEGAL OWNER OF THE ABOVE DESCRIBED LANDS	IF NO, EXPLAIN YOUR INTEREST
☐ YES ☐ NO	

* PLEASE NOTE LEGAL LAND OWNER SIGNATURE AND APPLICANT SIGNATURE ARE BOTH REQUIRED. IF THE LEGAL LAND OWNER AND APPLICANT ARE THE SAME, PLEASE SIGN IN BOTH PLACES. THANK YOU.

LEGAL LANDOWNER (PLEASE PRINT)

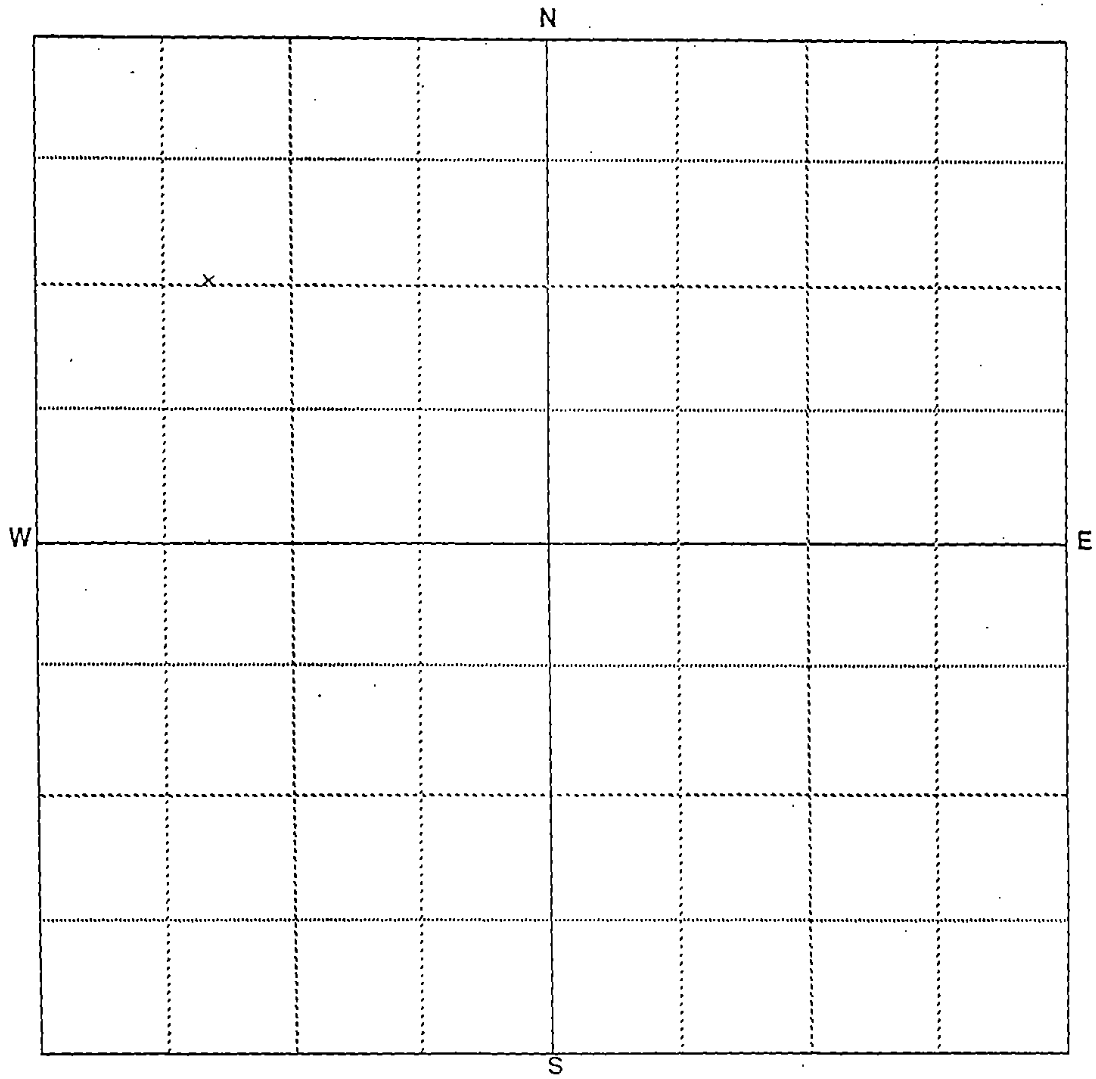
APPLICANT'S SIGNATURE

LEGAL LANDOWNER SIGNATURE (OWNER OF PROPERTY DESCRIBED IN ITEM NUMBER 3)

LEGAL LANDOWNER'S ADDRESS

SECTION MAP

Sec. 34 Twp. 24 N. R. 6E



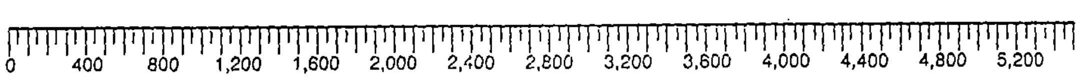
Scale: 1 inch = 800 feet (each small square = 10 acres)

Show by a cross (X) the location of point of diversion (surface water source) or point of withdrawal (ground water source). For ground water applications, show by a circle (O) the locations of other wells or works within a quarter of a mile.
Indicate traveling directions from nearest town in space below.

From Bellevue, Washington; take I-90 eastbound, exit off I-90 at Exit 17; go south on Front Street to SE Bush Street. Turn left (east) on SE Bush and go approximately 150 feet past the intersection with 1st Avenue SE and turh south into the parking lot. Go to southern end of parking area. Well site is between parking area and 2nd Avenue SE.

Detach here

Fold along scale



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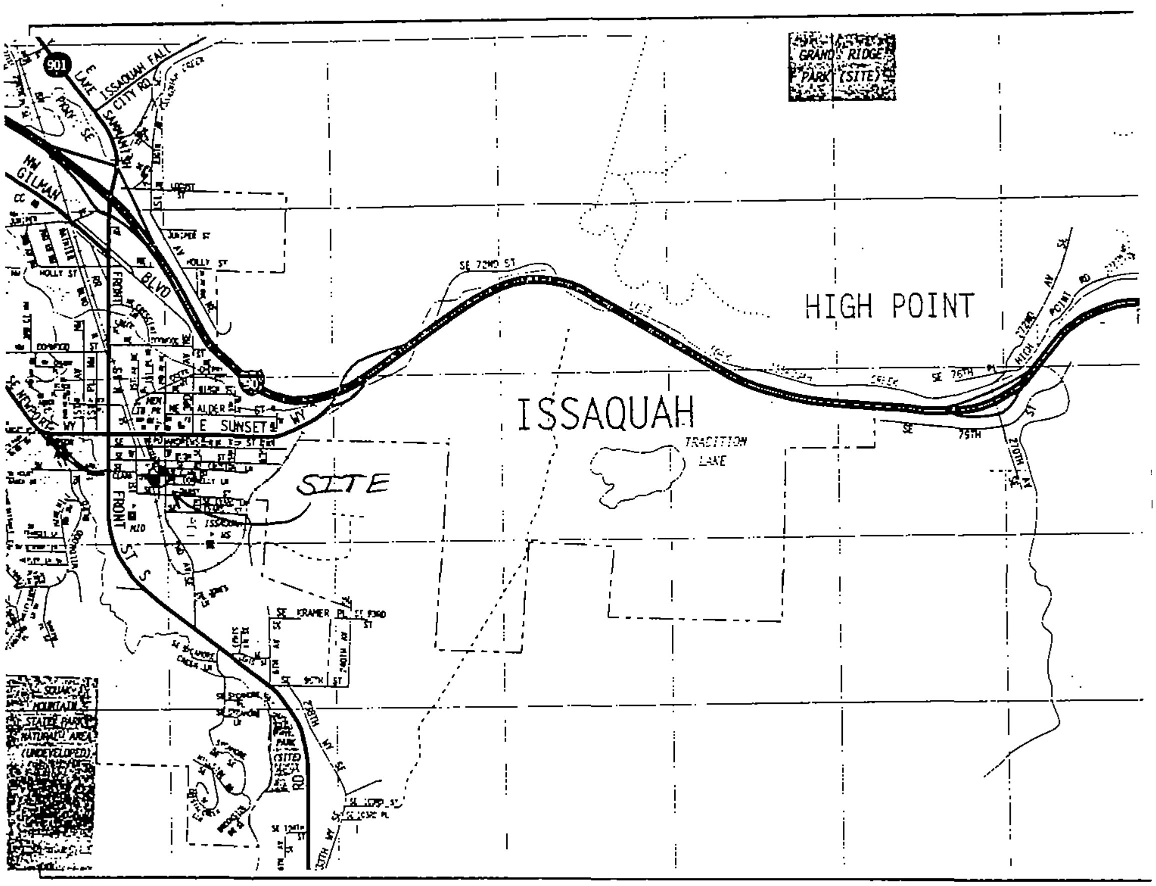

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Tel. (509) 575-2490
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N. 4601 Monroe, Suite 100
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Tel. (509) 456-2926
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The appropriate Regional Office will be happy to answer any further questions you may have.

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CITY OF ISSAQUAH
Public Works Department
1775 12th Ave. NW / P.O. Box 1307
Issaquah, WA 98027-1307
(206) 391-1004 Fax (206) 391-1050

RECEIVED

APR 30 1997

DEPT OF ECOLOGY

May 1, 1997

Mr. Ray Hellwig
Department of Ecology
Northwest Regional Office
3190 - 160th Avenue SE
Bellevue, Washington 98008-5452

Subject: Applications For Change of Point of Diversion and Preliminary Pump Test Permit

Dear Mr. Hellwig:

Enclosed with this letter are four separate applications for changing the point of diversion of two existing water rights to two separate geographic locations. These applications should also be considered as the City's request for a Preliminary Permit to Drill and Test wells at the two geographic locations. Also, a check for twenty dollars ($20) is enclosed for the processing of two of the four applications. Additionally, the City is requesting a at the following

The City is requesting that the Department of Ecology not publish the notice of application for the applications until test well drilling has been completed to determine which of the two locations is best suited for production well(s). Once a suitable location has been identified, the City will inform Ecology which two of the four applications to publish notifications for.

In February of this year, the City wrote Ecology a letter (February 19, 1997, to Buck Smith) requesting a "Pump Test Permit" in accordance with information given for the correct process. During a meeting with Mr. Smith, Mr. Svoboda, and Mr. Liszak on April 18, the City was informed that an application associated with either a change in water right or for new water right must be submitted to obtain a Preliminary Permit to Drill and Test a Well. Given that Ecology staff unknowingly mis-informed the City about the process, it is hoped that this request for the Preliminary Permit to Drill and Test will be expedited to allow for drilling and testing this summer.

Thank you for your attention to the City's application. Please contact me at 557-2505 if you have further questions or need additional information.

Sincerely,
Public Works Engineering

Sheldon Lynne

Sheldon Lynne, PE
City Engineer

cc: Project File (9543)
Day File
Greg Wilder, Public Works Director
Buck Smith, Department of Ecology
Jerry Liszak, Department of Ecology
Patrick Svoboda, Department of Ecology

MEMORANDUM OF UNDERSTANDING

WATER RESOURCES PLANNING

LOWER ISSAQUAH CREEK VALLEY

April, 97

CITY OF ISSAQUAH

____
Rowan Hinds, Mayor

WASHINGTON STATE DEPARTMENT OF FISH AND WILDLIFE

____
Bernard Shanks, Ph.D., Director

MUCKLESHOOT INDIAN TRIBE

____
Virginia Cross, Chairperson

Section 1; Background

In 1995 the State Department of Fish and Wildlife (WDFW) commissioned the preparation of a Facilities Master Plan for the Issaquah fish hatchery. During the preparation of the Facilities Plan issues surrounding water resources became evident in that there is opportunity to improve production of Coho and Chinook Salmon, improve stream flows, reduce the overall unit cost of producing these species at the Issaquah fish hatchery and improve conditions for egg incubation while maximizing natural spawning upstream of the hatchery. This can be done by providing groundwater to the facility. Another benefit associated with bringing groundwater to the facility is the opportunity to use the facility for egg rearing of rare, weak, or endangered stock from this and other basins.

While bringing groundwater to the facility is excellent, the idea brings with it the complexities of water rights, system reliability, capital and operational costs, and siting a well to produce the groundwater. In February 1973 a report was given to WDFW concerning the viability of siting a deep production well on the hatchery property. The report indicated that the soil stratigraphy below the hatchery site are not capable of producing quantities of water greater than that needed for single family domestic use.

Recognizing the needs of the fisheries resource in the Issaquah Creek Basin, the City of Issaquah offered the use of its production wells in producing groundwater for incubation during non-peak season times. This is in keeping with the City's commitment to the facility as demonstrated by an earlier $500,000 donation to the State to operate and improve the facility.

Recitations.

Whereas, the State of Washington, Muckleshoot Indian Tribe, and City of Issaquah have an interest in the continued operation of the Issaquah Fish Hatchery;

Whereas, the State of Washington, Muckleshoot Indian Tribe, and City of Issaquah would like to increase production of salmonids while reducing the overall operating costs of the hatchery;

Whereas, the State of Washington, Muckleshoot Indian Tribe, and City of Issaquah recognize the need to jointly plan for and protect water resources;

Whereas, the State Department of Fish and Wildlife has recently completed a Facilities Master Plan which identifies sediment laden and pathogen containing, egg incubation water as one of the major issues in production levels and operations costs;

Whereas, the provision of groundwater to the hatchery will help ensure annual production levels of at least 2,000,000 Fall Chinook and 1,000,000 Coho Salmon;

Whereas, the State Department of Fish and Wildlife can exercise its prerogative as a utility customer regarding continued use of the City water system:

Whereas, the City owns and operates groundwater supply, transmission, and distribution facilities with system redundancies built in for reliability;

Whereas, the City has proposed a solution to the State Department of Fish and Wildlife and Muckleshoot Indian Tribe which will reduce costs of operations while maximizing salmonid production and natural spawning in the Issaquah Creek basin, protect and enhance fisheries habitat, and provide water supply as mandated under the State's Growth Management Act;

Whereas, the City of Issaquah has contributed $500,000 toward operating and improving the Issaquah fish hatchery;

Whereas, there is a degree of certainty that the Lake Washington Chinook and Steelhead will be listed as endangered or threatened under the Endangered Species Act in late 1997, and that a supply of groundwater to the Issaquah Hatchery will aid in the implementation of the recovery plan for these species;

Whereas, the State Department of Fish and Wildlife are developing a recovery plan for Kokanee and that a supply of groundwater to the Issaquah Hatchery will aid in the implementation of this recovery plan;

Whereas, the Muckleshoot Indian Tribe and State Department of Fish and Wildlife recognize the importance of the water resources and that the benefit of the City supplying groundwater for egg incubation purposes to the hatchery is greater than the potential impact of additional consumptive water rights the City may apply for under this Memorandum of Understanding;

NOW THEREFORE THE PARTIES AGREE AS FOLLOWS:

Section 1. Those parties signing this Memorandum of Understanding agree to support the planning and development of the water resources in the Lower Issaquah Creek Valley as outlined in further sections.

Section 2. The City of Issaquah is committed to:

A. Provide untreated groundwater to the Issaquah salmon hatchery at a rate of 600 gpm during the egg incubation period of October 1 through April 30, beginning in 1997, and on a yearly basis thereafter following receipt of transfer of non-consumptive water right from the State for 600 gpm;
B. The City will provide untreated water to the hatchery from May 1 through September 30, and on a yearly basis thereafter at a rate of 600 gpm following receipt of a new consumptive use water right permit for 600 gpm, successful

change in 865 acre-feet of supplemental annual water rights to primary water rights, successful change in point of diversion of existing primary water rights (800 gpm) from the old Gun Club wells location to a new well, and construction of necessary facilities;

C. Apply for a change in 865 acre-feet of supplemental annual water rights to Primary water rights;
D. Apply for a change in point of diversion of existing primary water rights (800 gpm) from the old Gun Club wells location to a new well;
E. Apply for 600 gpm new consumptive water rights;
F. Perform hydrogeologic investigations to indicate that the potential impact of the new water rights are mitigated appropriately;
G. Accept a transfer of non-consumptive water rights from the State Department of Fish and Wildlife to a City production well in the amount of 600 gpm and 968 acre-feet non-consumptive water rights:
H. Construct the necessary wells and pumping facilities to produce the amount of water applied for in its water right applications and the amount being transferred to it by the State Department of Fish and Wildlife;
I. Maintain the public water supply and distribution system to the point where connections to it are made.

Section 3. The Washington State Department of Fish and Wildlife is committed to:

A. Transfer or change the point of diversion of non-consumptive water rights to a City of Issaquah production well in the amount of 600 gpm and 968 acre-feet;
B. Recognize the importance of the water resources and that the benefit of the City supplying groundwater for egg incubation purposes to the hatchery is greater than the potential impact of additional consumptive water rights
C. Work cooperatively with, and support the City of Issaquah in its efforts to obtain water rights and ensure that the benefit of the City supplying groundwater for egg incubation purposes to the hatchery is greater than the potential impact of additional consumptive water rights;
D. Not appealing the City's applications for water rights to the Washington State Department of Ecology;
E. Paying for the direct power costs associated with pumping 600 gpm for the period which it is delivered to the hatchery. The direct monthly power costs will be based on the actual unit (dollars per ccf) power costs for December of the preceding year and the amount of water passing through the meter to the hatchery. The unit power cost will remain constant for a period of 12 months, January through December and will be calculated in accordance with the following formula:
   - $P_U = P_T \div Q_V \div 100$

   Where:

   P_U = Unit Power Cost
   P_T = Total power cost for wells during the month of December
   Q_V = Total quantity of water produced in cubic feet

The direct power costs billed will be calculated as follows:

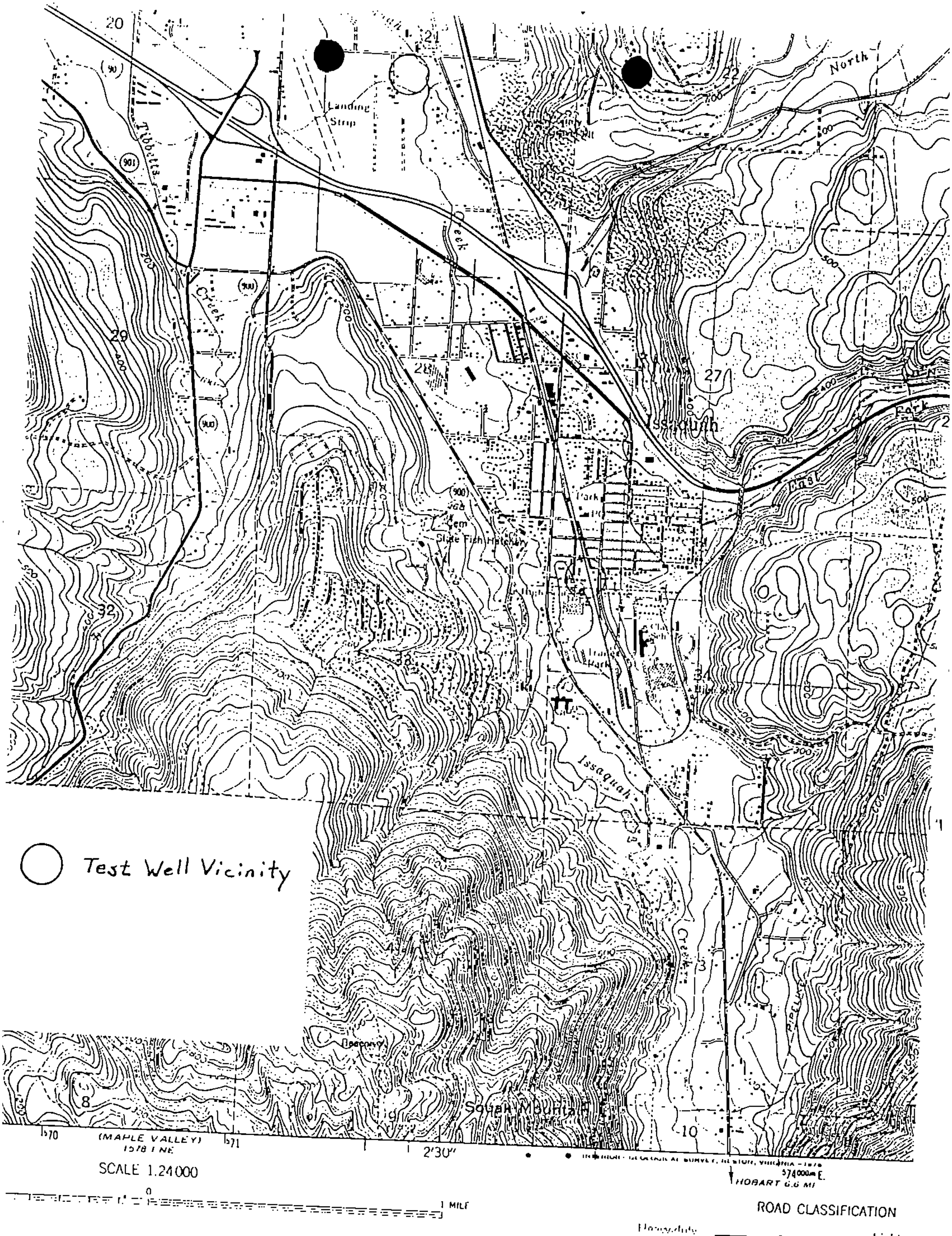
- $P_D = P_U \times Q_M$

Where:

P_D = Direct power cost
P_U = Unit power cost as calculated above
Q_M = Volume (ccf) as determined by reading the water meter

Section 4. The Muckleshoot Indian Tribe is committed to:

A. Recognize the importance of the water resources and the benefit of the City supplying groundwater for egg incubation purposes to the hatchery is greater than the potential impact of additional consumptive water rights
B. Work cooperatively with, and support, the City of Issaquah in its efforts to obtain water rights and ensuring that the benefit of the City supplying groundwater for egg incubation purposes to the hatchery is greater than the potential impact of additional consumptive water rights;
C. Not appealing the City's applications for water rights to the Washington State Department of Ecology.


Test Well Vicinity
Landing Strip
Tibbetts Creek
North
Issaquah
East Fork
Issaquah Creek
State Fish Hatchery
Squak Mountain
(MAPLE VALLEY)
2'30"
574000m E.
HOBART 6.6 MI
SCALE 1:24000
1 MILE
ROAD CLASSIFICATION

2279363

PROGRESS SHEET - APPLICATION FOR CHANGE

CERTIFICATE NO. G1-22733C

NAME: City of Issaquah
P.O. Box 1307
Issaquah, WA 98027

DENIED

Appurtenant to Water Right Certificate No. G1-22733C

PURPOSE OF APPLICATION to change place

Application originally received 4/30/97 Fee Paid $10 4/30/97

Returned for completion or correction

returned

amended & resent by D. Ward 7/2/02

PUBLICATION: Ok'd by D.W. Date Notice Sent 6/7/2002

Protests by

by

by

Affidavit received and checked DW. Time Expires 8/16/02

EXAMINATION: Made 6/5/03 by D. Ward

CERTIFICATE: Ok'd for issue by date

Statement of fee mailed Amount $5

Fee received

Certificate of Change Issued No.

ECY 070-23

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

JUN 13 2003

CERTIFIED MAIL
7002 3150 0004 8540 3619

City of Issaquah
Attn: Sheldon Lynne
P.O. Box 1307
Issaquah, WA 98027

Dear Mr. Lynne:

RE: Denial of Ground Water Right Change - Application No. G1-22733C

Enclosed is the Department of Ecology's Report of Examination, No. G1-22733C. This report constitutes our determination and order regarding the above referenced application.

This change application has been **denied**.

This Order may be appealed pursuant to RCW Chapter 43.21B. The person to whom this Order is issued must file an appeal with the Pollution Control Hearings Board **within thirty (30) days of receipt of this Order.** Send the appeal to: Pollution Control Hearings Board, PO Box 40903, Olympia, Washington 988504-0903. At the same time, a copy of the appeal **must** be sent to: Department of Ecology, Water Resources Appeals Coordinator, P.O. Box 47600, Olympia, Washington 98504-7600. All others receiving notice of this Order must file an appeal with the Pollution Control Hearings Board **within thirty (30) days of the date the Order was mailed** in the same manner described above. An appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21B.320.

If you have any questions or concerns on the above information, please call the Department of Ecology at (425) 649-7000.

Sincerely,

Daniel L Swenson

Daniel L. Swenson
Water Resources Supervisor
Northwest Regional Office

DS:dh
Enclosure:

I certify that I mailed this Order, or an identical copy thereof, postage prepaid, to the above addressee(s) this 13th **day of** June **2003.** Deedee Holt **(Signature)**

7002 3150 0004 8540 3619

U.S. Postal Service™
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(Domestic Mail Only; No Insurance Coverage Provided)

[redacted]

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OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To City of Issaquah
~~Attn: Sheldon Lynne~~
Street, Apt. No.; or PO Box No. P.O. Box 1307
City, State, ZIP+4 Issaquah, WA 98027

PS Form 3800, June 2002 — See Reverse for Instructions

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION FOR CHANGE TO GROUNDWATER RIGHT

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
September 1, 1976	G1-22733A	G1-22733P	G1-22733C

NAME
City of Issaquah

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
P.O. Box 1307	Issaquah	Washington	98027

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Request Denied to change Point of Withdrawal to City of Issaquah Well #6
TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	N/A	N/A

QUANTITY, TYPE OF USE, PERIOD OF USE

N/A

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL
700 feet west and 800 feet south of the NE corner of SE ¼ of Section 28

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼ SE¼	28	24N	06E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Water service area of the City of Issaquah as described in its 2002 Water System Plan, the boundaries of which are shown below.

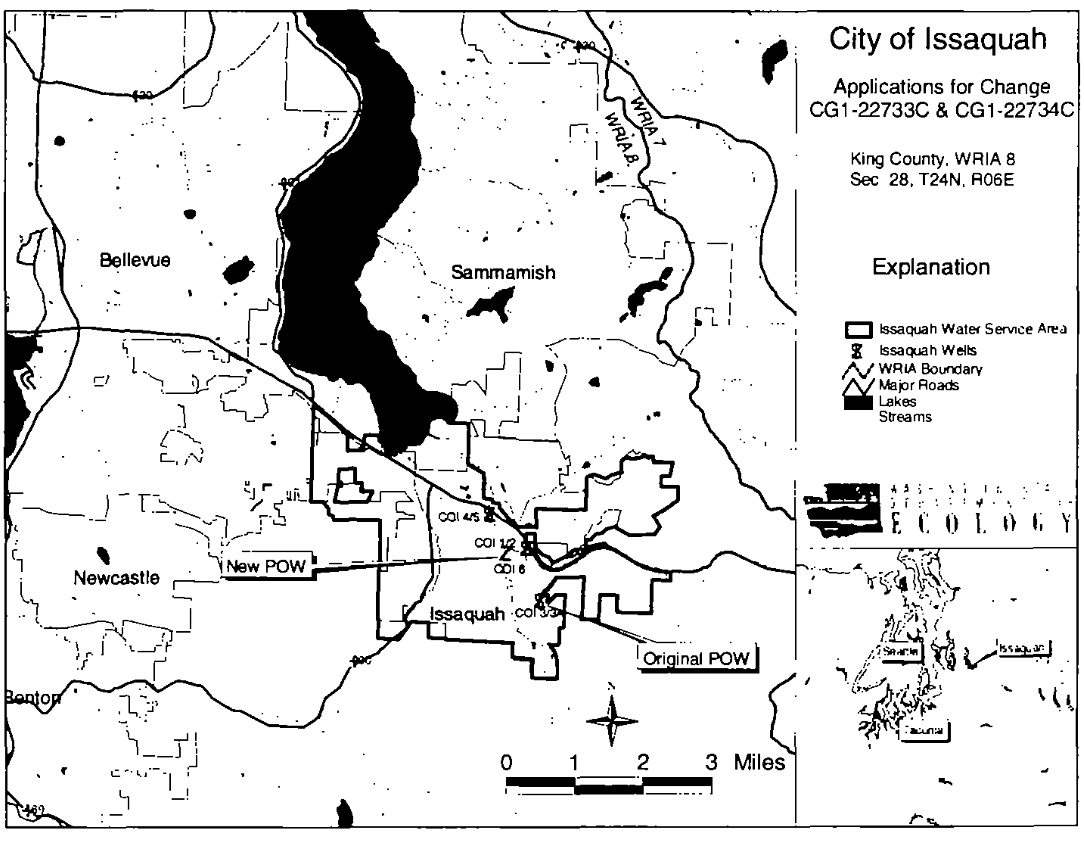


Figure 1: City of Issaquah water system service area and location of wells.

DESCRIPTION OF PROPOSED WORKS

City of Issaquah Well 6 (COI-6), drilled at a 16-inch diameter and tested in July 199?, was completed at a depth of 378 feet. A 20-inch diameter surface seal was installed to a depth of 18 feet. A 10-inch screen is installed from 258 to 363 feet.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE	COMPLETE PROJECT BY THIS DATE	WATER PUT TO FULL USE BY THIS DATE
Begun	N/A	N/A

REPORT

BACKGROUND INFORMATION

The City of Issaquah was granted surface water rights for the East Fork (East Fork) of Issaquah Creek in 1936. This surface water right (SWC 1087) became unusable when Interstate 90 was built over the diversion structure in the early 1970's through the East Fork watershed. The water right that is the subject of this application for change (G1-22733C and companion application G1-22734C) was filed with Ecology in 1976 to serve as a replacement for their compromised East Fork surface water source.

At the time water under G1-22733C and G1-22734C was allocated for wells COI-3A and COI-3 respectively, the City was utilizing groundwater from City of Issaquah Wells 1 and 2 (COI-1and COI-2), located between Gilman Boulevard and Interstate 5, east of Front Street in the city of Issaquah. The water rights for COI-1 and COI-2 were allocated a total Qa of 2600 afy, which Ecology in 1977 believed adequate to accommodate the estimated 10,000 population projected for the year 1997. For this reason the annual quantities under G1-22733C and G1-22734C were made supplemental to those for COI-1 and COI-2.

By the early 1990's City Wells 3A and 3 (COI-3A COI-3), utilizing water under G1-22733C and G1-22734C, were no longer able to produce an adequate supply of water due to construction errors. These wells were abandoned and decommissioned 1993. The City filed for a change in point of withdrawal for G1-22733C and G1-22734C in May 1997. Evidence provided by the City of Issaquah, including photographs of the well house and notes showing pumping records, the existence in the field of remaining infrastructure, as well as drill and decommission logs, and proof of appropriation documentation indicate that the city worked diligently toward perfection prior to filing an application for amending the water right.

Attributes of the Original Certificate

Name on Certificate:	City of Issaquah
Priority Date:	Sept. 1, 1976
Instantaneous Quantity:	300 gallons per minute (gpm)
Annual Quantity:	119 acre-feet per year (afy) *supplemental to GWC 6343 and 7031
Point of Withdrawal:	SE¼ NW¼ of Section 34, Township 24 North, Range 6 East
Purpose of Use:	Municipal Supply
Period of Use:	Continuously
Place of Use:	Area Served by City of Issaquah

Proposed Change

Name of Applicant:	City of Issaquah
Date of Application for Change:	April 30, 1997
Point of Withdrawal:	NE¼ SE¼ of Section 28, Township 24 North, Range 6 East
Notice of Publication:	The Issaquah Press – July 10 and July 17, 2002
Protests:	None

INVESTIGATION

In considering this application, my investigation included, but was not limited to research and/or review of:

- The State Water Code
- Existing water rights on file for City of Issaquah Water System
- Records of other water rights in the vicinity
- Notes from a site visit on March 18, 2002
- Correspondence from Sheldon Lynn, City of Issaquah Public Works Department
- GIS, topographic and local area maps
- City of Issaquah 2002 Water Comprehensive Plan Draft
- Issaquah Creek Valley Groundwater Management Plan, March 1999
- Reports on wells tests and groundwater exploration (Golder, 2000a), geophysical survey (Golder, 1997), and computer groundwater modeling (Golder, 2000b), all prepared by Golder Associates for the City of Issaquah.
- Technical Memorandum regarding "Technical Water Right Transfer Groundwater Withdrawal Issues From Well COI-6" prepared by Golder Associates hydrogeologist Robert Anderson, P.G. for the City of Issaquah (Golder, 2002).
- Technical Memorandum regarding the "Effects of Groundwater Extraction on Stream Flow in the Issaquah Creek Valley Watershed" prepared by Dr. Joel Massmann for the Muckleshoot Indian Tribe (Massmann, 2001).

Elements of this report dealing with hydrogeological assessment of the proposed water right change were prepared by the author, Douglas H. Wood, a Washington State licensed hydrogeologist (License #952).

State Water Code

Chapter 90.44 RCW authorizes the appropriation of public groundwater water for beneficial use and describes the process for obtaining groundwater rights including the process to amend or change existing rights. Laws specifically governing the ground water right permitting process are RCW 90.03.250 through 90.03.340 and RCW 90.44.060. Changes or amendments to ground water rights are regulated under RCW 90.44.100 and RCW 90.03.290.

Recorded Rights for the City of Issaquah Water System

The City of Issaquah holds 6 certificates of water right (Table 1) with an aggregate annual quantity (Qa) allocation of 2,800 acre-feet per year (afy). Instantaneous quantity (Qi) allocated under these rights totals 3030 gallons per minute (gpm).

The city serves a population of approximately 11,000 (Year 2000 OFM) and serves some 7,515 ERU's (Equivalent Residential Units). The city's total year 2000 production was approximately 1,850 acre-feet, 8% of which was purchased from the City of Bellevue. Year 2001 production from operating city wells was approximately 1,600 acre-feet, as shown in Table 1. Planned and potential annexations (some of which have already occurred) and growth, based on a conservative annual growth factor 0.5%, as detailed in the City of Issaquah Draft 2002 Water Comprehensive Plan (2002 WCP), would expand the population to over 40,000 by the year 2020 serving nearly 18,000 ERU's. Based on an average daily consumption per ERU of 209 gallons per day (2002 WCP), the year 2020 projected Qa requirements would amount to approximately 4,200 acre-feet.

It is apparent from these growth estimates that the city's current water rights are inadequate. To address the forecasted shortfall in water needs, the City of Issaquah has contracted with the City of Seattle to supply surface water via a pipeline constructed in 2001. It is also apparent that the city's current approximately 60% usage of its allocated Qa of 2800 afy (Table 1) afy will likely rise to serve a portion of increased demand.

Table 1: City of Issaquah Water Rights Summary

Well #	Certificate #	Priority Date	Qi (gpm)	Qa (afy)	2001 Use (Gal)	2001 Use (afy)
COI-1	6343-A	03/30/67	630	1,000	78,110,000	240
COI-2	7031-A	03/11/69	1,200	1,600	221,320,000	680
COI-3A	G1-22733C	09/01/76	300	119*		
COI-3	G1-22734C	09/01/76	500	645*		
COI-4	G1-24809C	03/10/86	250	200	14,220,000	44
COI-5	G1-24633C	04/02/85	150	1,600**	207,620,000	637
Total			**3,030**	**2,800**	**521,270,000**	**1,600**

* Supplemental to 6343-A and 7031-A (max cumulative = 2600 afy)

** Supplemental to G1-24809C, 6343-A and 7031-A (max cumulative = 2800 afy less amount from Wells 3 and 3A)

Other Water Rights in the Vicinity

A search of the Ecology water rights records indicates that there are 33 water rights, including those held by the City of Issaquah, within an approximate 1 mile radius of the proposed point of withdrawal in this application (Table 2).

Table 2: Issaquah Area Water Rights

Name	WR No.	Purpose*	CFS	GPM	AFY	Priority	Sec	Twn	Rng	Qtr-Qtr Sec
CARLSON B J	SWC-09859	IR,CI	-	-	3.6	7/16/1965	27	24	6E	NW/4NW/4
CARLSON BERTIL J	S1-00626C	FS	0.18	-	-	6/27/1969	27	24	6E	NW/4NW/4
Darigold Inc	G1-21648C	CI	-	1100	1232	5/16/1974	28	24	6E	NE/4SE/4
Darigold Inc	GWC-00311	CI	-	500	405	4/6/1949	28	24	6E	NE/4SE/4
EISENTRAGER NORMA	S1-23145C	DS	0.001	-	0.5	6/9/1978	33	24	6E	SW/4SE/4
HILLERY D R	SWC-04972	DS	0.005	-	-	10/9/1951	33	24	6E	NE/4NE/4
HILLERY D R	SWC-04971	DS	0.005	-	-	10/19/1951	33	24	6E	E/2E/2NE/4
KEES T D	SWC-11359	DS	0.01	-	1	2/16/1960	34	24	6E	SE/4SE/4
Lakeside Gravel Co	GWC-00570	DS,CI	-	650	250	6/13/1950	27	24	6E	NW/4NW/4
Lakeside Gravel Co	GWC-01327	DG,CI	-	850	316	8/18/1952	27	24	6E	NW/4NW/4
LARSON E	SWC-04970	DS	0.01	-	-	10/9/1951	27	24	6E	SW/4SE/4
MCCRAY E	SWC-04858	DS	0.005	-	-	5/1/1952	27	24	6E	
MILES L	SWC-01643	IR,DS	0.02	-	-	8/20/1937	27	24	6E	SE/4SW/4
Mine Hill Community	SWC-06329	DM	0.2	-	-	5/27/1954	33	24	6E	SW/4NE/4
NIX F E	SWC-01814	IR,DS	0.01	-	-	8/15/1941	27	24	6E	
Pickering Brothers	GWC-02985	DM	-	20	32	5/24/1956	28	24	6E	SW/4NW/4
SMITH EUGENE	SWC-01780	IR,DS	0.05	-	-	8/25/1939	27	24	6E	
SPWSD	G1-00289C	MU	-	3200	936	1/20/1972	28	24	6E	NE/4NE/4
SPWSD	G1-25428P	MU	-	2300	-	4/24/1989	28	24	6E	NE/4NE/4
SPWSD	G1-26014P	MU	-	2000	1608	12/24/1990	27	24	6E	SW/4NW/4
Squak Valley Water Club	SWC-07582A	DM	0.09	-	-	10/20/1958	33	24	6E	SE/4SE/4
STONEBRIDGE E M	SWC-06600	DS	0.005	-	-	7/15/1952	33	24	6E	NE/4NE/4
STROM WARNER A	SWC-04565	PO,DS	0.1	-	-	8/5/1936	33	24	6E	NE/4NE/4
Washington DFW	SWC-01330	FS	10	-	-	1/28/1939	33	24	6E	NE/4SE/4
Washington DFW	SWC-11478	FS	10	-	-	3/29/1968	33	24	6E	NE/4NE/4
Washington DFW	S1-00735C	FS	16	-	-	11/14/1970	33	24	6E	
WILTSE F G	SWC-07573	DS	0.01	-	-	3/24/1958	33	24	6E	SE/4NE/4

* IR=Irrigation, CI=Commercial, FS=Fire Safety, DS=Single Domestic, DG=General Domestic, DM=Multiple Domestic, MU=Municipal, PO=Power

Nineteen surface water rights are located in the immediate area of the proposed new point of withdrawal. These include 12 single hook-up domestic surface water rights (3 of which include irrigation), 4 for fish propagation (3 of which, totaling 36 cfs are held by Washington Department of Fish and Wildlife for use at the Issaquah Salmon Hatchery), one used for commercial purposes and irrigation, and two for community domestic water systems.

Surface and groundwater rights of significant quantity in the area of the proposed new well (Figure 2) include those used by the *Lakeside Gravel Quarry* ($Qi = 1500$ gpm, $Qa = 566$ afy), the *WA Department of Fish and Wildlife* (WDFW) *Issaquah Salmon Hatchery* ($Qi = 36$ cfs, non-consumptive), Darigold ($Qi = 1600$ gpm, $Qa = 1637$ afy), and the municipal water systems that share the Issaquah Valley Aquifer - Sammamish Plateau Water and Sewer District ($Qi = 5500$gpm, $Qa = 2109$ afy) and the City of Issaquah ($Qi = 3030$ gpm, $Qa = 2800$ afy). The Sammamish Plateau water rights in the valley also include supplemental and seasonal rights allowing a pumping rate of up to 6,500 gpm during the winter months.

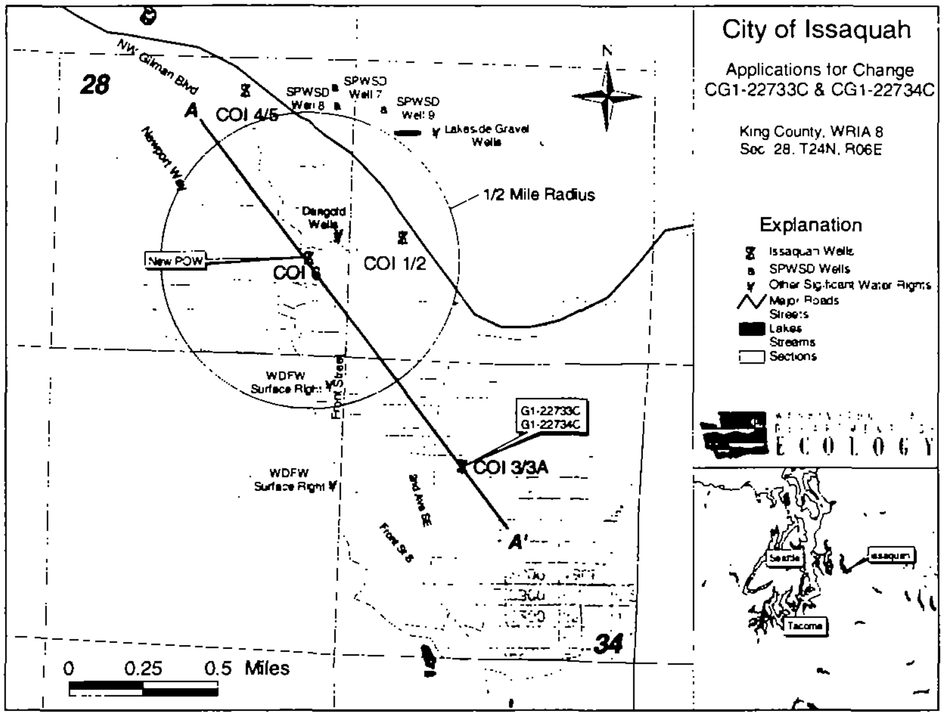


Figure 2: Detail map showing location of proposed changes and surface trace of geological cross-section (Figure 6).

Site Visit

The sites of COI-6 and the original COI-3A/3 location were visited by the author, Douglas Wood, on March 18, 2002. Water system infrastructure and well house foundations were examined at the former site of COI-3A/3. The COI-6 site was examined and it was noted that the well site is located in the city's works yard. The COI-6 wellhead is currently covered and fenced off to secure the site from potential contamination. Mr. Sheldon Lynne, Deputy Director of the Public Works Engineering Department for the City of Issaquah, informed Ecology during the site visit that the city will soon relocate the city works yard, which will further protect the wellhead area.

Correspondence Received

The City of Issaquah was granted a Preliminary Permit to drill and test two wells to replace wells COI -3, and 3A on May 30, 1997. A letter from Sheldon Lynne, Deputy Director of the Public Works Engineering Department for the City of Issaquah, dated February 23, 1998, informed Ecology that the results of the City's tests indicated that the new well for both water rights will be the well designated COI-6.

Mr. Steve Bessow of the Washington Department of Fish and Wildlife (WDFW), after reviewing the proposed changes for G1-22733C and G1-22734C, informed Ecology in a letter dated May 29, 2002, that WDFW has no objections or comments to these changes. In a letter dated February 14, 2003, Mr. Bessow, upon reviewing more recent information on the proposed new point of withdrawal, recommended that groundwater withdrawals in hydraulic continuity and Issaquah Creek be considered surface water diversions and thus closed to appropriation. He also requested that any replacement wells be denied if found to be in other than negligible hydraulic continuity the surface waters.

Topographic and Local Area Maps

Geological maps and reports, published through the US Geological Survey and from other sources relevant to this investigation were examined to provide geological and hydrological conditions relevant to the proposed change in point of withdrawal. Maps generated using ArcView GIS software were used to examine locations of the proposed new point of withdrawal in relation to other City wells, other water rights, and to Issaquah Creek and other surface water bodies.

City of Issaquah Water System Plans

The City of Issaquah 1996 Water System Plan Update and the Draft 2002 City of Issaquah Water Comprehensive Plan (2002 WSP) provide information on system infrastructure, existing system water rights, growth projections, and water system boundaries.

Issaquah Creek Valley Groundwater Management Plan

The 1999 Issaquah Creek Valley Groundwater Management Plan and supplemental Area Characterization provide hydrogeological background information and insight into water issues within the Issaquah area.

Golder Associates Reports for the City of Issaquah

City of Issaquah supplied their consultant's (Golder Associates) reports on groundwater assessment, geophysical studies of the Issaquah valley, well tests and aquifer modeling. These reports provided a detailed assessment of hydrogeological conditions within the Issaquah Valley Aquifer. The most recent detailed technical document supplied by the applicant is a report entitled "Groundwater Exploration and Pumping Tests – Lower Issaquah Valley" dated October 30, 2000. This report (Golder, 2000a) contains pump tests data for the proposed new well (COI-6) and has cross-sections and hydrogeological interpretations based on these tests and geophysical and modeling studies relayed in earlier reports. The November 2000 report on modeling (Golder, 2000b) provides short and long-term modeled estimates of the effects on stream flows resulting from pumping at the proposed new point of withdrawal. Additionally, a technical memorandum presenting a comparison of the hydrogeological characteristics of the proposed new point of withdrawal with those of the original wells included in the application, prepared by Golder Associates hydrogeologist Robert Anderson in October 2002, was supplied the City of Issaquah (Golder, 2002).

Effects of Groundwater Extraction on Stream Flow in the Issaquah Creek Valley Watershed

The report, in the form of technical memorandum, was prepared by Dr. Joel Massmann for the Muckleshoot Indian Tribe, February, 2001. This report discusses the effects of groundwater withdrawals on stream flows in Issaquah Creek (Massmann, 2001).

FINDINGS

In accordance with Ecology policies and Washington State law, the following considerations were addressed during the process of evaluating this change request:

- Will the change create an enlargement of the original right?
- Has a protest been filed against the proposed change?
- Will the change cause impairment to other existing rights?
- Is water available at the new point of withdrawal?
- Does the new point of withdrawal tap the same source of water as the original right?
- Is there potential for different impacts on the water source?
- Will the proposed change be detrimental to public welfare?

Potential for Enlargement

Washington State statutory and case law require that approval of a groundwater change must not result in an enlargement of the right (RCW 90.44.100; Schuh v. Ecology, 100 Wn.2d 180; Merrill v. PCHB, 137 Wn.2d 118). In the Merrill decision the Washington Supreme Court also requires Ecology to evaluate whether the right has been relinquished to the State through non-use or abandonment.

Based on the Washington Supreme Court's 1998 Theodoratus case (135 Wn.2d 582), Ecology reviews applications for changes or amendments to groundwater certificates that were issued pursuant to RCW 90.44.080, where an evaluation was not performed as to the perfected annual quantity put to beneficial use before issuance of the certificate.

The proof of appropriation for G1-22733C was filed on June 9, 1981. The document states that instantaneous quantity was perfected in the amount of 700 gpm. Ecology permit writer Janet Jorg determined at that time that the actual pumping rate was 300 gpm, consistent with the permit, G1-22733P, issued March 15, 1977.

Based on proof of appropriation documentation, copies of notes on water production provided by the City of Issaquah, drilling and decommissioning logs on file with Ecology, and remaining infrastructure seen in field, it is tentatively determined that the right has been beneficially used for municipal supply purposes and is eligible for change.

The water right being investigated (G1-22733C) was certificated for municipal purposes. The right is therefore exempt from relinquishment for non-use under RCW 90.14.141(d).

The common law principal of abandonment is applicable in the case of municipal water rights. Common law abandonment, as discussed by the Supreme Court of Washington 1997 Twisp Case (133 Wn.2d 769), does not however apply to the current application. The City of Issaquah made efforts to replace the wells through the filing of this application in 1997, thus establishing that the city did not intent to abandon the right after decommissioning the well in 1993.

Certificate G1-22733C was issued in the amount of 300 gpm on August 31, 1981, with an annual quantity of 119 afy, supplemental to existing rights under certificates GWC 6343-A and GWC 7031-A.

Table 3: 2001 City of Issaquah Well Production Records*

	COI- 1	COI-2	COI-4	COI-5
JAN	2,370,000	13,860,000	190,000	18,010,000
FEB	0	15,900,000	0	17,170,000
MAR	0	21,460,000	0	15,060,000
APR	0	15,246,000	0	18,570,000
MAY	5,540,000	17,766,000	0	21,000,000
JUN	11,420,000	22,176,000	0	10,290,000
JUL	11,660,000	28,917,000	2,240,000	14,740,000
AUG	10,660,000	24,633,000	3,190,000	21,690,000
SEP	8,640,000	20,601,000	2,550,000	20,790,000
OCT	9,880,000	11,907,000	1,630,000	20,290,000
NOV	8,960,000	13,797,000	2,110,000	14,410,000
DEC	8,980,000	15,057,000	2,310,000	15,600,000
Total (gal)	78,110,000	221,320,000	14,220,000	207,620,000
Total (afy)	**239.71**	**679.21**	**43.64**	**637.16**

* Supplied by City of Issaquah

The annual quantity of 119 afy allocated under G1-22733C is supplementary to groundwater certificates 6343-A and 7031-A, therefore perfection of the annual quantity under G1-22733C requires that 119 afy be utilized in any year by the wells sharing the primary annual quantity (2600 afy).

Well production records for the year 2001 for city wells COI-1, COI-2 and COI-5, all of which share the same 2600 afy annual quantity, were supplied by the Public Works Department of the City of Issaquah (Table 3). These show that in 2001 COI-1 and COI-2 produced 918.9 afy and COI-5 produced a further 541.6 afy supplementary to COI-1/2 (the remaining production from COI-5 was supplemental to water rights for COI-4), giving a total use of 1460 afy under the 2600 afy allocation for the COI-1/2 water rights.

Quantities available for change for water under G1-22733C are 300 gpm Qi and 119 afy Qa. Annual quantity remains supplementary to the rights under certificates 6343-A and 7031-A, whose annual usage of 1460 afy for the year 2001 is in excess of the 764 afy allocated under groundwater rights for G1-22733C (119 afy) and G122734C (500gpm, 645 afy).

Given the above analysis, it is the finding of this investigation that approval of the requested change will not result in an enlargement of the right.

Protests

There were no protests filed in response to the proposal to change the point of withdrawal from wells COI-3A/3 to well COI-6. The Muckleshoot Indian Tribe however has expressed concerns that approval would result in a greater total withdrawal from the Issaquah Valley Aquifer and that the connectivity between the aquifer and streams would cause impairment to instream flows necessary to support fish populations.

Ecology, as expressed in this report, recognizes the relationship between groundwater withdrawals, stream flows and fish habitat. Based on the information reviewed as part of this investigation, it is tentatively found that the City of Issaquah retains the right to the withdrawal of groundwater under certificates G1-22733C and G1-22734C as established under Chapter 90.44 RCW and is entitled under RCW 90.44.100 to propose a change to the point of withdrawal so long as (1) the proposed change will not result in an enlargement as conveyed by the original certificate, (2) the new point of withdrawal taps the same body of groundwater, (3) water is available at the new point of withdrawal, (4) the change does not impair existing water rights, and (5) the proposed change is not detrimental to the public interest.

The findings of this investigation are that the City of Issaquah and its consultants have provided sufficient evidence to show that the proposed new point of withdrawal would tap the same aquifer, is not likely impair existing water rights, and will not constitute an enlargement under the certificate. However Ecology's investigation reveals that the change as proposed is likely to cause a greater impact to stream levels, particularly in the mainstem of Issaquah Creek close to the location of the Issaquah Salmon Hatchery, than withdrawals from the well original location, thus indicating that a potential detriment to the public interest would result if the proposed change were approved.

Impairment of Other Rights

Aquifer tests and computer groundwater modeling conducted by Golder Associates after construction of COI-6 (Golder, 2000a and 2000b) indicate that pumping at the proposed new point of withdrawal will result in a 0 to 1 foot drawdown on groundwater levels in the shallow aquifer zone which is also utilized by the Darigold Dairy wells and City of Issaquah wells COI-1 and COI-2 (Figure 3).

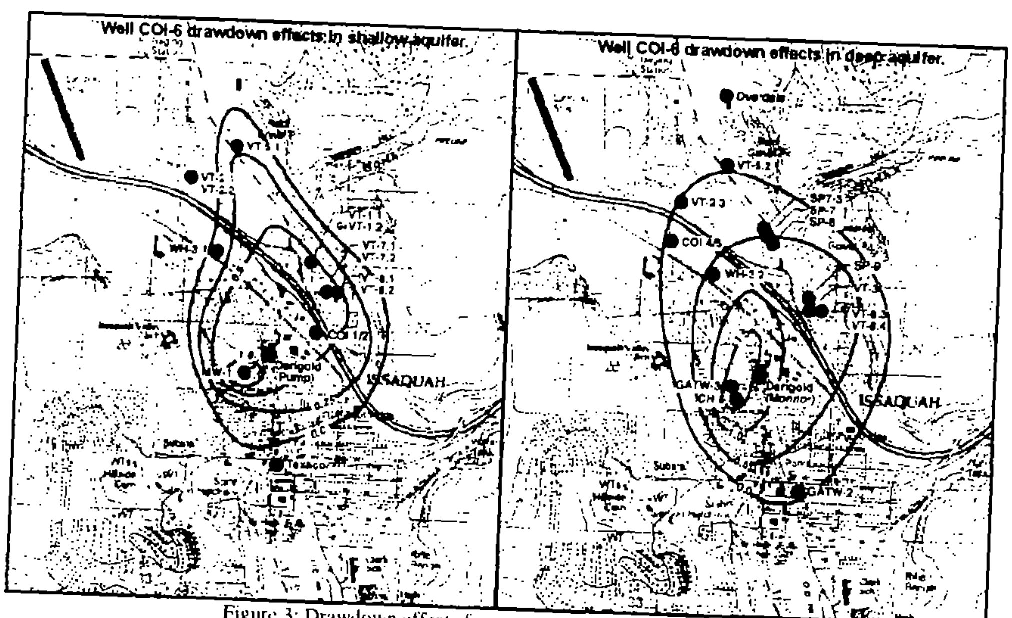


Figure 3: Drawdown effects from proposed well COI-6.

The amount of drawdown in wells tapping the deeper portion of the aquifer is greater than within wells utilizing shallow groundwater. The drawdown, from 0 to greater than 1.5 feet, is not however expected to cause interference which would unduly impact existing groundwater water rights within its zone of influence. The same may not be true with respect to surface water bodies in hydraulic continuity with groundwater within the zone of influence (cone of depression).

Surface bodies in hydraulic connection with the Issaquah Valley Aquifer within the zone of influence of the proposed new point of withdrawal will probably be impacted by pumping. The degree of impact was not measurable during testing of Well COI-6, however it is likely to be noticeable through long term continuous pumping as is authorized under the existing certificate, with its greatest impact felt within the drawdown area outlined for the shallow aquifer zone in figure 3. It is not likely however that the total qua[illegible] of water produced from the proposed new we[illegible]ived from surface water bodies would be greater than that which would result from pumping at the original point of withdrawal (Massmann, 2001).

The small amount of drawdown encountered for the deep aquifer zone in the testing of COI-6 is indicative of significant hydraulic continuity between the deeper portions of the Issaquah Valley Aquifer with shallower groundwater and surface water. Minimum instream flows set by regulation under chapter 173-508 WAC represent water rights which must be considered under an impairment evaluation for a change or amendment to a water right. However Issaquah Creek and its tributaries were closed to further appropriation under WAC 173-508-030 and 040 rather than having minimum instream flows set. An evaluation of impairment to the creeks as existing water rights is therefore not appropriate for the application under consideration. It is appropriate however for Ecology to investigate whether any impact the proposed new point of withdrawal might have on stream flows would be contrary to public interest (see section of this report on Public Interest).

Source of Water and Availability

The Issaquah Valley Aquifer system is hosted in alluvial and glacial sand and gravel deposited during and following the most recent ice age which lasted from approximately 35,000 to 10,000 years before present. It is located in the east-central portion of WRIA 8 (Cedar-Sammamish Water Resources Inventory Area), within an area designated herein as the Issaquah - Lake Sammamish sub-basin (Figure 4).

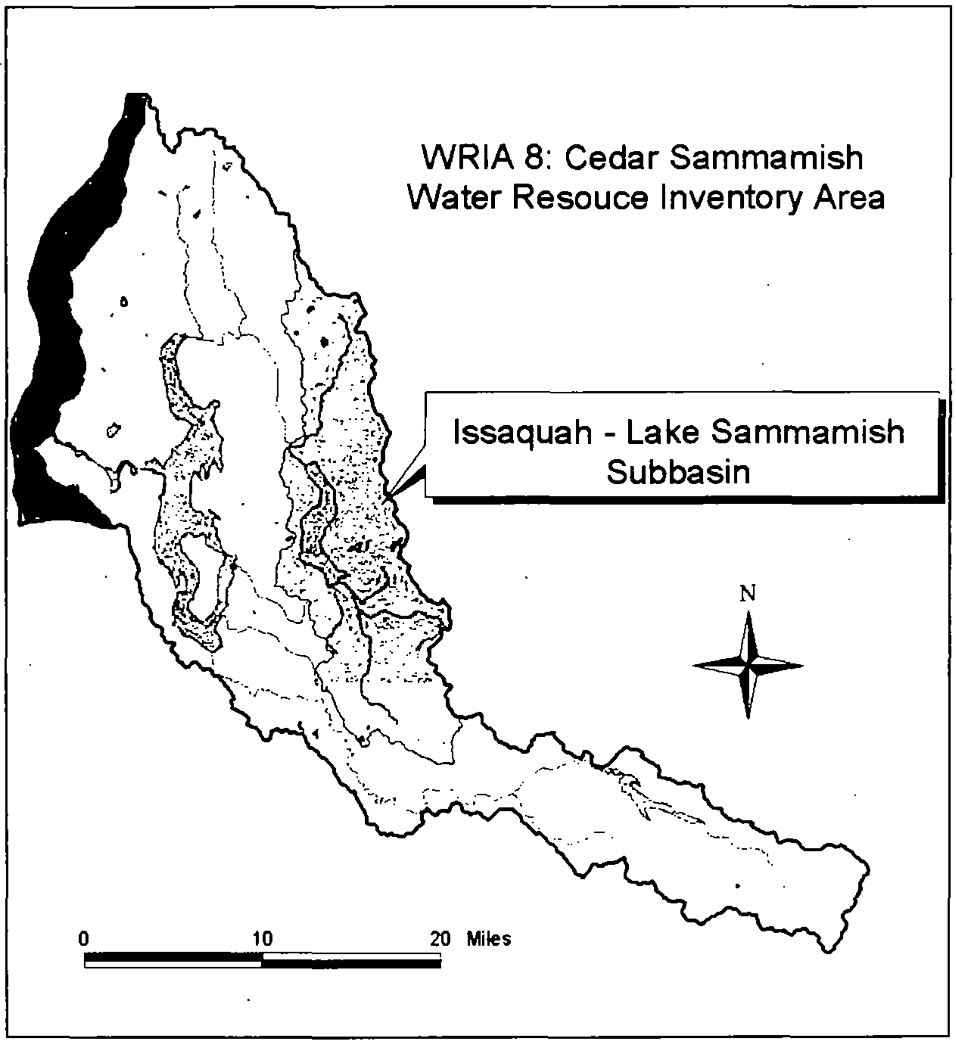


Figure 4: Map showing location of the Issaquah-Sammamish sub-basin of WRIA 8.

Issaquah Creek has three principal tributaries: the mainstem, East Fork, and North Fork (Figure 5). The mainstem drains the south and westernmost slopes of Tiger Mountain and the eastern slopes of Squak Mountain. The East Fork of Issaquah Creek drains the south flank of Grandview Ridge, the northern slopes of Tiger Mountain and the Tradition Lake Plateau. The North Fork of Issaquah Creek drains a portion of the Issaquah Highlands/Grand Ridge area and the western edge of the southernmost portion of the Sammamish Plateau.

Groundwater recharge for the Issaquah Valley Aquifer system is supplied by infiltration of rainfall from the northern slopes of Squak and Tiger Mountains, the lower portions of the Issaquah valley, the Tradition Lake Plateau, and a portion of the Issaquah Highlands/Grand Ridge area. Near the confluence of the mainstem of Issaquah Creek and East Fork, the location of the proposed new point of withdrawal at well COI-6, the bulk of groundwater recharge originates from the northwestern slopes of Tiger Mountain, the eastern slopes of Squak Mountain and the Tradition Lake Plateau (Figure 5).

Longer term storage and recharge of the aquifer is possible from sandstone bedrock which underlies both Squak and Tiger Mountains, but little is known about the quantity of recharge from this source or its ability to store groundwater.

Water Availability

A determination of water availability of a water right is made at the time the original water right application is investigated. The original Report of Examination on the water right, dated January 31, 1977, affirmatively established that water was available and a water right consisting of an instantaneous quantity of 300 gallons per minute with a supplemental annual quantity of 119 afy was issued.

Previously allocated groundwater rights totaling 2600 afy were already held by the City of Issaquah in 1977 and this primary annual amount was deemed sufficient to supply the city's then and projected needs (10,000 population by 1997). With this in mind the City of Issaquah was allocated a supplemental annual quantity under G1-22733C and G1-22734C. The annual quantity for Wells 3A and 3 are both supplemental to the primary quantities allocated under right for Wells 1 and 2 (GWC 6343-A and GWC 7031-A). All four wells utilize the same source, the Issaquah Valley Aquifer.

Subsequent to the issuance of permits for G1-22733 and G1-22734, the City of Issaquah applied for and was allocated additional groundwater rights from the Issaquah Valley Aquifer (G1-24809C and G1-24633C) for COI 4 and 5. In addition the Sammamish Plateau Water and Sewer District (SPWSD) has been issued groundwater rights for three wells located in the Issaquah Valley that utilize the same aquifer.

The groundwater recharge area of the Issaquah Valley Aquifer encompasses the surface area of the Issaquah Creek and Tibbets Creek watersheds (see Figure 5). While surface water from the entire watershed contributes to groundwater in the aquifer through losing stream segments, the groundwater regime in much of the southernmost Issaquah Creek watershed and most of the Tibbets Creek watershed does not contribute directly to groundwater recharge at the COI-6 location.

Most groundwater flow in the portion of the Issaquah Creek watershed situated south of Tiger and Squak mountains flows to the west into the aquifers of the Cedar River (WRIA 8) and Green River (WRIA 9) watersheds. Groundwater from the Tibbets Creek watershed is isolated from the location of COI-6 by a spur of bedrock extending north from Squak Mountain, and much of the groundwater north of the East Fork of Issaquah Creek (Issaquah Highlands/Grand Ridge area) flows northward into the Sammamish Plateau and the Snoqualmie Valley aquifer systems.

The bulk of recharge for the aquifer system at the location of well COI-6 originates as rainfall within the immediate valley area and from the Tradition-Lake Plateau area (the East Fork watershed draining the northern slopes of Tiger Mountain and southern slope of Grand Ridge). This area encompasses approximately 7,000 acres of the over 45,000 acres within the Issaquah and Tibbets Creeks surface watershed (Figure 5).

Figure 5: Map showing the Issaquah and Tibbets Creek watersheds and the recharge area for the proposed new well.

Massmann (2001) estimates that Issaquah Valley Aquifer system receives approximately 14,000 to 18,000 afy (recalculated from 20 to 25 cfs) in recharge annually. Groundwater rights have been allocated for approximately 10,000 afy (Table 2) not including rights granted outside of the area within approximately one mile of well COI-6. Massmann (2001) also cites an estimate by Ecology that actual use from wells in the area is less than half of the current allocation or approximately 3,600 afy (5 cfs).

In the present application the proposed new point of withdrawal is further down-gradient within the same aquifer as the original point of withdrawal and recharge occurs from a larger catchment area, and thus would thus be more capable of supplying the same quantity of water.

Well test data supplied by the City (Golder, 2000a) suggest only minimal drawdown to the water table in the area of the new well (0 to 1 feet; see Figure 3). Tests were conducted during late summer when stream flows are most critical to fish habitat. Pump tests and stream gaging, done in conjunction with aquifer testing, indicate that surface water bodies are perched in late summer in this area and therefore not in close hydraulic continuity with the water table at the immediate area of the well during this part of the season. During the remainder of the year the water table associated with the Shallow Aquifer Zone is in closer hydraulic continuity with streams and creek levels would be affected.

Based on the results of computer modeling of the proposed new point of withdrawal (Golder, 2000b), long term pumping would result in 85% of well withdrawals being derived from shallow groundwater sources in close hydraulic continuity with Issaquah Creek (~500 gpm of 600 gpm modeled pumping after 300 days, when steady state is achieved). The model shows that if pumping is discontinued after 115 days less than 50% of pumping volume would be derived from shallow sources (~270 gpm of 600 gpm).

While the total impact, in terms of both drawdown and stream capture, would be spread along the creek and over a wide area of the shallow aquifer zone, the strongest effects of pumping would occur in the immediate area of the proposed well within the cone of depression of the shallow aquifer zone as shown in Figure 3.

The model effects are reported as being conservative (Golder, 2000b), and therefore are likely overstated. Since the model was based on a pumping rate of 600 gpm, the estimates are not accurate for the proposed changes for G1-22733C and G1-22734C totaling 800 gpm, but still give a reasonable estimate of the magnitude of stream impact.

Source of Water

Both the original and the new point of withdrawal utilize groundwater from within the Issaquah Valley Aquifer system (see Figure 6). Therefore the proposed change conforms to requirements of RCW 90.44.100 that replacement wells must tap the same body of groundwater.

At both locations wells tap the deep, sand and gravel hosted, semi-confined, aquifer zone that is separated from the shallow water table aquifer zone (also hosted in sand and gravel) by a lower permeability silt, fine sand and clay layer of lacustrine origin. Lenses of silt and clay and in places glacial till, locally form low permeability layers that do not significantly restrict vertical mobility of water within the upper portion of the aquifer.

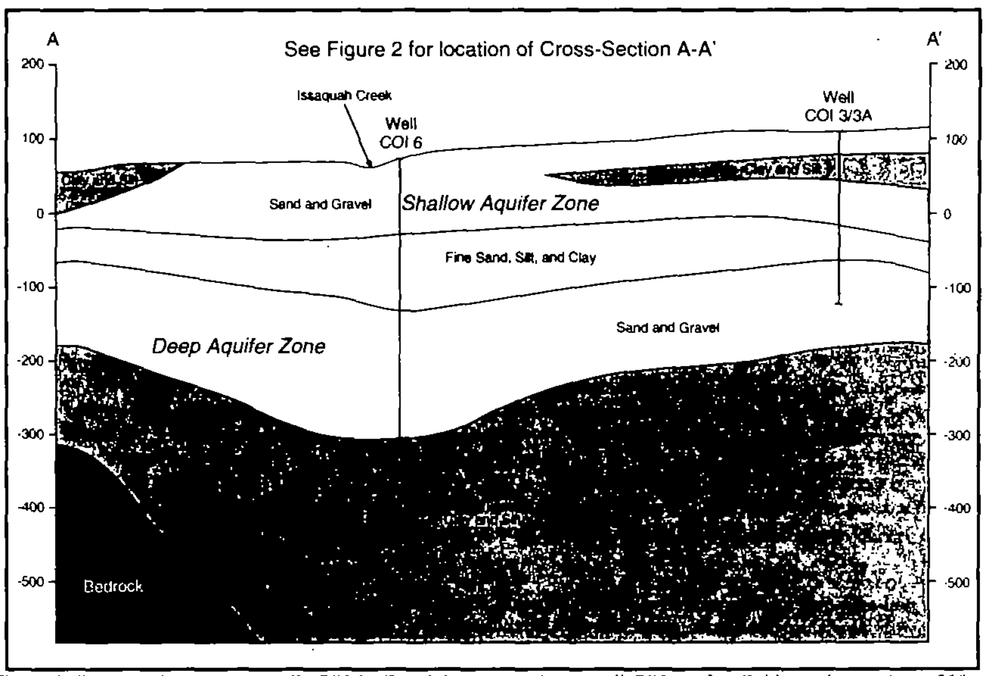


Figure 6: Cross-section between wells COI 3A/3 and the proposed new well COI 6 (after Golder and Associates, 2000).

Potential for Different Impacts on the Water Source

The City of Issaquah is currently utilizing (based on data supplied by the City of 2001 well production) 1600 afy out of their total allocation under existing certificates of 2800 afy. Approval of the applications for change for groundwater certificates G1-22733C and G1-22734C will result in the City being capable of producing 764 afy toward that amount. Note however that, under changes the legislature passed in 1997 to RCW 90.44.100, the city has the authority, independent of these applications, to drill a replacement well or wells at the original location of wells COI-3A/3, giving the City of Issaquah the freedom to use the entire 764 afy from rights under certificates G1-22733C and G1-22734C without filing applications for change.

The City's consultants (Golder, 2002) suggest that withdrawals from the proposed new point of withdrawal will result in less overall impact to the environment due to: (1) the greater thickness of the leaky aquitard at the new location (thus resulting in less impact to shallow groundwater and surface water bodies in the immediate area of the well), (2) a greater, more diversified recharge area for waters withdrawn at the proposed new well, and (3) because groundwater from the new well would not likely interact with surface water flows above Lake Sammamish.

While these claims appear on their face to be reasonable based on what is known about the aquifer and on the dynamics of pumping, it relies on an assumption that there will not be a direct impact on stream flows as a result of pumping. Pumping tests (Golder 2000a) however suggest that there will be an impact on the shallow aquifer zone within zone of influence (cone of depression) of the new well and hence on stream flows within the zone that would not occur with pumping at the original point of withdrawal. During pumping at the proposed new well, stream flow within the zone of influence that would have otherwise stayed within the stream and/or shallow aquifer zone, would instead be drawn down into the deeper aquifer zone and contribute to pumped volumes.

Public Interest

The East Fork, North Fork and mainstem of Issaquah Creek are closed by rule under WAC 173-508-030 and 173-508-040 to preserve stream flows required to support salmon habitat. The streams have been administratively closed since 1950 when the

Washington State Department of Fisheries requested that all remaining stream flows were required to support salmon spawning and rearing habitat. In 1971 the USGS performed field surveys of Issaquah Creek that indicated that flows between May and November were inadequate for support of fish populations, confirming that Issaquah Creek and all its tributaries should be closed.

Approval of the requested change in point of withdrawal will not alter the quantity allocated under certificate G1-22733C, thus there would be no net gain in the quantities available under the right from the source aquifer. There is information however that indicates the proposed change in the point of withdrawal would result in greater local contribution from closed streams to pumped quantities.

It is generally agreed among hydrogeologists that groundwater in alluvial aquifers is closely associated with surface water bodies occupying the same valley. The understanding of hydraulic continuity supports the concept that groundwater withdrawals from an alluvial aquifer divert all or a portion of the pumped volume from streams and other surface water bodies occupying surface areas of the alluvial valley.

The current application seeks to replace a point of withdrawal located on the periphery of the alluvial aquifer at a distance of approximately 2000 feet from each of two closed streams (East Fork and mainstem of Issaquah Creek) with a new point of withdrawal located approximately 200 feet from the streams. The effect of withdrawals from each location must be analyzed with respect to their effects on both streams in order to determine whether approval of the change will result in a net increase to the amount of water that the new well will derive from creek flow.

The degree to which pumping from a well can effect stream flows is largely dependent on the distance of the well from the stream, the depth from which water is withdrawn and on the ability of the aquifer and intervening aquitard media to allow the transmission of water (hydraulic conductivity).

Unconfined aquifers, i.e., aquifers not separated from the surface by a low permeability aquitard, are generally found to be in closer hydraulic continuity with streams. Withdrawals that derive water from unconfined aquifers, particularly when they are in close proximity to streams, have a more pronounced effect on stream flows than withdrawals from confined aquifers.

In the Issaquah Valley Aquifer an aquitard of varying thickness and hydraulic conductivity occurs such that the degree of hydraulic connection between the point of withdrawal and surface streams is largely dependent on the position within the valley of the well. An aquitard overlying a confined aquifer that allows significant hydraulic connection with a shallower aquifer is considered to be "leaky". Aquifer tests at Well COI-6, where shallow aquifer water levels were lowered by up to 1 foot, are consistent with the existence of a leaky aquitard separating the aquifer at well intake level from the shallow aquifer near the surface.

Robert Anderson, in his technical analysis of the original and proposed new points of withdrawal (Golder, 2002), states that moving the point of withdrawal to Well COI-6 will result in less impact to the environment based on his analysis of well completion depth, recharge area, distance of each point of withdrawal from Issaquah Creek, and the thickness of the aquitard at the two well locations. Anderson's analysis however assumes that the city would only use Well COI-6 for summer peaking requirements. The applicant has not however requested a reduction in the period of use for this water right and therefore Ecology must evaluate effects on stream flows consistent with the well operating continuously as currently authorized under the certificate. In addition Anderson does not take into account the direct effect that pumping will have on surface water bodies with the well's zone of influence.

Anderson (Golder, 2002) estimates that at the original point of withdrawal (Wells COI-3A/3), the contribution to well production from the shallow, unconfined aquifer would be greater than 90% after only 10 days of pumping. He also states that groundwater computer model analysis (Golder, 2000b) indicates that after 100 days of pumping at COI-6, the contribution from leakage would be less than 50% of pumping volume. The model also indicates that if the well is pumped continuously the contribution through leakage would reach 85% of pumping volume. At either location, the contribution from leakage would include water from the shallow aquifer and a component from stream flows, whose magnitude would largely be dependent on the distance to the surface water body and the direction and velocity of flow in the aquifer.

The difference in leakage between the two locations can be explained by the relative thicknesses of low permeability material present at both locations. At Well COI-6 a sandy silt aquitard overlying the completion zone is some 140 feet thick, while at COI-3A/3 the low permeability material overlying the completion zone is only a few feet thick. It is not certain whether the silt layer present at both locations is continuous. The leakage suggests that it is not. Well 3A/3 also has a 20 foot thick glacial till layer near the surface. This till layer however is discontinuous in the valley and does not form an effective aquitard.

Well COI-3A/3 is nearly 10 times the distance from either the East Fork or mainstem of Issaquah Creek than is Well COI-6. The effect of withdrawals from a well in hydraulic connection to a stream drops off rapidly with distance of the well from the stream. It is likely therefore that the contribution of stream flows to pumping volume would be greater at the proposed new point of withdrawal than from Wells COI-3A/3 due to the difference in distance from the streams. The presence of the thicker aquitard at COI-6 would likely attenuate the effect in the short term, but would, on a long term basis, result in a greater impact on the shallow aquifer and ultimately on stream flows in the immediate area of the well.

Anderson points out that the recharge area of the original point of withdrawal is limited largely to Tradition Lake Plateau and that the recharge area for Well COI-6 includes a much larger area, with contributions from the upper Issaquah Creek valley, the East Fork/Issaquah Highlands area in addition to the Tradition Lake Plateau. While the greater diversity in recharge sources suggests that withdrawals at Well COI-6 would cause less overall stress on the aquifer, they do not lessen the potential to cause a greater impact on stream flows in the zone of influence of the proposed new point of withdrawal, where pumping stress on the shallow aquifer and streams would be greatest.

A change in point of withdrawal, as proposed, would result in a negative impact to the flow of water in a salmon spawning and rearing stream. The negative impact to a stream closed by rule, with no water available is detrimental to the interest of the people of Washington.

DISCUSSION

The proposed changes in point of withdrawal for G1-22733C and G1-22734C do not conform to all the requirements for approval of an application for change or amendment to a groundwater right under applicable statutes RCW 90.44.100 and RCW 90.03.290.

This investigation finds that approval of the proposed change threatens to prove detrimental to the public interest, due to the impact that pumping at the proposed point of withdrawal would have on stream flows, and hence on salmon habitat in the East Fork of Issaquah Creek and the mainstem of Issaquah Creek, both of which are critical salmon habitat streams and closed to appropriation under Chapter 173-508 WAC. Ecology's concerns are supported by the Department of Fish and Wildlife whose objection to this application is based on the degree of hydraulic continuity of the proposed new point of withdrawal.

Under Ecology authority in the consideration of changes or amendments to groundwater rights, if approval threatens to prove detrimental to the public interest, Ecology has a duty to reject the application. It is also noted in this investigation that a denial of this application does not prevent the applicant from exercising the right by drilling a replacement well at the original published well location.

RECOMMENDATIONS

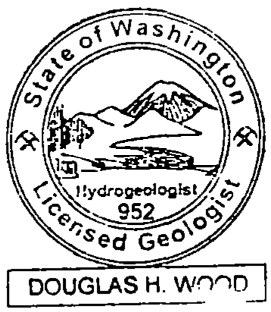
I recommend the proposed changes to groundwater certificate G1-22733C be denied and the application for change be rejected pursuant to the requirements of RCW 90.44.100 and RCW 90.03.290.

CONCLUSIONS

In accordance with chapter 90.44 RCW, and based on the findings of this report, I conclude that the proposed new point of withdrawal for groundwater certificate G1-22733C cannot be authorized.

REPORT BY: Douglas H Wood DATE: 6/5/2003

Douglas H. Wood, MS, LHG
Licensed Hydrogeologist (WA #952)



Gun Club Well 3

Certificate G1-22734C

S.F. No. 370-B—OS—8-67.

$10.00 examination fee should accompany each application.

No other DOE Permits rec'd TBH

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
Division of Water Management

PRIORITY
Date 9/1/76
Time 1600 9/3/76
Accepted TBH

APPLICATION FOR A PERMIT

To Appropriate Public Ground Waters
OF THE STATE OF WASHINGTON

Ralph Klei 392-7237

WRIA - 8

Application No. G. ~~W~~ G 22734

I, CITY OF ISSAQUAH, WASHINGTON (Name of applicant)

of 130 E. Sunset Way (P.O. Box M) Issaquah, WA 98027 (Complete post office address)

do hereby make application for a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights. This application is made under the provisions of Chap. 263 of the Session Laws of 1945, and amendments thereto of the State of Washington and subject to the rules and regulations of the Department of Water Resources.

1. The proposed appropriation will be from well (Well, tunnel, infiltration trench)

located within the city limits of Issaquah, Washington (Give approximate distance and direction from nearest city or town)

Area (Leave blank) Sub-area (Leave blank)

Zone (Leave blank)

Applicant's name or number of well or other works, if any #4

2. The quantity of water which applicant intends to withdraw for beneficial use is 600 gallons per minute; 645 acre feet per year.

3. The use or uses to which water is to be applied municipal

(Domestic supply, irrigation, municipal, manufacturing, industrial use, etc.)

4. The time during which water will be required each year all year

5. Location of well or other works for withdrawal of water: In county of King

(a) 1280' S & ~~3~~ 320' W from N 1/4 cor of Sec 34 ~~From N.W. Corner of the N.W. Quarter of Section 34, T24N, Range 6E, W.M., S 63° 31' 31" E for 2910.5 ft.~~ (Give distance and bearing from nearest corner of section or legal subdivision)

being within the SE 1/4 ~~NE~~ of NW ¼ (Give smallest legal subdivision) of Sec. 34, Twp. 24 N., Rge. 6E (E. or W.)

or (b) If within limits of recorded platted property, town or city: Lot ______, Block ______,

of ______ (Give name of plat or addition) (If within town or city, give name)

(c) Show this location on accompanying section plat. Other adequate maps or drawings will be acceptable.

6. DESCRIPTION OF WORKS:

(a) Well will be **drilled** *and have a diameter of* **8** *inches and an estimated depth of* **190** *feet.*
(Dug or drilled)

(b) Tunnels or trenches to be described: (Attach additional sheets if needed for full description.)

(c) Distribution system to be described:

Water from said well shall be pumped through a 12" transmission main, which in turn enters the existing city water distribution system.

(d) If pumps are to be used, give size and type:

Pumping system has not been designed at this time. Design is awaiting well testing as to its capacity.

(e) Give capacity and type of motor or engine to be used:

(f) If the location of the well, tunnel, or other works is less than one-fourth mile from a natural stream or stream channel, give the distance to the nearest point on each of such channels and the difference in elevation between the stream bed and the ground surface at the source of development:

(g) Ownership of each existing well or other works from which ground water is withdrawn within a radius of one-quarter mile and the distance and direction from well or other works being reported her :

(Name)	(Direction)	(Distance)
City of Issaquah	South	200 feet

SUPPLY THE FOLLOWING INFORMATION ACCORDING TO USE PROPOSED:

7. *For Municipal Supply: To supply the city, town, or community of* Issaquah*, in the county of* King*, having a present population of* 4,850*, and an estimated population of* 10,000*, in 19*90.

8. *For Irrigation: Number of acres to be irrigated* ______ *acres.*

9. *Legal Description of Property on which water is to be used for all purposes other than municipal supply:*

(Copy legal description from deed)
(If more space is required, attach separate sheet)

~~Well #4 is located in a portion of the southeast quarter of the northwest quarter of Section 34, Township 24 North, Range 6 East, W.M., described as follows:~~

~~Beginning at the northwest corner of the northwest quarter of Section 34, thence south 2°00'11" west along the west line thereof 1647.3 feet; thence south 87°59'49" east, at right angles 2399.4 feet to the center of the casing of said well. Bearings refer to the Washington State Coordinate System, North Zone, as established by the King County Aerial Survey.~~

Area served by City of Issaquah

(On accompanying plat show location of the existing wells or works)

10. *What interest do you have in the above described property?* Owner

(Owner, lessee, contract buyer, etc.)

11. *Do you have any other water rights appurtenant to the above described property?* Yes

If so, from what source? Well #3 (groundwater) Concurrent application (G1-22733) for municipal - 300 gpm. 9/14/76

12. *Construction work will begin on or before* September 1976

13. *Construction work will be completed on or before* November 1976

14. *Water will be put to complete beneficial use on or before* November 1976

City of Issaquah
By: H G Herrington
(Signature of applicant)

15. *Name and address of owner of land on which well or works are located:*

City of Issaquah (Name)	130 E. Sunset (P.O. Box M) Issaquah, WA 98027 (Address)

By: H G Herrington
(Signature of legal landowner)
H. G. HERRINGTON, MAYOR

Signed in the presence of us as witnesses:

Linda Ruehle Linda Ruehle, (Name) City Clerk	City of Issaquah; P.O.Box M; Issaquah, WA 98027 (Address of witness)
Jerald L. Osterman Jerald L. Osterman, (Name) Admin. Assistant	City of Issaquah; P.O.Box M; Issaquah, WA 98027 (Address of witness)

STATE OF WASHINGTON,
COUNTY OF THURSTON. } *ss.*

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for correction or completion as follows:

....

....

In order to retain its priority, this application must be returned to the Department of Water Resources, with corrections, on or before ...., 19......

WITNESS my hand this .... *day of* ...., 19......

....
Division of Water Management.
~~Department of Water Resources.~~

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

APPLICATION NO.	PRIORITY DATE OF APPLICATION
G1-22734	September 1, 1976

NAME
CITY OF ISSAQUAH

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 East Sunset Way (P.O. Box M)	Issaquah	Washington	98027

Examination Date: January 20,1977

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	600.0	645.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWL
1280 feet south and 320 feet west from north ¼ corner of Sec. 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼NW¼	34	24	6 E.	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Area served by City of Issaquah

DESCRIPTION OF PROPOSED WORKS

Drilled 8" diameter, 190' deep.
Detailed plans will be supplied prior to final Certificate.

DEVELOPMENT SCHEDULE

BEGINNING DATE	COMPLETION DATE	DATE COMPLETE APPLICATION OF WATER TO BE MADE
Started - well drilled	3 yrs from permit issuance	4 yrs from permit issuance

PROVISIONS AND RECOMMENDATIONS

Evaluation:

This Report of Examination began with a site visit on January 20, 1977, followed by a review of your current water rights, a review of your Comprehensive Water Plan and finally a review of the Ground Water Study and pump test results for the wells in question.

The City of Issaquah currently has two (2) certificates of water rights in good standing from the Risdon Wells Numbers 1 and 2 - Certificates Numbers 6343 and 7031 respectively. Your Comprehensive Water Plan also shows a certificate of water right No. 1087 from your water shed. This was relinquished by the City on October 2, 1970. Also, a pending 1970 Surface Water Application from seven springs on the East Water Shed is scheduled to be cancelled once these present applications are approved.

Recognizing that your system requirements are based on peak demands using instantaneous withdrawals and storage as key factors, we will normally approve a realistic request for additional instantaneous withdrawals, assuming no overriding factors occur. Our management of the resource, however, requires that we restrict your total annual permitted use from all sources to a quantity compatible with projected population growth. For example, you show a projected population of 10,000 by the year 1990. Using our standard maximum allowable daily average of 200 gallons per day/person or 0.224 acre-feet per year/person x 10,000 = 2,240 acre-feet per year (Maximum annual total from all your water rights). Quantities granted on your current two (2) ground water certificate exceeds this by 360 acre-feet per year; primarily due to past over estimation of population growth. This should create no major problem, however, as any annual quantities granted on these current requests would be supplemental to that presently approved.

A graphic look at your past, present and proposed water rights is as follows:

WATER RIGHT CERTIFICATES

Source	W.R.C. No.	Inst. Q	Annual Q. Primary	Annual Q. Supplemental
Water Shed	S.W. 1087	- Relinquished by the City October 2, 1970		
Risdon Wells				
No. 1	G.W. 6343	630 GPM	1000 AF/YR	
No. 2	G.W. 7031	1200 GPM	1600 AF/YR	

PENDING APPLICATIONS

Source	Application No.	Inst. Q.	Annual Q. Primary	Annual Q. Supplemental
East Water Shed 7 springs	21981	2.5 CFS	To be canceled pending approval of Ground Water Application	
Well #3	G1-22733	300 GPM		119 AF/YR
Well #4	G1-22734	600 GPM		645 AF/YR

Conclusions

The pump tests substantiate availability of water in quantities requested. No evidence was found to show that this withdrawal, if approved, would have any effect on existing rights nor prove detrimental to the public interest. Therefore, having due regard to the highest feasible development of the use to public waters, I recommend this application should go to permit subject to existing rights and the following conditions.

Special Conditions:

To be included on Permit and final Water Right Certificate -

"Instantaneous withdrawal shall not exceed 600 gallons per minute and the annual withdrawal shall not exceed 645 acre-feet per year" (Quantity approved based on quantity requested).

When approved "This is a supplemental right to primary Ground Water Certificates 6343 and 7031. Total annual withdrawals from all sources shall not exceed the 2600 acre-feet per year previously approved on primary rights." (Annual quantity calculated from estimated 1990 population of 10,000. Future increase to this annual quantity must be justified by population increase, or other unusual circumstances, and approved by this office.)

To be included on permit -

"All new water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

"The 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 airline and gage in addition to the access port."

"A suitable measuring device shall be installed and maintained in accordance with WAC 508-64-020 through WAC 508-64-040." (Installation, operation and maintenance requirements attached hereto.)

"Prior to issuance of a Certificate of Water Right, the applicant will be required to furnish information to this office as part of his Proof of Appropriation as to the size and type of equipment installed and the rate at which water is withdrawn in gallons per minute."

Other Comments and Recommendations:

Applicant is advised that notice of proof of appropriation of water (under which final certificate of water right issues) should not be filed until the permanent diversion facilities have been installed together with a mainline system capable of delivering the recommended quantity of water to an existing or proposed distribution system within the area to be served.

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 Assistant Secretary, Division of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Division of Health, Public Health Building No. 4, Thurston Airdustrial Center, Olympia, with regard to the need for compliance.

Upon approval of this application G1-22734 and/or accompanying application G1-22733 we shall initiate final action for cancellation of pending Surface Water Application No. 21981.

Signed at Redmond, Washington,
this 31 day of January, 1977.

Roy C. Bishop
ROY C. BISHOP
Resource Management
Department of Ecology

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

APPLICATION NO.	PRIORITY DATE OF APPLICATION
G1-22734	9-1-76

NAME
CITY OF ~~ISSAUQAH~~ Issaquah

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 East Sunset Way	P.O. Box M	Issaquah, Washington	98027

1/20/77 Ron

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	600	645

QUANTITY, TYPE OF USE, PERIOD OF USE
municipal supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWL
1280 feet south and 320 feet west from north 1/4 corner of SEC 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
~~NE~~ SE 1/4 NW 1/4	34	24	6 E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Geoffrey Thomas

26709.9
26751.7
26709.3
4

ECY 070-16(1)

REPORT OF EXAMINATION

DESCRIPTION OF PROPOSED WORKS

drilled 8" dia 190' deep

Detailed plans will be supplied prior to final Certificate

DEVELOPMENT SCHEDULE

BEGINNING DATE	COMPLETION DATE	DATE COMPLETE APPLICATION OF WATER TO BE MADE
Started - well drilled	3 YRs from Date P.I.	4 YR from P.I.

PROVISIONS AND RECOMMENDATIONS

Evaluation:

This Report of Examination began with a site visit on Jan. 20, 1977, followed by a review of your current water rights, a review of your Comprehensive Water Plan and finally a review of the Ground Water Study and pump test results for the wells in question.

The City of Issaquah currently has two (2) certificates of water rights in good standing from the Risdon Wells Nos 1 + 2 – Certificate Nos 6343 + 7031 respectively. Your Comprehensive Water Plan also shows a certificate of water right No. 1087 from your water shed. This was relinquished by the City on Oct 2, 1970. Also, a pending 1970 Surface Water application from seven springs on the East Water Shed is scheduled to be canceled once these present applications are approved.

Recognizing that your system requirements are based on peak demands using ~~instantaneous~~ instantaneous withdrawals and storage as key factors, we will normally approve a realistic request for additional ~~instantaneous~~ instantaneous withdrawals, assuming no overriding factors occur*. Our Management of the resource, however, requires that we restrict your total annual estimated use from all sources to a quantity compatible with projected population growth. For example, you show a projected population of 10,000 by the year 1990. Using our standard maximum allowable daily average of 200 GPD/person or 0.224 AF/YR/person x 10,000 =

Evaluation:

This Report of Examination began with a site visit on Jan. 20, 1977, followed by a review of your current water rights, a review of your Comprehensive Water Plan and finally a review of the Ground Water Study and pump test results for the wells in question.

The City of Issaquah currently has two(2) certificates of water rights in good standing from the Risdon Wells Nos 1 & 2 – Certificate Nos 6343 & 7031 respectively. Your Comprehensive Water Plan also shows a certificate of water right No. 1087 from your water shed. This was relinquished by the City on Oct 2, 1970. Also, a pending 1970 Surface Water Application from seven springs on the East Water Shed is scheduled to be canceled once these present applications are approved.

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

PERMIT NUMBER	APPLICATION NUMBER	PRIORITY DATE
G1-22734P	G1-22734	September 1, 1976

NAME
CITY OF ISSAQUAH

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 East Sunset Way (P.O. Box M)	Issaquah	Washington	98027

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	~~600.0~~ 500.0	645.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
1280 feet south and 320 feet west from north ¼ corner of Sec. 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼NW¼	34	24	6 E.	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Area served by City of Issaquah

ECY 040-1-20

PERMIT

DESCRIPTION OF PROPOSED WORKS

DEVELOPMENT SCHEDULE

BEGINNING DATE	COMPLETION DATE	DATE COMPLETE APPLICATION OF WATER TO BE MADE
Started - well drilled	March 15, 1980	March 15, 1981

PROVISIONS

Instantaneous withdrawal shall not exceed 600 gallons per minute and the annual withdrawal shall not exceed 645 acre-feet per year.

This is a supplemental right to primary Ground Water Certificates 6343 and 7031. Total annual withdrawals from all sources shall not exceed the 2600 acre-feet per year previously approved on primary rights.

All new water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

The 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 airline and gage in addition to the access port.

A suitable measuring device shall be installed and maintained in accordance with WAC 508-64-020 through WAC 508-64-040.

Prior to issuance of a Certificate of Water Right, the applicant will be required to furnish information to this office as part of his Proof of Appropriation as to the size and type of equipment installed and the rate at which water is withdrawn in gallons per minute.

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Olympia, Washington, this 15th *day of* March, *19*77

~~JOHN A. BIGGS, Director~~
Department of Ecology

by Robert K. McCormick
ROBERT K. McCORMICK, Regional Manager

ENGINEERING DATA
OK JJ

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.)

[X] 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
September 1, 1976	G1-22734	G1-22734P	G1-22734C

NAME
CITY OF ISSAQUAH

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 East Sunset Way (P.O. Box M)	Issaquah	Washington	98027

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
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	500.0	645.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
1280 feet south and 320 feet west from north ¼ corner of Sec. 34.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼NW¼	34	24	6 E.	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Issaquah.

PROVISIONS

Instantaneous withdrawal shall not exceed 600 gallons per minute and the annual withdrawal shall not exceed 645 acre-feet per year.

This is a supplemental right to primary Ground Water Certificates 6343 and 7031. Total annual withdrawals from all sources shall not exceed the 2600 acre-feet per year previously approved on primary rights.

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508-64-020 through WAC 508-64-040 (Installation, operation and maintenance requirements attached hereto).

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 Redmond *Washington, this* 31st *day of* August *, 19*81

Department of Ecology

ENGINEERING DATA

OK ff

by Robert K. McCormick
ROBERT K. McCORMICK, Regional Manager

FOR COUNTY USE ONLY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PROGRESS SHEET

COMPUTER INPUT
☐ APPLICATION
☐ PERMIT
☐ CERTIFICATE
☐ OTHER

☐ SURFACE WATER ☒ GROUND WATER

NAME			TELEPHONE NO.
CITY OF ISSAQUAH			
ADDRESS: 130 E. Sunset Way (P.O. Box M)	(CITY) Issaquah	(STATE) Washington	(ZIP CODE) 98027
ASSIGNED TO		TELEPHONE NO.	DATE ASSIGNED
ADDRESS	(CITY)	(STATE)	(ZIP CODE)
APPLICATION NO. G-22734	PERMIT NO. G122734P	CERTIFICATION NO. G-22734C	
DATE AMENDED	DATE CANCELLED	W.R.I.A.	

APPLICATION

DATE APPLICATION RECEIVED	INITIAL $10.00 FEE RECEIVED	DATE FEE RECEIVED
9-1-76	☒ YES ☐ NO	9-7-76
STATEMENT OF ADDITIONAL EXAMINATION FEE $	DATE SENT	DATE RECEIVED
DATE RETURNED FOR COMPLETION OR CORRECTION	DATE RECEIVED	

TEMPORARY PERMIT

APPROVED BY	DATE ISSUED

PUBLICATION

APPROVED BY	DATE APPROVED	DATE NOTICE SENT
JJ	9/15/76	

PROTESTED BY AND DATE

Returned as not original

DATE AFFIDAVIT RECEIVED	CHECKED BY	TIME EXPIRED	DATE AMENDED NOTICE SENT	DATE AFFIDAVIT RECEIVED	TIME EXPIRED
11-29-76 / 12-9-76	JS	10-29-76			

DEPARTMENT OF GAME AND FISHERIES REPORT

APPROVED	PROVISO	PROTEST

EXAMINATION

DATE EXAMINATION MADE	MADE BY	DATE REPORT OF EXAM. WRITTEN	WRITTEN BY	CHECKED BY
1/20/77	Roy B	1/28/77	Roy B	[illegible]
DATE PERMIT FEE REQUESTED 2/3/77	AMOUNT DUE 20.00		DATE RECEIVED 2-10-77 / OK TO PERMIT 2-14-77 JS	

PERMIT

PERMIT APPROVED BY	DATE APPROVED	PERMIT NO.	DATE ISSUED
JJ	3/11/77	G122734P	3-15-77

BEGINNING OF CONSTRUCTION

DATE NOTICE SENT	DATE FILED	EXTENSION FEE
—		
EXTENDED TO	EXTENDED TO	

WELL DRILLER'S AND/OR CONSTRUCTION REPORT

DATE SENT	DATE FILED
3-16-77	In file

COMPLETION OF CONSTRUCTION

DATE NOTICE SENT	DATE FILED	EXTENSION FEE
3-16-77	3/31/80	
EXTENDED TO	EXTENDED TO	

PROOF OF APPROPRIATION

DATE SENT	DATE FILED	EXTENSION FEE	EXTENDED TO
	6-12-81		

DATE CERTIFICATE FEE REQUESTED	AMOUNT DUE	DATE RECEIVED	DATE APPROVED FOR CERTIFICATE	APPROVED BY
		6-12-81	7-14-81	JJ

CERTIFICATION

PROOF EXAM. REQUIRED	CERTIFICATE NUMBER	DATE ISSUED
☐ YES ☐ NO	G-22734C	8-30-81

REMARKS

ECY 070-17

PROGRESS

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Accepted By
Date 5-21-97
Is Field Exam Required? ☐ YES ☒ NO
Determined By

APPLICATION FOR CHANGE OF WATER RIGHT

☐ PURPOSE ☒ DIVERSION OR WITHDRAWAL
☒ PLACE ☐ ADDITIONAL POINT OR POINTS

NAME: CITY OF ISSAQUAH

DENIED

FEE PAID 8/0.00 4/30/97

Bus. Tel. 391-1004
Home Tel.
Other Tel.

ADDRESS	(CITY)	(STATE)	(ZIP CODE)
PO Box 1307	Issaquah	Washington	98027

APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
G1-22734	G1-22734P	G1-22734C

DECREED RIGHT (TITLE OF CASE)

APPROPRIATIONS MADE (GIVE DATE IF PRIOR TO JUNE 7, 1917 IF SURFACE WATER, OR JUNE 7, 1945 IF GROUND WATER)

IS THE WATER RIGHT RECORDED IN YOUR NAME? ☒ YES ☐ NO
IF NO, GIVE NAME RECORDED UNDER

1. RIGHT CONSISTS OF

WATERS USED FROM (STREAM, LAKE, WELL, OR TRENCH, ETC.)	GALLONS PER MINUTE OR CUBIC FEET PER SECOND
Well	500 gpm

WATER CURRENTLY USED FOR	TIME OF USE
Municipal Supply	Continuously

2. LOCATION OF PRESENT POINT OF DIVERSION OR WITHDRAWAL

ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.

1280 feet south and 320 feet west from north 1/4 corner of Section 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
SE 1/4 NW 1/4	34	24	6E	King

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, COMPLETE THIS SECTION

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

3. LEGAL DESCRIPTION OF LANDS WATER IS USED ON

Within the corporate limits of the City of Issaquah

SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
			King

(ATTACH SEPARATE SHEET IF NECESSARY)

ARE YOU THE LEGAL OWNER OF THE ABOVE DESCRIBED LANDS ☐ YES ☐ NO
IF NO, EXPLAIN YOUR INTEREST

REASONS FOR THE PROPOSED CHANGE

Well capacity dropped due to poor well construction and City no longer owns property where well was sited.

A MINIMUM FEE OF $10.00 MUST ACCOMPANY THIS APPLICATION

CONTINUE ON REVERSE SIDE

CHANGE

ECY 040-1-97
Rev. 3/96

4. **CHANGE REQUESTED**

CHANGE WATER USE TO	TIME OF USE	GALLONS PER MINUTE OR CUBIC FEET PER SECOND
N/A	N/A	N/A

5. **LOCATION OF PROPOSED POINT OF DIVERSION OR WITHDRAWAL**

ON ACCOMPANYING SECTION MAPS, ACCURATELY MARK AND IDENTIFY EACH POINT OF DIVERSION. SHOW NORTH-SOUTH AND EAST-WEST DISTANCES FROM NEAREST SECTION CORNER OR PROPERTY CORNER.

ALSO, ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.

1346 feet north and 1780 feet west of the Center of Section 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
SE 1/4 NW 1/4 NW 1/4	34	24	6E	King

6. **IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, COMPLETE THIS SECTION**

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

ARE YOU THE OWNER OF THE LAND ON WHICH THE PROPOSED POINT OF DIVERSION OR WITHDRAWAL IS TO BE LOCATED

☐ YES ☐ NO

LEGAL DESCRIPTION OF LANDS WATER IS USED ON

Within the corporate limits of the City of Issaquah

SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
			King

(ATTACH SEPARATE SHEET IF NECESSARY)

ARE YOU THE LEGAL OWNER OF THE ABOVE DESCRIBED LANDS	IF NO, EXPLAIN YOUR INTEREST
☐ YES ☐ NO	

* PLEASE NOTE LEGAL LAND OWNER SIGNATURE AND APPLICANT SIGNATURE ARE BOTH REQUIRED. IF THE LEGAL LAND OWNER AND APPLICANT ARE THE SAME, PLEASE SIGN IN BOTH PLACES. THANK YOU.

LEGAL LANDOWNER (PLEASE PRINT)

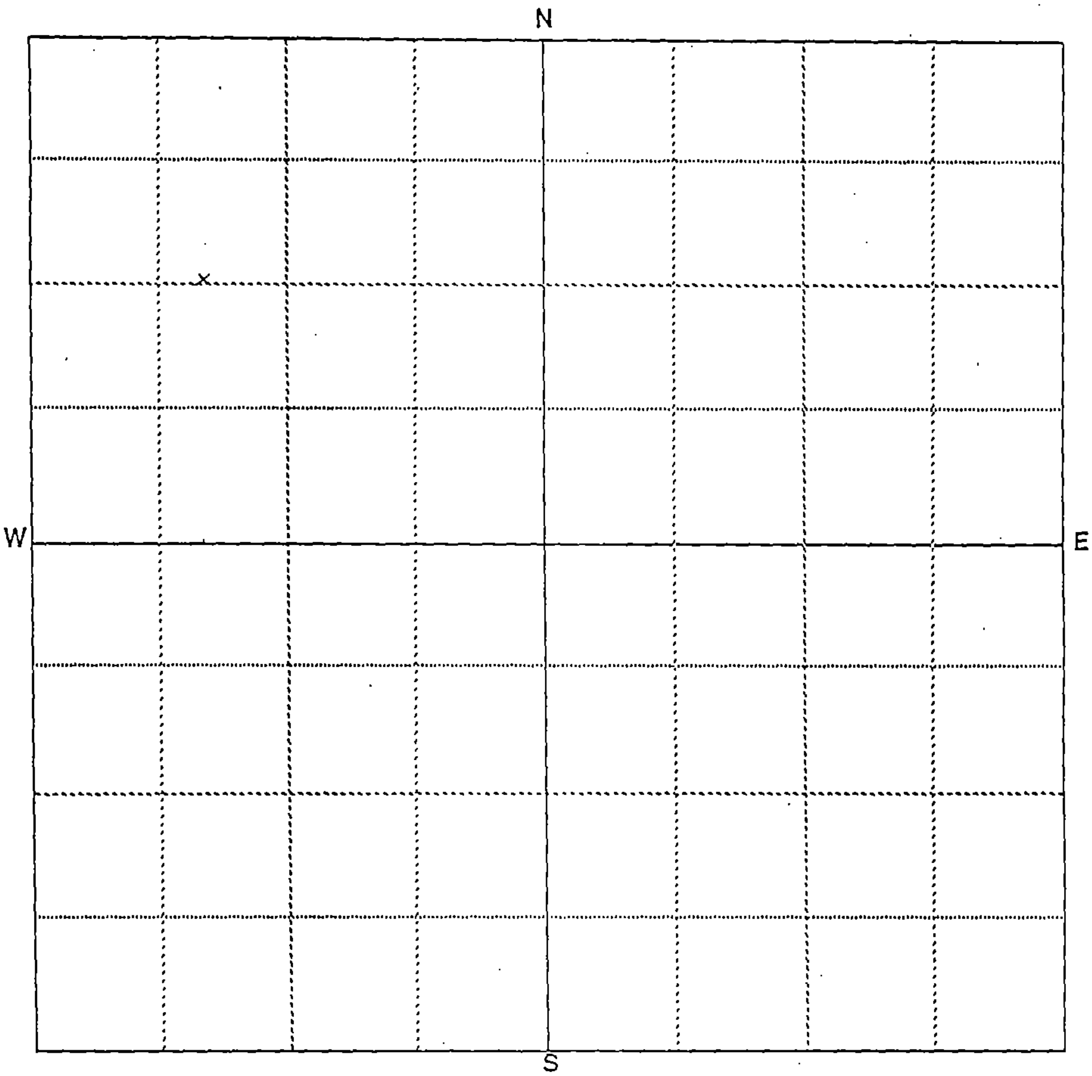
[signature]
APPLICANT'S SIGNATURE

LEGAL LANDOWNER SIGNATURE (OWNER OF PROPERTY DESCRIBED IN ITEM NUMBER 3)

LEGAL LANDOWNER'S ADDRESS

SECTION MAP

Sec. 34 Twp. 24 N. R. 6E



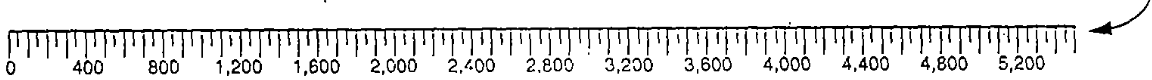
Scale: 1 inch = 800 feet (each small square = 10 acres)

Show by a cross (X) the location of point of diversion (surface water source) or point of withdrawal (ground water source). For ground water applications, show by a circle (O) the locations of other wells or works within a quarter of a mile.
Indicate traveling directions from nearest town in space below.

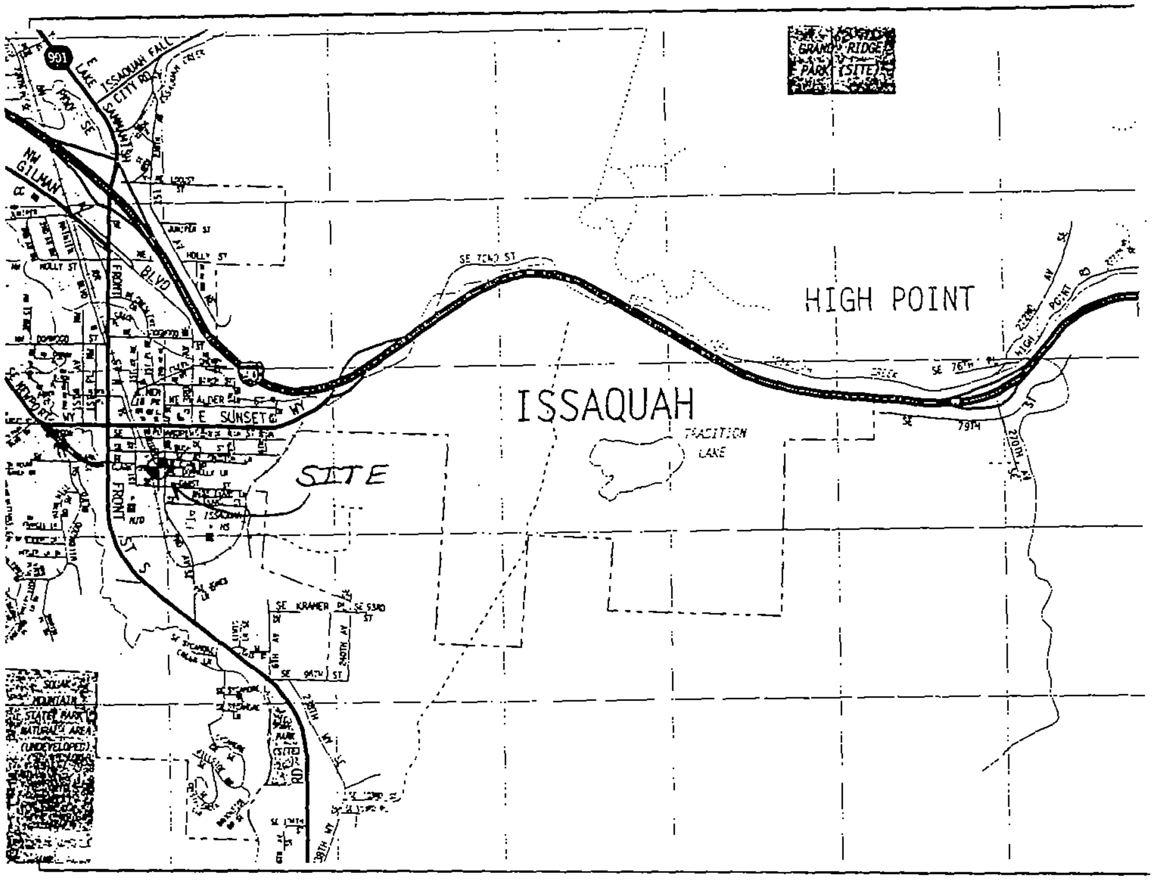
From Bellevue, Washington; take I-90 eastbound, exit off I-90 at Exit 17; go south on Front Street to SE Bush Street. Turn left (east) on SE Bush and go approximately 150 feet past the intersection with 1st Avenue SE and turn south into the parking lot. Go to southern end of parking area. Well site is between parking area and 2nd Avenue SE.

Detach here

Fold along scale.



Detach this scale at the perforation, fold excess paper under or cut off excess by cutting along the scale line. This scale corresponds to the SECTION MAP above. You can read feet directly from this scale to outline property and locate points of diversion or withdrawal on the SECTION MAP. Enclose this map along with the application and $10.00 examination fee.



Your water right application will be processed by the Regional Office of the Department of Ecology having jurisdiction in the area in which your water works are located. Please submit your completed **application form, maps, sketches, and $10.00 examination fee to the appropriate Regional Office.**

Northwest Regional Office
3190 - 160th Avenue S.E.
Bellevue, WA 98008-5452
Tel. (206) 649-7000
TDD (206) 649-4259

Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902-3401
Tel. (509) 575-2490
TDD (509) 454-7673

Southwest Regional Office
PO Box 47775
Olympia, Washington 98504-7775
300 Desmond Drive
Lacey, WA 98503
Tel. (360) 407-6300
TDD (360) 407-6306

Eastern Regional Office
N. 4601 Monroe, Suite 100
Spokane, Washington 99205-1295
Tel. (509) 456-2926
TDD (509) 458-2055

The appropriate Regional Office will be happy to answer any further questions you may have.

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs please contact the appropriate Regional Office from above.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

JUN 13 2003

CERTIFIED MAIL
7002 3150 0004 8540 3640

City of Issaquah
Attn: Sheldon Lynne
P.O. Box 1307
Issaquah, WA 98027

Dear Mr. Lynne:

RE: Denial of Ground Water Right Change - Application No. G1-22734C

Enclosed is the Department of Ecology's Report of Examination, No. G1-22734C. This report constitutes our determination and order regarding the above referenced application.

This change application has been **denied**.

This Order may be appealed pursuant to RCW Chapter 43.21B. The person to whom this Order is issued must file an appeal with the Pollution Control Hearings Board **within thirty (30) days of receipt of this Order.** Send the appeal to: Pollution Control Hearings Board, PO Box 40903, Olympia, Washington 988504-0903. At the same time, a copy of the appeal **must** be sent to: Department of Ecology, Water Resources Appeals Coordinator, P.O. Box 47600, Olympia, Washington 98504-7600. All others receiving notice of this Order must file an appeal with the Pollution Control Hearings Board **within thirty (30) days of the date the Order was mailed** in the same manner described above. An appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21B.320.

If you have any questions or concerns on the above information, please call the Department of Ecology at (425) 649-7000.

Sincerely,

Daniel L Swenson

Daniel L. Swenson
Water Resources Supervisor
Northwest Regional Office

DS:dh
Enclosure:

I certify that I mailed this Order, or an identical copy thereof, postage prepaid, to the above addressee(s) this 13th **day of** June **2003.** Deidre Holt **(Signature)**

7002 3150 0004 8540 3640

U.S. Postal Service
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For delivery information visit our website at www.usps.com

OFFICIAL USE

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Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To CITY OF ISSAQUAH
ATTN SHELDON LYNNE
Street, Apt. No.; or PO Box No. P O BOX 1307
City, State, ZIP+4 ISSAQUAH WA 98027

PS Form 3800, June 2002 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

~~WR: G1-22734C~~

1. Article Addressed to:

CITY OF ISSAQUAH
ATTN SHELDON LYNNE
P O BOX 1307
ISSAQUAH WA 98027

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Shirley A. Lambert ☐ Agent ☐ Addressee

B. Received by (Printed Name) SHIRLEY A LAMBERT
C. Date of Delivery 6/16/3

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number
[redacted]

PS Form 3811, August 2001 Domestic Return Receipt 102595-02-M-1035

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION FOR CHANGE TO GROUNDWATER RIGHT

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
September 1, 1976	G1-22734A	G1-22734P	G1-22734C

NAME
City of Issaquah

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
P.O. Box 1307	Issaquah	Washington	98027

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Request Denied to change Point of Withdrawal to City of Issaquah Well #6

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	N/A	N/A

QUANTITY, TYPE OF USE, PERIOD OF USE

N/A

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL
700 feet west and 800 feet south of the NE corner of SE ¼ of Section 28

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼ SE¼	28	24N	06E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Water service area of the City of Issaquah as described in its 2002 Water System Plan, the boundaries of which are shown below.

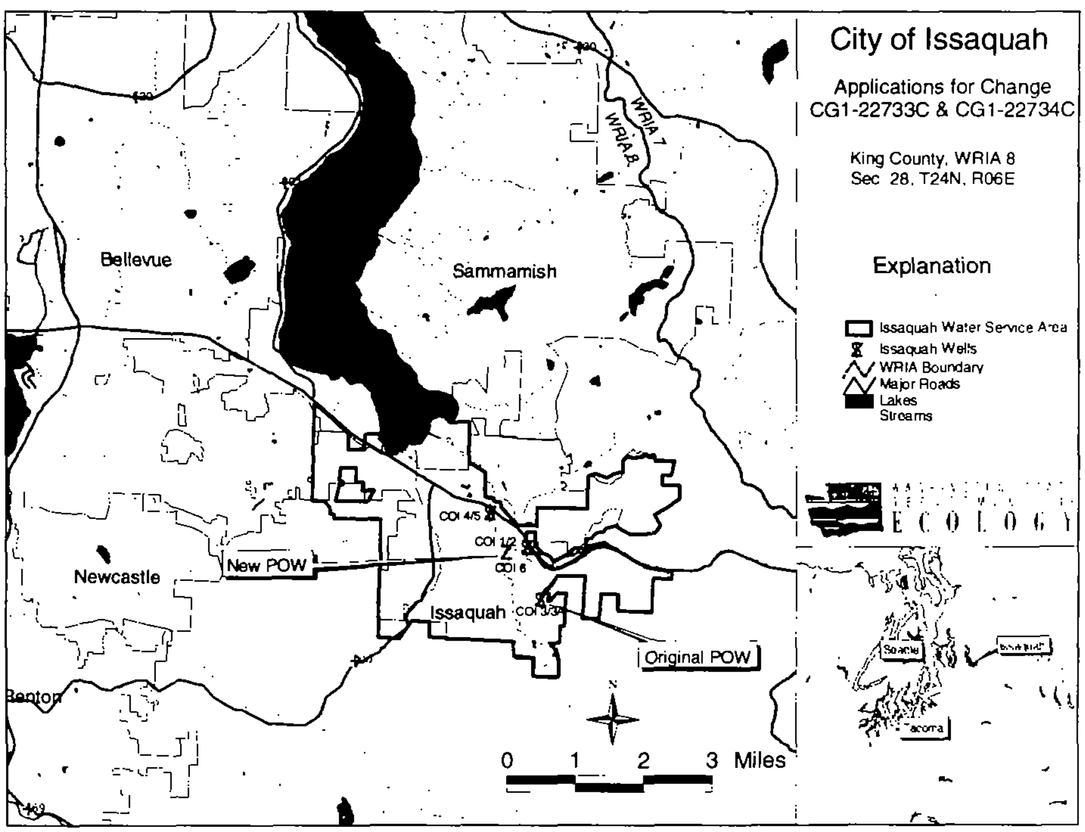


Figure 1: City of Issaquah water system service area and location of wells.

DESCRIPTION OF PROPOSED WORKS

City of Issaquah Well 6 (COI-6), drilled at a 16-inch diameter and tested in July 1998, was completed at a depth of 378 feet. A 20-inch diameter surface seal was installed to a depth of 18 feet. A 10-inch screen is installed from 258 to 363 feet.

DEVELOPMENT SCHEDULE		
BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Begun	N/A	N/A

REPORT

BACKGROUND INFORMATION

The City of Issaquah was granted surface water rights for the East Fork (East Fork) of Issaquah Creek in 1936. This surface water right (SWC 1087) became unusable when Interstate 90 was built over the diversion structure in the early 1970's through the East Fork watershed. The water right that is the subject of this application for change (G1-22734C and companion application G1-22733C) was filed with Ecology in 1976 to serve as a replacement for their compromised East Fork surface water source.

At the time water under G1-22733C and G1-22734C was allocated for wells COI-3A and COI-3 respectively, the City was utilizing groundwater from City of Issaquah Wells 1 and 2 (COI-1and COI-2), located between Gilman Boulevard and Interstate 5, east of Front Street in the city of Issaquah. The water rights for COI-1 and COI-2 were allocated a total Qa of 2600 afy, which Ecology in 1977 believed adequate to accommodate the estimated 10,000 population projected for the year 1997. For this reason the annual quantities under G1-22733C and G1-22734C were made supplemental to those for COI-1 and COI-2.

By the early 1990's City Wells 3A and 3 (COI-3A COI-3), utilizing water under G1-22733C and G1-22734C, were no longer able to produce an adequate supply of water due to construction errors. These wells were abandoned and decommissioned 1993. The City filed for a change in point of withdrawal for G1-22733C and G1-22734C in May 1997. Evidence provided by the City of Issaquah, including photographs of the well house and notes showing pumping records, the existence in the field of remaining infrastructure, as well as drill and decommission logs, and proof of appropriation documentation indicate that the city worked diligently toward perfection prior to filing an application for amending the water right.

Attributes of the Original Certificate

Name on Certificate:	City of Issaquah
Priority Date:	Sept. 1, 1976
Instantaneous Quantity:	500 gallons per minute (gpm)
Annual Quantity:	645 acre-feet per year (afy) *supplemental to GWC 6343 and 7031
Point of Withdrawal:	SE¼ NW¼ of Section 34, Township 24 North, Range 6 East
Purpose of Use:	Municipal Supply
Period of Use:	Continuously
Place of Use:	Area Served by City of Issaquah

Proposed Change

Name of Applicant:	City of Issaquah
Date of Application for Change:	April 30, 1997
Point of Withdrawal:	NE¼ SE¼ of Section 28, Township 24 North, Range 6 East
Notice of Publication:	The Issaquah Press – July 10 and July 17, 2002
Protests:	None

INVESTIGATION

In considering this application, my investigation included, but was not limited to research and/or review of:

- The State Water Code
- Existing water rights on file for City of Issaquah Water System
- Records of other water rights in the vicinity
- Notes from a site visit on March 18, 2002
- Correspondence from Sheldon Lynn, City of Issaquah Public Works Department
- GIS, topographic and local area maps
- City of Issaquah 2002 Water Comprehensive Plan Draft
- Issaquah Creek Valley Groundwater Management Plan, March 1999
- Reports on wells tests and groundwater exploration (Golder, 2000a), geophysical survey (Golder, 1997), and computer groundwater modeling (Golder, 2000b), all prepared by Golder Associates for the City of Issaquah.
- Technical Memorandum regarding "Technical Water Right Transfer Groundwater Withdrawal Issues From Well COI-6" prepared by Golder Associates hydrogeologist Robert Anderson, P.G. for the City of Issaquah (Golder, 2002).
- Technical Memorandum regarding the "Effects of Groundwater Extraction on Stream Flow in the Issaquah Creek Valley Watershed" prepared by Dr. Joel Massmann for the Muckleshoot Indian Tribe (Massmann, 2001).

Elements of this report dealing with hydrogeological assessment of the proposed water right change were prepared by the author, Douglas H. Wood, a Washington State licensed hydrogeologist (License #952).

State Water Code

Chapter 90.44 RCW authorizes the appropriation of public groundwater water for beneficial use and describes the process for obtaining groundwater rights including the process to amend or change existing rights. Laws specifically governing the ground water right permitting process are RCW 90.03.250 through 90.03.340 and RCW 90.44.060. Changes or amendments to ground water rights are regulated under RCW 90.44.100 and RCW 90.03.290.

Recorded Rights for the City of Issaquah Water System

The City of Issaquah holds 6 certificates of water right (Table 1) with an aggregate annual quantity (Qa) allocation of 2,800 acre-feet per year (afy). Instantaneous quantity (Qi) allocated under these rights totals 3030 gallons per minute (gpm).

The city serves a population of approximately 11,000 (Year 2000 OFM) and serves some 7,515 ERU's (Equivalent Residential Units). The city's total year 2000 production was approximately 1,850 acre-feet, 8% of which was purchased from the City of Bellevue. Year 2001 production from operating city wells was approximately 1,600 acre-feet, as shown in Table 1. Planned and potential annexations (some of which have already occurred) and growth, based on a conservative annual growth factor 0.5%, as detailed in the City of Issaquah Draft 2002 Water Comprehensive Plan (2002 WCP), would expand the population to over 40,000 by the year 2020 serving nearly 18,000 ERU's. Based on an average daily consumption per ERU of 209 gallons per day (2002 WCP), the year 2020 projected Qa requirements would amount to approximately 4,200 acre-feet.

It is apparent from these growth estimates that the city's current water rights are inadequate. To address the forecasted shortfall in water needs, the City of Issaquah has contracted with the City of Seattle to supply surface water via a pipeline constructed in 2001. It is also apparent that the city's current approximately 60% usage of its allocated Qa of 2800 afy (Table 1) afy will likely rise to serve a portion of increased demand.

Table 1: City of Issaquah Water Rights Summary

Well #	Certificate #	Priority Date	Qi (gpm)	Qa (afy)	2001 Use (Gal)	2001 Use (afy)
COI-1	6343-A	03/30/67	630	1,000	78,110,000	240
COI-2	7031-A	03/11/69	1,200	1,600	221,320,000	680
COI-3A	G1-22733C	09/01/76	300	119*		
COI-3	G1-22734C	09/01/76	500	645*		
COI-4	G1-24809C	03/10/86	250	200	14,220,000	44
COI-5	G1-24633C	04/02/85	150	1,600**	207,620,000	637
Total			**3,030**	**2,800**	**521,270,000**	**1,600**

* Supplemental to 6343-A and 7031-A (max cumulative = 2600 afy)

** Supplemental to G1-24809C, 6343-A and 7031-A (max cumulative = 2800 afy less amount from Wells 3 and 3A)

Other Water Rights in the Vicinity

A search of the Ecology water rights records indicates that there are 33 water rights, including those held by the City of Issaquah, within an approximate 1 mile radius of the proposed point of withdrawal in this application (Table 2).

Table 2: Issaquah Area Water Rights

Name	WR No.	Purpose*	CFS	GPM	AFY	Priority	Sec	Twn	Rng	Qtr-Qtr Sec
CARLSON B J	SWC-09859	IR,CI	-	-	3.6	7/16/1965	27	24	6E	NW/4NW/4
CARLSON BERTIL J	S1-00626C	FS	0.18	-	-	6/27/1969	27	24	6E	NW/4NW/4
Darigold Inc	G1-21648C	CI	-	1100	1232	5/16/1974	28	24	6E	NE/4SE/4
Darigold Inc	GWC-00311	CI	-	500	405	4/6/1949	28	24	6E	NE/4SE/4
EISENTRAGER NORMA	S1-23145C	DS	0.001	-	0.5	6/9/1978	33	24	6E	SW/4SE/4
HILLERY D R	SWC-04972	DS	0.005	-	-	10/9/1951	33	24	6E	NE/4NE/4
HILLERY D R	SWC-04971	DS	0.005	-	-	10/19/1951	33	24	6E	E/2E/2NE/4
KEES T D	SWC-11359	DS	0.01	-	1	2/16/1960	34	24	6E	SE/4SE/4
Lakeside Gravel Co	GWC-00570	DS,CI	-	650	250	6/13/1950	27	24	6E	NW/4NW/4
Lakeside Gravel Co	GWC-01327	DG,CI	-	850	316	8/18/1952	27	24	6E	NW/4NW/4
LARSON E	SWC-04970	DS	0.01	-	-	10/9/1951	27	24	6E	SW/4SE/4
MCCRAY E	SWC-04858	DS	0.005	-	-	5/1/1952	27	24	6E	
MILES L	SWC-01643	IR,DS	0.02	-	-	8/20/1937	27	24	6E	SE/4SW/4
Mine Hill Community	SWC-06329	DM	0.2	-	-	5/27/1954	33	24	6E	SW/4NE/4
NIX F E	SWC-01814	IR,DS	0.01	-	-	8/15/1941	27	24	6E	
Pickenng Brothers	GWC-02985	DM	-	20	32	5/24/1956	28	24	6E	SW/4NW/4
SMITH EUGENE	SWC-01780	IR,DS	0.05	-	-	8/25/1939	27	24	6E	
SPWSD	G1-00289C	MU	-	3200	936	1/20/1972	28	24	6E	NE/4NE/4
SPWSD	G1-25428P	MU	-	2300	-	4/24/1989	28	24	6E	NE/4NE/4
SPWSD	G1-26014P	MU	-	2000	1608	12/24/1990	27	24	6E	SW/4NW/4
Squak Valley Water Club	SWC-07582A	DM	0.09	-	-	10/20/1958	33	24	6E	SE/4SE/4
STONEBRIDGE E M	SWC-06600	DS	0.005	-	-	7/15/1952	33	24	6E	NE/4NE/4
STROM WARNER A	SWC-04565	PO,DS	0.1	-	-	8/5/1936	33	24	6E	NE/4NE/4
Washington DFW	SWC-01330	FS	10	-	-	1/28/1939	33	24	6E	NE/4SE/4
Washington DFW	SWC-11478	FS	10	-	-	3/29/1968	33	24	6E	NE/4NE/4
Washington DFW	S1-00735C	FS	16	-	-	11/14/1970	33	24	6E	
WILTSE F G	SWC-07573	DS	0.01	-	-	3/24/1958	33	24	6E	SE/4NE/4

* IR=Irrigation, CI=Commercial, FS=Fire Safety, DS=Single Domestic, DG=General Domestic, DM=Multiple Domestic, MU=Municipal, PO=Power

Nineteen surface water rights are located in the immediate area of the proposed new point of withdrawal. These include 12 single hook-up domestic surface water rights (3 of which include irrigation), 4 for fish propagation (3 of which, totaling 36 cfs are held by Washington Department of Fish and Wildlife for use at the Issaquah Salmon Hatchery), one used for commercial purposes and irrigation, and two for community domestic water systems.

Surface and groundwater rights of significant quantity in the area of the proposed new well (Figure 2) include those used by the Lakeside Gravel Quarry (Qi = 1500 gpm, Qa = 566 afy), the WA Department of Fish and Wildlife (WDFW) Issaquah Salmon Hatchery (Qi = 36 cfs, non-consumptive), Darigold (Qi = 1600 gpm, Qa = 1637 afy), and the municipal water systems that share the Issaquah Valley Aquifer - Sammamish Plateau Water and Sewer District (Qi = 5500gpm, Qa = 2109 afy) and the City of Issaquah (Qi = 3030 gpm, Qa = 2800 afy). The Sammamish Plateau water rights in the valley also include supplemental and seasonal rights allowing a pumping rate of up to 6,500 gpm during the winter months.

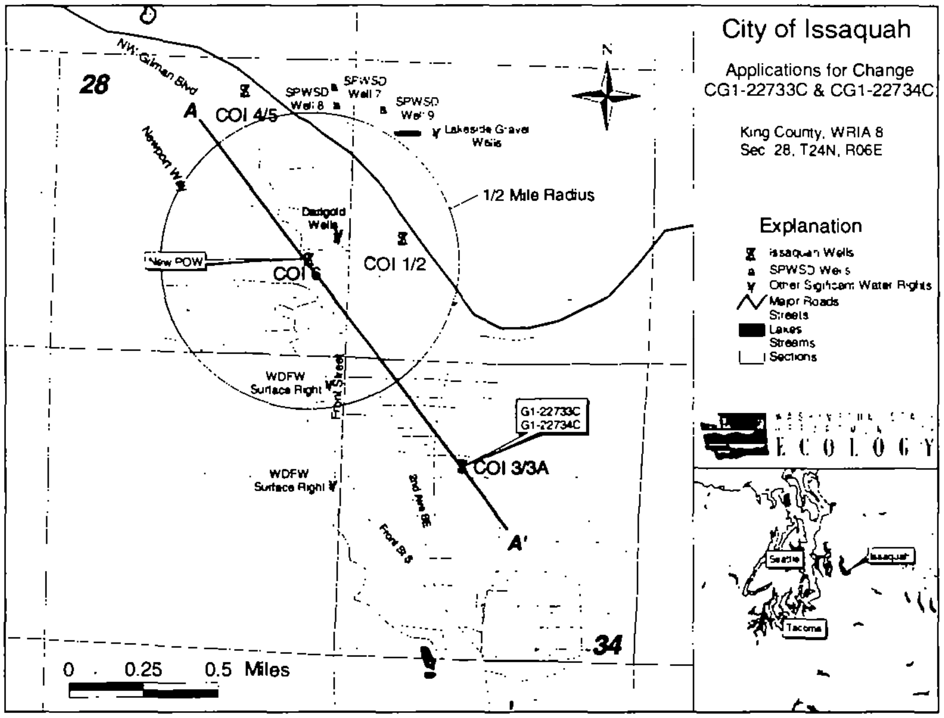


Figure 2: Detail map showing location of proposed changes and surface trace of geological cross-section (Figure 6).

Site Visit

The sites of COI-6 and the original COI-3A/3 location were visited by the author, Douglas Wood, on March 18, 2002. Water system infrastructure and well house foundations were examined at the former site of COI-3A/3. The COI-6 site was examined and it was noted that the well site is located in the city's works yard. The COI-6 wellhead is currently covered and fenced off to secure the site from potential contamination. Mr. Sheldon Lynne, Deputy Director of the Public Works Engineering Department for the City of Issaquah, informed Ecology during the site visit that the city will soon relocate the city works yard, which will further protect the wellhead area.

Correspondence Received

The City of Issaquah was granted a Preliminary Permit to drill and test two wells to replace wells COI -3, and 3A on May 30, 1997. A letter from Sheldon Lynne, Deputy Director of the Public Works Engineering Department for the City of Issaquah, dated February 23, 1998, informed Ecology that the results of the City's tests indicated that the new well for both water rights will be the well designated COI-6.

Mr. Steve Bessow of the Washington Department of Fish and Wildlife (WDFW), after reviewing the proposed changes for G1-22733C and G1-22734C, informed Ecology in a letter dated May 29, 2002, that WDFW has no objections or comments to these changes. In a letter dated February 14, 2003, Mr. Bessow, upon reviewing more recent information on the proposed new point of withdrawal, recommended that groundwater withdrawals in hydraulic continuity and Issaquah Creek be considered surface water diversions and thus closed to appropriation. He also requested that any replacement wells be denied if found to be in other than negligible hydraulic continuity the surface waters.

Topographic and Local Area Maps

Geological maps and reports, published through the US Geological Survey and from other sources relevant to this investigation were examined to provide geological and hydrological conditions relevant to the proposed change in point of withdrawal. Maps generated using ArcView GIS software were used to examine locations of the proposed new point of withdrawal in relation to other City wells, other water rights, and to Issaquah Creek and other surface water bodies.

City of Issaquah Water System Plans

The City of Issaquah 1996 Water System Plan Update and the Draft 2002 City of Issaquah Water Comprehensive Plan (2002 WSP) provide information on system infrastructure, existing system water rights, growth projections, and water system boundaries.

Issaquah Creek Valley Groundwater Management Plan

The 1999 Issaquah Creek Valley Groundwater Management Plan and supplemental Area Characterization provide hydrogeological background information and insight into water issues within the Issaquah area.

Golder Associates Reports for the City of Issaquah

City of Issaquah supplied their consultant's (Golder Associates) reports on groundwater assessment, geophysical studies of the Issaquah valley, well tests and aquifer modeling. These reports provided a detailed assessment of hydrogeological conditions within the Issaquah Valley Aquifer. The most recent detailed technical document supplied by the applicant is a report entitled "Groundwater Exploration and Pumping Tests – Lower Issaquah Valley" dated October 30, 2000. This report (Golder, 2000a) contains pump tests data for the proposed new well (COI-6) and has cross-sections and hydrogeological interpretations based on these tests and geophysical and modeling studies relayed in earlier reports. The November 2000 report on modeling (Golder, 2000b) provides short and long-term modeled estimates of the effects on stream flows resulting from pumping at the proposed new point of withdrawal. Additionally, a technical memorandum presenting a comparison of the hydrogeological characteristics of the proposed new point of withdrawal with those of the original wells included in the application, prepared by Golder Associates hydrogeologist Robert Anderson in October 2002, was supplied the City of Issaquah (Golder, 2002).

Effects of Groundwater Extraction on Stream Flow in the Issaquah Creek Valley Watershed

The report, in the form of technical memorandum, was prepared by Dr. Joel Massmann for the Muckleshoot Indian Tribe, February, 2001. This report discusses the effects of groundwater withdrawals on stream flows in Issaquah Creek (Massmann, 2001).

FINDINGS

In accordance with Ecology policies and Washington State law, the following considerations were addressed during the process of evaluating this change request:

- Will the change create an enlargement of the original right?
- Has a protest been filed against the proposed change?
- Will the change cause impairment to other existing rights?
- Is water available at the new point of withdrawal?
- Does the new point of withdrawal tap the same source of water as the original right?
- Is there potential for different impacts on the water source?
- Will the proposed change be detrimental to public welfare?

Potential for Enlargement

Washington State statutory and case law require that approval of a groundwater change must not result in an enlargement of the right (RCW 90.44.100; Schuh v. Ecology, 100 Wn.2d 180; Merrill v. PCHB, 137 Wn.2d 118). In the Merrill decision the Washington Supreme Court also requires Ecology to evaluate whether the right has been relinquished to the State through non-use or abandonment.

Based on the Washington Supreme Court's 1998 Theodoratus case (135 Wn.2d 582), Ecology reviews applications for changes or amendments to groundwater certificates that were issued pursuant to RCW 90.44.080, where an evaluation was not performed as to the perfected annual quantity put to beneficial use before issuance of the certificate.

The proof of appropriation for G1-22734C was filed on June 9, 1981. The document states that instantaneous quantity was perfected in the amount of 1100 gpm. Ecology permit writer Janet Jorg determined at that time that the actual pumping rate was 500 gpm, consistent with the permit, G1-22734P, issued March 15, 1977.

Based on proof of appropriation documentation, copies of notes on water production provided by the City of Issaquah, drilling and decommissioning logs on file with Ecology, and remaining infrastructure seen in field, it is tentatively determined that the right has been beneficially used for municipal supply purposes and is eligible for change.

The water right being investigated (G1-22734C) was certificated for municipal purposes. The right is therefore exempt from relinquishment for non-use under RCW 90.14.141(d).

The common law principal of abandonment is applicable in the case of municipal water rights. Common law abandonment, as discussed by the Supreme Court of Washington 1997 Twisp Case (133 Wn.2d 769), does not however apply to the current application. The City of Issaquah made efforts to replace the wells through the filing of this application in 1997, thus establishing that the city did not intent to abandon the right after decommissioning the well in 1993.

Certificate G1-22734C was issued in the amount of 500 gpm on August 31, 1981, with an annual quantity of 645 afy, supplemental to existing rights under certificates GWC 6343-A and GWC 7031-A.

Table 3: 2001 City of Issaquah Well Production Records*				
	COI-1	COI-2	COI-4	COI-5
JAN	2,370,000	13,860,000	190,000	18,010,000
FEB	0	15,900,000	0	17,170,000
MAR	0	21,460,000	0	15,060,000
APR	0	15,246,000	0	18,570,000
MAY	5,540,000	17,766,000	0	21,000,000
JUN	11,420,000	22,176,000	0	10,290,000
JUL	11,660,000	28,917,000	2,240,000	14,740,000
AUG	10,660,000	24,633,000	3,190,000	21,690,000
SEP	8,640,000	20,601,000	2,550,000	20,790,000
OCT	9,880,000	11,907,000	1,630,000	20,290,000
NOV	8,960,000	13,797,000	2,110,000	14,410,000
DEC	8,980,000	15,057,000	2,310,000	15,600,000
Total (gal)	78,110,000	221,320,000	14,220,000	207,620,000
Total (afy)	**239.71**	**679.21**	**43.64**	**637.16**

* Supplied by City of Issaquah

The annual quantity of 645 afy allocated under G1-22734C is supplementary to groundwater certificates 6343-A and 7031-A, therefore perfection of the annual quantity under G1-22734C requires that 645 afy be utilized in any year by the wells sharing the primary annual quantity (2600 afy).

Well production records for the year 2001 for city wells COI-1, COI-2 and COI-5, all of which share the same 2600 afy annual quantity, were supplied by the Public Works Department of the City of Issaquah (Table 3). These show that in 2001 COI-1 and COI-2 produced 918.9 afy and COI-5 produced a further 541.6 afy supplementary to COI-1/2 (the remaining production from COI-5 was supplemental to water rights for COI-4), giving a total use of 1460 afy under the 2600 afy allocation for the COI-1/2 water rights.

Quantities available for change for water under G1-22734C are 500 gpm Qi and 645 afy Qa. Annual quantity remains supplementary to the rights under certificates 6343-A and 7031-A, whose annual usage of 1,460 afy for the year 2001 is in excess of the 764 afy allocated under groundwater rights for G122734C (645 afy) and G1-22733C (119 afy).

Given the above analysis, it is the finding of this investigation that approval of the requested change will not result in an enlargement of the right.

Protests

There were no protests filed in response to the proposal to change the point of withdrawal from wells COI-3A/3 to well COI-6. The Muckleshoot Indian Tribe however has expressed concerns that approval would result in a greater total withdrawal from the Issaquah Valley Aquifer and that the connectivity between the aquifer and streams would cause impairment to instream flows necessary to support fish populations.

Ecology, as expressed in this report, recognizes the relationship between groundwater withdrawals, stream flows and fish habitat. Based on the information reviewed as part of this investigation, it is tentatively found that the City of Issaquah retains the right to the withdrawal of groundwater under certificates G1-22733C and G1-22734C as established under Chapter 90.44 RCW and is entitled under RCW 90.44.100 to propose a change to the point of withdrawal so long as (1) the proposed change will not result in an enlargement as conveyed by the original certificate, (2) the new point of withdrawal taps the same body of groundwater, (3) water is available at the new point of withdrawal, (4) the change does not impair existing water rights, and (5) the proposed change is not detrimental to the public interest.

The findings of this investigation are that the City of Issaquah and its consultants have provided sufficient evidence to show that the proposed new point of withdrawal would tap the same aquifer, is not likely impair existing water rights, and will not constitute an enlargement under the certificate. However Ecology's investigation reveals that the change as proposed is likely to cause a greater impact to stream levels, particularly in the mainstem of Issaquah Creek close to the location of the Issaquah Salmon Hatchery, than withdrawals from the well original location, thus indicating that a potential detriment to the public interest would result if the proposed change were approved.

Impairment of Other Rights

Aquifer tests and computer groundwater modeling conducted by Golder Associates after construction of COI-6 (Golder, 2000a and 2000b) indicate that pumping at the proposed new point of withdrawal will result in a 0 to 1 foot drawdown on groundwater levels in the shallow aquifer zone which is also utilized by the Darigold Dairy wells and City of Issaquah wells COI-1 and COI-2 (Figure 3).

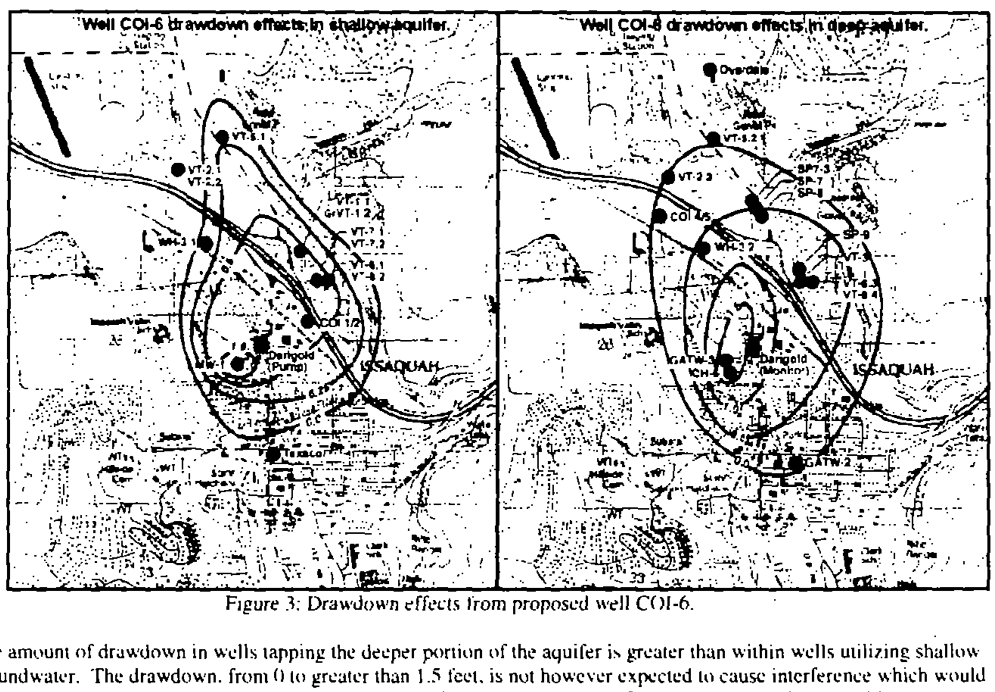


Figure 3: Drawdown effects from proposed well COI-6.

The amount of drawdown in wells tapping the deeper portion of the aquifer is greater than within wells utilizing shallow groundwater. The drawdown, from 0 to greater than 1.5 feet, is not however expected to cause interference which would unduly impact existing groundwater water rights within its zone of influence. The same may not be true with respect to surface water bodies in hydraulic continuity with groundwater within the zone of influence (cone of depression).

Surface bodies in hydraulic connection with the Issaquah Valley Aquifer within the zone of influence of the proposed new point of withdrawal will probably be impacted by pumping. The degree of impact was not measurable during testing of Well COI-6, however it is likely to be noticeable through long term continuous pumping as is authorized under the existing certificate, with its greatest impact felt within the drawdown area outlined for the shallow aquifer zone in figure 3. It is not likely however that the total qua[illegible]of water produced from the proposed new we[illegible]ived from surface water bodies would be greater than that which would result from pumping at the original point of withdrawal (Massmann, 2001).

The small amount of drawdown encountered for the deep aquifer zone in the testing of COI-6 is indicative of significant hydraulic continuity between the deeper portions of the Issaquah Valley Aquifer with shallower groundwater and surface water. Minimum instream flows set by regulation under chapter 173-508 WAC represent water rights which must be considered under an impairment evaluation for a change or amendment to a water right. However Issaquah Creek and its tributaries were closed to further appropriation under WAC 173-508-030 and 040 rather than having minimum instream flows set. An evaluation of impairment to the creeks as existing water rights is therefore not appropriate for the application under consideration. It is appropriate however for Ecology to investigate whether any impact the proposed new point of withdrawal might have on stream flows would be contrary to public interest (see section of this report on Public Interest).

Source of Water and Availability

The Issaquah Valley Aquifer system is hosted in alluvial and glacial sand and gravel deposited during and following the most recent ice age which lasted from approximately 35,000 to 10,000 years before present. It is located in the east-central portion of WRIA 8 (Cedar-Sammamish Water Resources Inventory Area), within an area designated herein as the Issaquah - Lake Sammamish sub-basin (Figure 4).

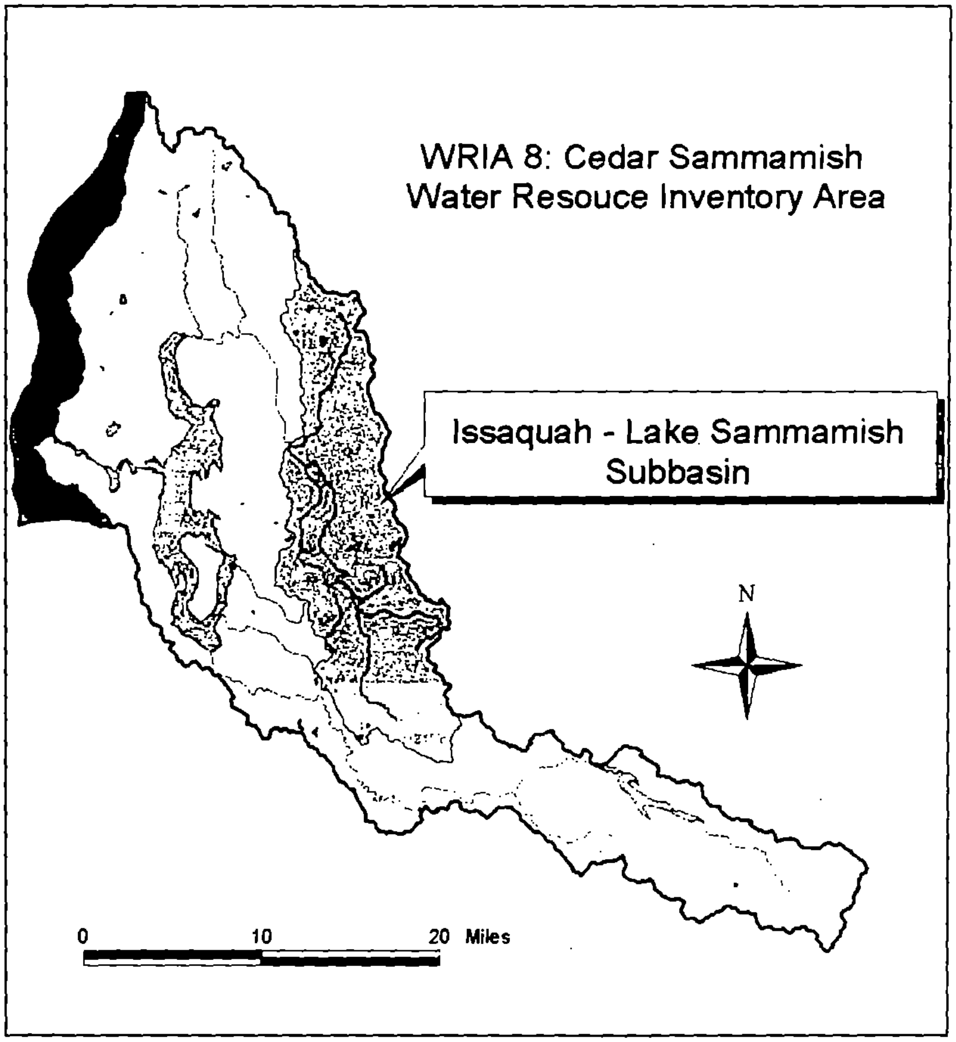


Figure 4: Map showing location of the Issaquah-Sammamish sub-basin of WRIA 8.

Issaquah Creek has three principal tributaries: the mainstem, East Fork, and North Fork (Figure 5). The mainstem drains the south and westernmost slopes of Tiger Mountain and the eastern slopes of Squak Mountain. The East Fork of Issaquah Creek drains the south flank of Grandview Ridge, the northern slopes of Tiger Mountain and the Tradition Lake Plateau. The North Fork of Issaquah Creek drains a portion of the Issaquah Highlands/Grand Ridge area and the western edge of the southernmost portion of the Sammamish Plateau.

Groundwater recharge for the Issaquah Valley Aquifer system is supplied by infiltration of rainfall from the northern slopes of Squak and Tiger Mountains, the lower portions of the Issaquah valley, the Tradition Lake Plateau, and a portion of the Issaquah Highlands /Grand Ridge area. Near the confluence of the mainstem of Issaquah Creek and East Fork, the location of the proposed new point of withdrawal at well COI-6, the bulk of groundwater recharge originates from the northwestern slopes of Tiger Mountain, the eastern slopes of Squak Mountain and the Tradition Lake Plateau (Figure 5).

Longer term storage and recharge of the aquifer is possible from sandstone bedrock which underlies both Squak and Tiger Mountains, but little is known about the quantity of recharge from this source or its ability to store groundwater.

Water Availability

A determination of water availability of a water right is made at the time the original water right application is investigated. The original Report of Examination on the water right, dated January 31, 1977, affirmatively established that water was available and a water right consisting of an instantaneous quantity of 500 gallons per minute with a supplemental annual quantity of 645 afy was issued.

Previously allocated groundwater rights totaling 2600 afy were already held by the City of Issaquah in 1977 and this primary annual amount was deemed sufficient to supply the city's then and projected needs (10,000 population by 1997). With this in mind the City of Issaquah was allocated a supplemental annual quantity under G1-22733C and G1-22734C. The annual quantity for Wells 3A and 3 are both supplemental to the primary quantities allocated under right for Wells 1 and 2 (GWC 6343-A and GWC 7031-A). All four wells utilize the same source, the Issaquah Valley Aquifer.

Subsequent to the issuance of permits for G1-22733 and G1-22734, the City of Issaquah applied for and was allocated additional groundwater rights from the Issaquah Valley Aquifer (G1-24809C and G1-24633C) for COI 4 and 5. In addition the Sammamish Plateau Water and Sewer District (SPWSD) has been issued groundwater rights for three wells located in the Issaquah Valley that utilize the same aquifer.

The groundwater recharge area of the Issaquah Valley Aquifer encompasses the surface area of the Issaquah Creek and Tibbets Creek watersheds (see Figure 5). While surface water from the entire watershed contributes to groundwater in the aquifer through losing stream segments, the groundwater regime in much of the southernmost Issaquah Creek watershed and most of the Tibbets Creek watershed does not contribute directly to groundwater recharge at the COI-6 location.

Most groundwater flow in the portion of the Issaquah Creek watershed situated south of Tiger and Squak mountains flows to the west into the aquifers of the Cedar River (WRIA 8) and Green River (WRIA 9) watersheds. Groundwater from the Tibbets Creek watershed is isolated from the location of COI-6 by a spur of bedrock extending north from Squak Mountain, and much of the groundwater north of the East Fork of Issaquah Creek (Issaquah Highlands/Grand Ridge area) flows northward into the Sammamish Plateau and the Snoqualmie Valley aquifer systems.

The bulk of recharge for the aquifer system at the location of well COI-6 originates as rainfall within the immediate valley area and from the Tradition Lake Plateau area (the East Fork watershed draining the northern slopes of Tiger Mountain and southern slope of Grand Ridge). This area encompasses approximately 7,000 acres of the over 45,000 acres within the Issaquah and Tibbets Creeks surface watershed (Figure 5).

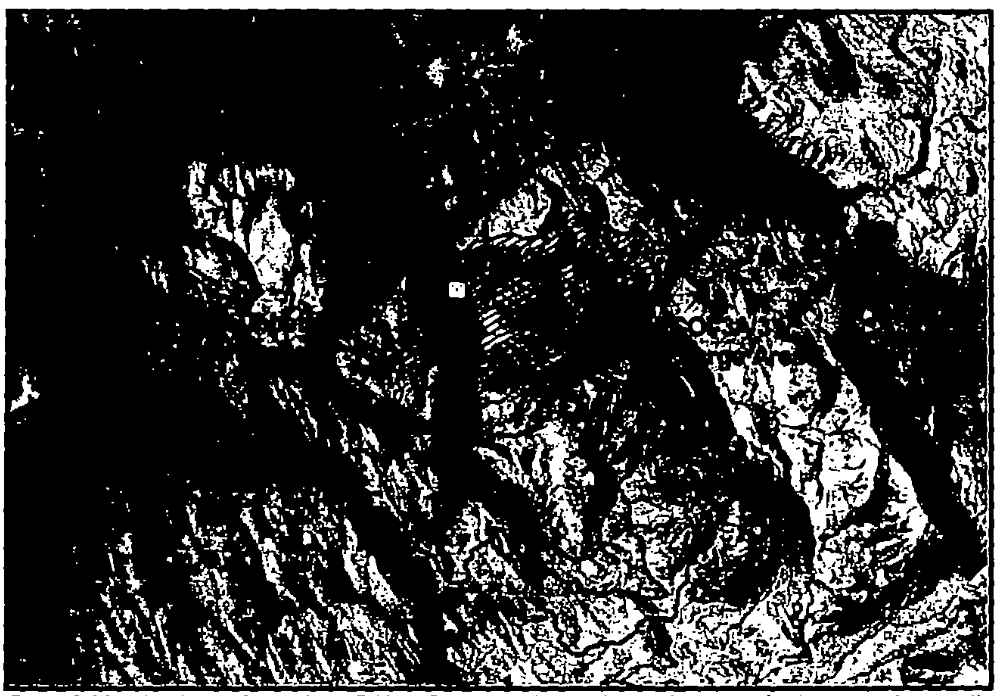


Figure 5: Map showing the Issaquah and Tibbets Creek watersheds and the recharge area for the proposed new well.

Massmann (2001) estimates that Issaquah Valley Aquifer system receives approximately 14,000 to 18,000 afy (recalculated from 20 to 25 cfs) in recharge annually. Groundwater rights have been allocated for approximately 10,000 afy (Table 2) not including rights granted outside of the area within approximately one mile of well COI-6. Massmann (2001) also cites an estimate by Ecology that actual use from wells in the area is less than half of the current allocation or approximately 3,600 afy (5 cfs).

In the present application the proposed new point of withdrawal is further down-gradient within the same aquifer as the original point of withdrawal and recharge occurs from a larger catchment area, and thus would thus be more capable of supplying the same quantity of water.

Well test data supplied by the City (Golder, 2000a) suggest only minimal drawdown to the water table in the area of the new well (0 to 1 feet; see Figure 3). Tests were conducted during late summer when stream flows are most critical to fish habitat. Pump tests and stream gaging, done in conjunction with aquifer testing, indicate that surface water bodies are perched in late summer in this area and therefore not in close hydraulic continuity with the water table at the immediate area of the well during this part of the season. During the remainder of the year the water table associated with the Shallow Aquifer Zone is in closer hydraulic continuity with streams and creek levels would be affected.

Based on the results of computer modeling of the proposed new point of withdrawal (Golder, 2000b), long term pumping would result in 85% of well withdrawals being derived from shallow groundwater sources in close hydraulic continuity with Issaquah Creek (~500 gpm of 600 gpm modeled pumping after 300 days, when steady state is achieved). The model shows that if pumping is discontinued after 115 days, less than 50% of pumping volume would be derived from shallow sources (~270 gpm of 600 gpm).

While the total impact, in terms of both drawdown and stream capture, would be spread along the creek and over a wide area of the shallow aquifer zone, the strongest effects of pumping would occur in the immediate area of the proposed well within the cone of depression of the shallow aquifer zone as shown in Figure 3.

The model effects are reported as being conservative (Golder, 2000b), and therefore are likely overstated. Since the model was based on a pumping rate of 600 gpm, the estimates are not accurate for the proposed changes for G1-22733C and G1-22734C totaling 800 gpm, but still give a reasonable estimate of the magnitude of stream impact.

<u>**Source of Water**</u>

Both the original and the new point of withdrawal utilize groundwater from within the Issaquah Valley Aquifer system (see Figure 6). Therefore the proposed change conforms to requirements of RCW 90.44.100 that replacement wells must tap the same body of groundwater.

At both locations wells tap the deep, sand and gravel hosted, semi-confined, aquifer zone that is separated from the shallow water table aquifer zone (also hosted in sand and gravel) by a lower permeability silt, fine sand and clay layer of lacustrine origin. Lenses of silt and clay and in places glacial till, locally form low permeability layers that do not significantly restrict vertical mobility of water within the upper portion of the aquifer.

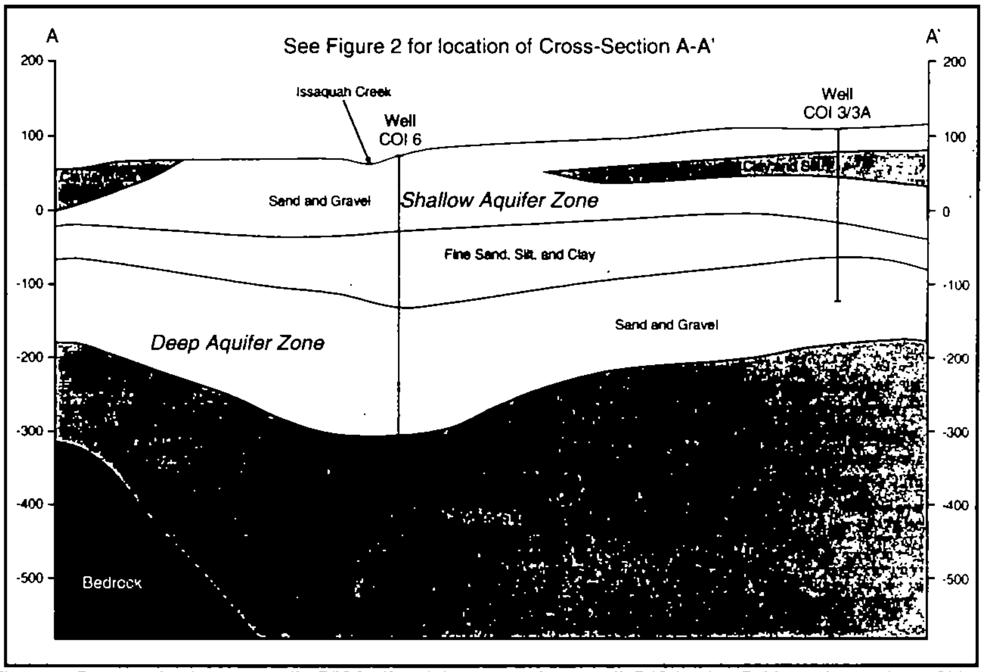


Figure 6: Cross-section between wells COI 3A/3 and the proposed new well COI 6 (after Golder and Associates, 2000).

Potential for Different Impacts on the Water Source

The City of Issaquah is currently utilizing (based on data supplied by the City of 2001 well production) 1600 afy out of their total allocation under existing certificates of 2800 afy. Approval of the applications for change for groundwater certificates G1-22733C and G1-22734C will result in the City being capable of producing 764 afy toward that amount. Note however that, under changes the legislature passed in 1997 to RCW 90.44.100, the city has the authority, independent of these applications, to drill a replacement well or wells at the original location of wells COI-3A/3, giving the City of Issaquah the freedom to use the entire 764 afy from rights under certificates G1-22733C and G1-22734C without filing applications for change.

The City's consultants (Golder, 2002) suggest that withdrawals from the proposed new point of withdrawal will result in less overall impact to the environment due to: (1) the greater thickness of the leaky aquitard at the new location (thus resulting in less impact to shallow groundwater and surface water bodies in the immediate area of the well), (2) a greater, more diversified recharge area for waters withdrawn at the proposed new well, and (3) because groundwater from the new well would not likely interact with surface water flows above Lake Sammamish.

While these claims appear on their face to be reasonable based on what is known about the aquifer and on the dynamics of pumping, it relies on an assumption that there will not be a direct impact on stream flows as a result of pumping. Pumping tests (Golder 2000a) however suggest that there will be an impact on the shallow aquifer zone within zone of influence (cone of depression) of the new well and hence on stream flows within the zone that would not occur with pumping at the original point of withdrawal. During pumping at the proposed new well, stream flow within the zone of influence that would have otherwise stayed within the stream and/or shallow aquifer zone, would instead be drawn down into the deeper aquifer zone and contribute to pumped volumes.

Public Interest

The East Fork, North Fork and mainstem of Issaquah Creek are closed by rule under WAC 173-508-030 and 173-508-040 to preserve stream flows required to support salmon habitat. The streams have been administratively closed since 1950 when the

Washington State Department of Fisheries requested that all remaining stream flows were required to support salmon spawning and rearing habitat. In 1971 the USGS performed field surveys of Issaquah Creek that indicated that flows between May and November were inadequate for support of fish populations, confirming that Issaquah Creek and all its tributaries should be closed.

Approval of the requested change in point of withdrawal will not alter the quantity allocated under certificate G1-22734C, thus there would be no net gain in the quantities available under the right from the source aquifer. There is information however that indicates the proposed change in the point of withdrawal would result in greater local contribution from closed streams to pumped quantities.

It is generally agreed among hydrogeologists that groundwater in alluvial aquifers is closely associated with surface water bodies occupying the same valley. The understanding of hydraulic continuity supports the concept that groundwater withdrawals from an alluvial aquifer divert all or a portion of the pumped volume from streams and other surface water bodies occupying surface areas of the alluvial valley.

The current application seeks to replace a point of withdrawal located on the periphery of the alluvial aquifer at a distance of approximately 2000 feet from each of two closed streams (East Fork and mainstem of Issaquah Creek) with a new point of withdrawal located approximately 200 feet from the streams. The effect of withdrawals from each location must be analyzed with respect to their effects on both streams in order to determine whether approval of the change will result in a net increase to the amount of water that the new well will derive from creek flow.

The degree to which pumping from a well can effect stream flows is largely dependent on the distance of the well from the stream, the depth from which water is withdrawn and on the ability of the aquifer and intervening aquitard media to allow the transmission of water (hydraulic conductivity).

Unconfined aquifers, i.e. aquifers not separated from the surface by a low permeability aquitard, are generally found to be in closer hydraulic continuity with streams. Withdrawals that derive water from unconfined aquifers, particularly when they are in close proximity to streams, have a more pronounced effect on stream flows than withdrawals from confined aquifers.

In the Issaquah Valley Aquifer an aquitard of varying thickness and hydraulic conductivity occurs such that the degree of hydraulic connection between the point of withdrawal and surface streams is largely dependent on the position within the valley of the well. An aquitard overlying a confined aquifer that allows significant hydraulic connection with a shallower aquifer is considered to be "leaky". Aquifer tests at Well COI-6, where shallow aquifer water levels were lowered by up to 1 foot, are consistent with the existence of a leaky aquitard separating the aquifer at well intake level from the shallow aquifer near the surface.

Robert Anderson, in his technical analysis of the original and proposed new points of withdrawal (Golder, 2002), states that moving the point of withdrawal to Well COI-6 will result in less impact to the environment based on his analysis of well completion depth, recharge area, distance of each point of withdrawal from Issaquah Creek, and the thickness of the aquitard at the two well locations. Anderson's analysis however assumes that the city would only use Well COI-6 for summer peaking requirements. The applicant has not however requested a reduction in the period of use for this water right and therefore Ecology must evaluate effects on stream flows consistent with the well operating continuously as currently authorized under the certificate. In addition Anderson does not take into account the direct effect that pumping will have on surface water bodies with the well's zone of influence.

Anderson (Golder, 2002) estimates that at the original point of withdrawal (Wells COI-3A/3), the contribution to well production from the shallow, unconfined aquifer would be greater than 90% after only 10 days of pumping. He also states that groundwater computer model analysis (Golder, 2000b) indicates that after 100 days of pumping at COI-6, the contribution from leakage would be less than 50% of pumping volume. The model also indicates that if the well is pumped continuously the contribution through leakage would reach 85% of pumping volume. At either location, the contribution from leakage would include water from the shallow aquifer and a component from stream flows, whose magnitude would largely be dependent on the distance to the surface water body and the direction and velocity of flow in the aquifer.

The difference in leakage between the two locations can be explained by the relative thicknesses of low permeability material present at both locations. At Well COI-6 a sandy silt aquitard overlying the completion zone is some 140 feet thick, while at COI-3A/3 the low permeability material overlying the completion zone is only a few feet thick. It is not certain whether the silt layer present at both locations is continuous. The leakage suggests that it is not. Well 3A/3 also has a 20 foot thick glacial till layer near the surface. This till layer however is discontinuous in the valley and does not form an effective aquitard.

Well COI-3A/3 is nearly 10 times the distance from either the East Fork or mainstem of Issaquah Creek than is Well COI-6. The effect of withdrawals from a well in hydraulic connection to a stream drops off rapidly with distance of the well from the stream. It is likely therefore that the contribution of stream flows to pumping volume would be greater at the proposed new point of withdrawal than from Wells COI-3A/3 due to the difference in distance from the streams. The presence of the thicker aquitard at COI-6 would likely attenuate the effect in the short term, but would, on a long term basis, result in a greater impact on the shallow aquifer and ultimately on stream flows in the immediate area of the well.

Anderson points out that the recharge area of the original point of withdrawal is limited largely to Tradition Lake Plateau and that the recharge area for Well COI-6 includes a much larger area, with contributions from the upper Issaquah Creek valley, the East Fork/Issaquah Highlands area in addition to the Tradition Lake Plateau. While the greater diversity in recharge sources suggests that withdrawals at Well COI-6 would cause less overall stress on the aquifer, they do not lessen the potential to cause a greater impact on stream flows in the zone of influence of the proposed new point of withdrawal, where pumping stress on the shallow aquifer and streams would be greatest.

A change in point of withdrawal, as proposed, would result in a negative impact to the flow of water in a salmon spawning and rearing stream. The negative impact to a stream closed by rule, with no water available is detrimental to the interest of the people of Washington.

DISCUSSION

The proposed changes in point of withdrawal for G1-22733C and G1-22734C do not conform to all the requirements for approval of an application for change or amendment to a groundwater right under applicable statutes RCW 90.44.100 and RCW 90.03.290.

This investigation finds that approval of the proposed change threatens to prove detrimental to the public interest, due to the impact that pumping at the proposed point of withdrawal would have on stream flows, and hence on salmon habitat in the East Fork of Issaquah Creek and the mainstem of Issaquah Creek, both of which are critical salmon habitat streams and closed to appropriation under Chapter 173-508 WAC. Ecology's concerns are supported by the Department of Fish and Wildlife whose objection to this application is based on the degree of hydraulic continuity of the proposed new point of withdrawal.

Under Ecology authority in the consideration of changes or amendments to groundwater rights, if approval threatens to prove detrimental to the public interest, Ecology has a duty to reject the application. It is also noted in this investigation that a denial of this application does not prevent the applicant from exercising the right by drilling a replacement well at the original published well location.

RECOMMENDATIONS

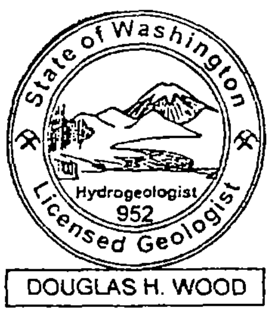
I recommend the proposed changes to groundwater certificate G1-22734C be denied and the application for change be rejected pursuant to the requirements of RCW 90.44.100 and RCW 90.03.290.

CONCLUSIONS

In accordance with chapter 90.44 RCW, and based on the findings of this report, I conclude that the proposed new point of withdrawal for groundwater certificate G1-22734C cannot be authorized.

REPORT BY: Douglas H. Wood DATE: 6/5/2003

Douglas H. Wood, MS, LHG
Licensed Hydrogeologist (WA #952)



PROGRESS SHEET - APPLICATION FOR CHANGE 2279364

CERTIFICATE NO. G1-22734C

NAME: City of Issaquah
P.O. Box 1307
Issaquah, WA 98027

DENIED

Appurtenant to Water Right Certificate No. G1-22734C

PURPOSE OF APPLICATION to change place and point of withdrawal

Application originally received 4/30/97 Fee Paid $10 4/30/97

Returned for completion or correction ______

returned ______

PUBLICATION: Ok'd by ______ Date ______ Notice Sent 6/7/2002

Protests ______ by ______

______ by ______

______ by ______

Affidavit received and checked ______ Time Expires 8/16/02

EXAMINATION: Made 6/5/2003 by ______

CERTIFICATE: Ok'd for issue by ______ date ______

Statement of fee mailed ______ Amount $5 ______

Fee received ______

Certificate of Change Issued ______ No. ______

Gilman Well 4

Certificate G1-24809CWRIS

Washington
Department of Ecology

APPLICATION FOR PERMIT
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

I have examined this application as required by SEPA and find that it is: ☐ not an "action". ☐ categorically exempt.
3/21/86 M Tuhie
DATE SIGNATURE

$10.00 MINIMUM STATUTORY EXAMINATION FEE REQUIRED WITH APPLICATION

(GRAY BOXES FOR OFFICE USE ONLY)

APPLICATION NO.	W.R.I.A.	COUNTY	PRIORITY DATE	TIME	ACCEPTED
G1-24809	8	King	3/10/86		✓

APPLICANT'S NAME: CITY OF ISSAQUAH
BUSINESS TEL. 391-1004
HOME TEL.

ADDRESS (STREET): 130 E. SUNSET WAY (CITY): ISSAQUAH (STATE): WASHINGTON (ZIP CODE): 98027-1307

DATE & PLACE OF INCORPORATION IF APPLICANT IS A CORPORATION

1. SOURCE OF SUPPLY

IF SURFACE WATER	IF GROUND WATER
SOURCE (NAME OF STREAM, LAKE, SPRING, ETC.) (IF UNNAMED, SO STATE)	SOURCE (WELL, TUNNEL, INFILTRATION TRENCH, ETC.) WELL
TRIBUTARY	SIZE AND DEPTH 16-INCH CASING TO 110 FEET

2. USE

USE TO WHICH WATER IS TO BE APPLIED (DOMESTIC SUPPLY, IRRIGATION, MINING, MANUFACTURING, ETC.)
PUBLIC WATER SUPPLY

ENTER QUANTITY OF WATER REQUESTED USING UNITS OF: CUBIC FEET PER SECOND .... CFS **OR** GALLONS PER MINUTE 250 GPM — ACRE FEET PER YEAR 400

Municipal

RECEIVED
MAR 10 1986
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

TIMES DURING YEAR WATER WILL BE REQUIRED
ALL YEAR

IF IRRIGATION, NUMBER OF ACRES	IF DOMESTIC USE, NUMBER OF UNITS BY TYPE, E.G. 1-HOME, 1-MOBILE HOME, 2-CAMPSITES, ETC.	IF MUNICIPAL USE, ESTIMATED POPULATION 20 YEARS FROM TODAY
N/A	N/A	8000

DATE PROJECT WAS OR WILL BE STARTED	DATE PROJECT WAS OR WILL BE COMPLETED
DECEMBER, 1984	SEPTEMBER, 1985

3. LOCATION OF POINT OF DIVERSION/WITHDRAWAL

3A. IF IN PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)	SECTION	TOWN	RANGE

ALSO, PLEASE ENCLOSE A COPY OF THE PLAT AND MARK THE POINT(S) OF WITHDRAWAL OR DIVERSION

3B. IF NOT IN PLATTED PROPERTY

ON ACCOMPANYING SECTION MAPS, ACCURATELY MARK AND IDENTIFY EACH POINT OF DIVERSION. SHOW NORTH-SOUTH AND EAST-WEST DISTANCES FROM NEAREST SECTION CORNER OR PROPERTY CORNER.

ALSO, ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.
APPROXIMATELY 1900 FEET WEST AND 500 FEET SOURTH OF NE CORNER OF SECTION 28

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
(TAX LOT 287)NW½ of NE¼	28	24N	6E	KING

NW¼ NE¼

4. DO YOU OWN THE LAND ON WHICH THIS SOURCE IS LOCATED. IF NOT, INSERT NAME & ADDRESS OF OWNER

PURCHASE OPTION EXERCISED OCTOBER, 1985

5. LEGAL DESCRIPTION OF PROPERTY *ON WHICH WATER IS TO BE USED*

ATTACH A COPY OF THE LEGAL DESCRIPTION OF THE PROPERTY (ON WHICH THE WATER WILL BE USED) TAKEN FROM A REAL ESTATE CONTRACT, PROPERTY DEED OR TITLE INSURANCE POLICY, OR, COPY CAREFULLY IN THE SPACE BELOW.

The water will be used for public use within the City limits of the City of Issaquah and within the portion of unincorporated King County totally enclosed within the City, known as the Issaquah County Island.

APPLICATION

ECY 040-1-14
Rev. 12-76

WHAT IS YOUR INTEREST IN THE PROPERTY ON WHICH WATER IS TO BE USED (PROPERTY OWNER, LESSEE, CONT PURCHASER, ETC.)

ARE THERE ANY EXISTING WATER RIGHTS RELATED TO THE LAND ON WHICH THE WATER IS TO BE USED (INCLUDING WATER PROVIDED BY IRRIGATION DISTRICTS OR DITCH COMPANIES.) ☒ YES ☐ NO

IF YES, FROM WHAT SOURCE (i.e. SURFACE OR GROUND WATER) AND UNDER WHAT AUTHORITY

Ground water source. The City of Issaquah owns and operates 3 wells at other sites within the City (permits G1-22733P, G1-2273P, G1-22733C) and one other at this site (APPG124633)

6. DESCRIPTION OF SYSTEM PROPOSED OR INSTALLED

(FOR EXAMPLE: SIZE OF PUMP, CAPACITY OF PUMP, PUMP MOTOR HORSE POWER, PIPE DIAMETER, NUMBER OF SPRINKLERS, ETC.)

The production at this site will be from two wells each producing from a distinct aquifer. The shallower well will produce from a confined aquifer 75 to 100 feet below land surface using a submersible pump. A maximum of 250 gpm will be produced. The deeper well produces up to 1000 gpm from a confined aquifer 270 to 450 feet below land surface. A 10 - 12-inch turbine pump will be set to 220 feet.

REMARKS

7.

IF 10 ACRE-FEET OR MORE OF WATER IS TO BE STORED AND/OR IF THE WATER DEPTH WILL BE 10 FEET OR MORE AT THE DEEPEST POINT, A STORAGE PERMIT MUST BE FILED IN ADDITION TO THIS PERMIT. THESE FORMS CAN BE SECURED, TOGETHER WITH INSTRUCTIONS, FROM THE DEPARTMENT OF ECOLOGY.

SIGNATURES

A E Gerst Jr., Director of Public Works

APPLICANT'S SIGNATURE

A J Culver Mayor

LEGAL LANDOWNER'S SIGNATURE

130 E. Sunset Way, P.O.B 1307 Issaquah, Wa 98037

LEGAL LANDOWNER'S ADDRESS

FOR OFFICE USE ONLY

STATE OF WASHINGTON } ss.
DEPARTMENT OF ECOLOGY }

This is to certify that I have examined this application together with the accompanying maps and data, and am returning it for correction or completion as follows: ....

....

....

In order to retain its priority date, this application must be returned to the Department of Ecology, with corrections, on or before......................., 19..........

Witness my hand this..............day of.............., 19.......

....

Department of Ecology

ECY 040-1-14
Rev. 12-76

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
March 10, 1986	G1-24809		

NAME
City of Issaquah

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 East Sunset Way	Issaquah	Washington	98027-1307

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
—	250	200

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
Approximately 1900 feet west and 500 feet south of northeast corner of Section 28.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼NE¼	28	24	6E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The water will be used for public use within the City limits of the City of Issaquah and within the portion of unincorporated King County totally enclosed within the City, known as the Issaquah County Island.

DESCRIPTION OF PROPOSED WORKS

Test/production well located approximately 65' east of Issaquah Creek. Well is 20" casing, installed to 54' and 16' well to 200 feet.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	6 mos. from permit issuance	1 year from permit issuance

REPORT

Background:

This application was filed on March 10, 1986, requesting continuous withdrawal of ground waters for backup municipal supply. The legal notice was published on June 25, 1986, and July 2, 1986, in The Issaquah Press, a legal newspaper in Issaquah, Washington. The 30-day protest period prescribed by law has expired and no protests or objections were received. This application was identified as categorically exempt under the State Environmental Protection Act.

Investigation:

This writer and Roy Bishop have undertaken an office investigation pertinent to the application. The location of the well is near the I-90 crossing of Issaquah Creek, in the rapidly developing western side of the City of Issaquah. Issaquah Creek is closed to surface water diversions and this investigation is concerned that hydraulic continuity between the well and the creek should not occur. The ground water geology of the valley basin is relatively productive and is expected to be more fully utilized in the future. A ground water management program, designated under Chapter 173-100 WAC, has been initiated in this area, although it should not materially affect whether this permit should issue.

The site was visited on October 22, 1986, and the shallow production well was located as stated on the application, approximately 65 feet east of Issaquah Creek.

The City of Issaquah began development of production wells in this location in 1984. Exploration of the shallow well produced only modest supplies and the City of Issaquah commenced exploration of deeper aquifer sources. The permit requested herein is for the shallow production well. Permit #G1-24633 for the deeper production well was issued on April 15, 1986. Development of both wells is fully documented in "City of Issaquah 1984/1985 Drilling Program" by Robinson & Noble, Inc. (Tacoma, Washington).

The shallow well was drilled to 200 feet, but subsequently drawn back to 112 feet below land surface. Twenty-five feet of screen exposes the well to an orange-brown sand and gravel layer lying between 75 and 104 feet below land surface.

The shallow well was tested for a 24-hour period at an average discharge of 240 gpm. The pumping water level at the conclusion of the test was 57 feet below land surface which is 51.5 feet below the pretest static water level of 5.5 feet. The water level was nearly stable after the first eight hours of pumping at 250 gpm. Recovery data agrees with the drawdown data and indicates a regional average aquifer transmissivity of approximately 25,000 gpd/ft.

Water District 82 has wells approximately 2,000 feet east of the site. These were developed for 3,200 gpm under Permit #G1-00289P issued on January 20, 1972 and December 12, 1972. No drawdown interference attributable to the pumping test was recorded at Water District 82 wells, as observed by J.R. Carr and Associates.

The hydrogeology of the area begins with 38 feet of silt and clay and 40 feet of semi-permeable silt and fine sand. These units overlie the "shallow aquifer". Another silt and clay sequence underlies the shallow aquifer and effectively isolates it from the deeper aquifer. Hydraulic continuity is not identified at this site. The Robinson & Noble report states that low permeability surface material (silt and clay) tends to (at least locally) isolate surface water systems from the shallow aquifer.

Conclusion:

In accordance with Section 90.03 and 90.44 RCW, I find that there is water available for appropriation from the source in question and that the appropriation as recommended above will not impair existing rights or be detrimental to the public welfare. Therefore, permit should issue subject to existing rights and indicated provisions.

Recommendation:

I recommend that this application for continuous municipal supply be approved for the requested 250 gpm. The expected usage of the well will be for approximately 12 hours daily throughout the year. Therefore, the annual withdrawal shall not exceed 200 acre-feet/year.

The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required.

A certificate of water right will not be issued until a final investigation is made.

REPORT BY: Rodney D. Solenson DATE: 2/2/87

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PERMIT

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
March 10, 1986	G1-24809	G1-24809P	

NAME
City of Issaquah

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
~~130 East Sunset Way~~ P.O. Box 1307	Issaquah	Washington	98027-1307

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
—	250	200

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
Approximately 1900 feet west and 500 feet south of northeast corner of Section 28.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼NE¼	28	24	6E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The water will be used for public use within the City limits of the City of Issaquah and within the portion of unincorporated King County totally enclosed within the City, known as the Issaquah County Island.

DESCRIPTION OF PROPOSED WORKS

Test/production well located approximately 65' east of Issaquah Creek. Well is 20" casing, installed to 54' and 16' well to 200 feet.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	December 15, 19~~87~~88	June 15, 19~~88~~89

PROVISIONS

The amount of water granted is a maximum limit that shall not be exceeded and the water users shall be entitled only to that amount of water within the specified limit that is beneficially used and required.

A certificate of water right will not be issued until [illegible] investigation is made.

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Redmond, *Washington, this* 15 *day*

of June, *19* 87

ENGINEERING DATA

OK [signature]

Department of Ecology

by [signature]

Nancy Ellison, Regional Manager

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
March 10, 1986	G1-24809	G1-24809P	G1-24809C

NAME

City of Issaquah

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
Post Office Box 1307	Issaquah	Washington	98027-1307

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATER TO BE APPROPRIATED

SOURCE

Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
--	250	200

QUANTITY, TYPE OF USE, PERIOD OF USE

Municipal supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

Approximately 1900 feet west and 500 feet south of northeast corner of Section 28.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼NE¼	28	24	6E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The water will be used for public use within the City limits of the City of Issaquah and within the portion of unincorporated King County totally enclosed within the City, known as the Issaquah County Island.

PROVISIONS

The amount of water granted is a maximum limit that shall not be exceeded and the water users shall be entitled only to that amount of water within the specified limit that is beneficially used and required.

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 Redmond *Washington, this* 15th *day of* September *, 19* 89

Department of Ecology

ENGINEERING DATA

OK

by Herman H. Huggins

Herman H. Huggins, Section Supervisor Water Resources

FOR COUNTY USE ONLY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PROGRESS SHEET

COMPUTER INPUT
- [ ] APPLICATION
- [ ] PERMIT
- [ ] CERTIFICATE
- [ ] OTHER

[ ] SURFACE WATER [x] GROUND WATER

NAME			TELEPHONE NO.
City of Issaquah Att; Bill Crite			391-1004

ADDRESS	(CITY)	(STATE)	(ZIP CODE)
P.O. Box 1307 ~~130 E. Sunset Way~~	Issaquah	Washington	98027-1307

ASSIGNED TO	TELEPHONE NO.	DATE ASSIGNED

ADDRESS	(CITY)	(STATE)	(ZIP CODE)

APPLICATION NO.	PERMIT NO.	CERTIFICATION NO.
G1-24809	G1-24809P	G1-24809C
DATE AMENDED	DATE CANCELLED	W.R.I.A.

APPLICATION

DATE APPLICATION RECEIVED	INITIAL $10.00 FEE RECEIVED	DATE FEE RECEIVED
March 10, 1986	[x] YES [ ] NO	March 10, 1986
STATEMENT OF ADDITIONAL EXAMINATION FEE $	DATE SENT	DATE RECEIVED
DATE RETURNED FOR COMPLETION OR CORRECTION	DATE RECEIVED	

TEMPORARY PERMIT

APPROVED BY	DATE ISSUED

PUBLICATION

APPROVED BY	DATE APPROVED	DATE NOTICE SENT
		4-30-86

PROTESTED BY AND DATE

DATE AFFIDAVIT RECEIVED	CHECKED BY	TIME EXPIRED	DATE AMENDED NOTICE SENT	DATE AFFIDAVIT RECEIVED	TIME EXPIRED
8/14/86	[illegible]	8/2			

DEPARTMENT OF GAME AND FISHERIES REPORT

APPROVED	PROVISO	PROTEST

EXAMINATION

DATE EXAMINATION MADE	MADE BY	DATE REPORT OF EXAM. WRITTEN	WRITTEN BY	CHECKED BY

DATE PERMIT FEE REQUESTED	AMOUNT DUE	DATE RECEIVED
2-5-87		5/20/87 OK FOR PERMIT [illegible]

PERMIT

PERMIT APPROVED BY	DATE APPROVED	PERMIT NO.	DATE ISSUED
		G1-24809P	6-15-87

BEGINNING OF CONSTRUCTION

DATE NOTICE SENT	DATE FILED	EXTENSION FEE
EXTENDED TO	EXTENDED TO	

WELL DRILLER'S AND/OR CONSTRUCTION REPORT

DATE SENT	DATE FILED

COMPLETION OF CONSTRUCTION

DATE NOTICE SENT	DATE FILED	EXTENSION FEE
6-15-87	4-26-89	$5.00
EXTENDED TO	EXTENDED TO	
6/15/88		

PROOF OF APPROPRIATION

DATE SENT	DATE FILED	EXTENSION FEE	EXTENDED TO
4-28-89	8-10-89		

DATE CERTIFICATE FEE REQUESTED	AMOUNT DUE	DATE RECEIVED	DATE APPROVED FOR CERTIFICATE	APPROVED BY
		8-10-89	8-23-89	[illegible]

CERTIFICATION

PROOF EXAM. REQUIRED	CERTIFICATE NUMBER	DATE ISSUED
[ ] YES [ ] NO	G1-24809C	

REMARKS

Gilman Well 5

Certificate G1-24633CWRIS

State of Washington Department of Ecology

APPLICATION FOR PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

$10.00 MINIMUM STATUTORY EXAMINATION FEE REQUIRED WITH APPLICATION

(GRAY BOXES FOR OFFICE USE ONLY)

APPLICATION NO.	W.R.I.A.	COUNTY	PRIORITY DATE	TIME	ACCEPTED
G1-24633	8	King	4-2-85		m

APPLICANT'S NAME — PLEASE PRINT: City of Issaquah

BUSINESS TEL. 391-1004
HOME TEL. 392-7595

ADDRESS (STREET): (P.O. Box 1307) 130 E. Sunset Way — (CITY) Issaquah — (STATE) WA. — (ZIP CODE) 98027-1307

DATE & PLACE OF INCORPORATION IF APPLICANT IS A CORPORATION:

1. SOURCE OF SUPPLY

IF SURFACE WATER	IF GROUND WATER
SOURCE (NAME OF STREAM, LAKE, SPRING, ETC.) (IF UNNAMED, SO STATE)	SOURCE (WELL, TUNNEL, INFILTRATION TRENCH, ETC.) Well
TRIBUTARY	SIZE AND DEPTH ~~16" casing to 200' depth and~~ 9-4-85 16" casing to 450' depth
	Per Bouey Sund will send in another application for shallower well (Ron)

2. USE

USE TO WHICH WATER IS TO BE APPLIED (DOMESTIC SUPPLY, IRRIGATION, MINING, MANUFACTURING, ETC.)

~~Public water supply~~

ENTER QUANTITY OF WATER REQUESTED USING UNITS OF: CUBIC FEET PER SECOND ......CFS **OR** GALLONS PER MINUTE ~~2500~~ GPM 3000 (Ron) 9-4-85 — ACRE FEET PER YEAR 3000

TIMES DURING YEAR WATER WILL BE REQUIRED: Year around

IF IRRIGATION, NUMBER OF ACRES	IF DOMESTIC USE, NUMBER OF UNITS BY TYPE, E.G. 1-HOME, 1-MOBILE HOME, 2-CAMPSITES, ETC.	IF MUNICIPAL USE, ESTIMATED POPULATION 20 YEARS FROM TODAY
		8000

DATE PROJECT WAS OR WILL BE STARTED	DATE PROJECT WAS OR WILL BE COMPLETED
December 1984	July 1985

3. LOCATION OF POINT OF DIVERSION/WITHDRAWAL

3A. IF IN PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)	SECTION	TOWN	RANGE

ALSO, PLEASE ENCLOSE A COPY OF THE PLAT AND MARK THE POINT(S) OF WITHDRAWAL OR DIVERSION

3B. IF NOT IN PLATTED PROPERTY

ON ACCOMPANYING SECTION MAPS, ACCURATELY MARK AND IDENTIFY EACH POINT OF DIVERSION. SHOW NORTH-SOUTH AND EAST-WEST DISTANCES FROM NEAREST SECTION CORNER OR PROPERTY CORNER.

ALSO, ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.

375' south and 600 ft. east of the N.W. corner of Section 28-24-RE

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
Tax Lot #287	28	24	6E	King

NW¼ NE¼

4. DO YOU OWN THE LAND ON WHICH THIS SOURCE IS LOCATED. IF NOT, INSERT NAME & ADDRESS OF OWNER

Robert W. & Lois H. Catterall, 160 N.W. Gilman Blvd., Issaquah, WA. 98027

5. LEGAL DESCRIPTION OF PROPERTY *ON WHICH WATER IS TO BE USED*

ATTACH A COPY OF THE LEGAL DESCRIPTION OF THE PROPERTY (ON WHICH THE WATER WILL BE USED) TAKEN FROM **A REAL ESTATE CONTRACT, PROPERTY DEED OR TITLE INSURANCE POLICY.** OR, COPY CAREFULLY IN THE SPACE BELOW.

The water will be used for public use within the City limits of the City of Issaquah and within the portion of unincorporated King County totally enclosed within the City, known as the Issaquah County Island.

APPLICATION

WHAT IS YOUR INTEREST IN THE PROPERTY ON WHICH THE WATER IS TO BE USED (PROPERTY OWNER, LESSEE, CONTRACT PURCHASER, ETC.)

Option for outright purchase

ARE THERE ANY EXISTING WATER RIGHTS RELATED TO THE LAND ON WHICH THE WATER IS TO BE USED (INCLUDING WATER PROVIDED BY IRRIGATION DISTRICTS OR DITCH COMPANIES.) ☒ YES ☐ NO

IF YES, FROM WHAT SOURCE (i.e. SURFACE OR GROUND WATER) AND UNDER WHAT AUTHORITY

Ground water source, the City of Issaquah presently owns and operates three wells in the City.

Permit Numbers: G1 22733P, G1 2273P, G1 2273 3C

6. DESCRIPTION OF SYSTEM PROPOSED OR INSTALLED

(FOR EXAMPLE: SIZE OF PUMP, CAPACITY OF PUMP, PUMP MOTOR HORSE POWER, PIPE DIAMETER, NUMBER OF SPRINKLERS, ETC.)

The proposed system will be two wells side by side. The first well is drilled to 200 ft. This well will have a submersible pump with a 30 HP motor. A maximum of 500 GPM will be drawn from this well. The second well will be a 16" casing down to 450'. We will be installing a turbine pump with either a 10" or 12" column to a depth of 200'. The horsepower will be 200 to 250. The maximum withdrawal from this well will be 2000 G.P.M.

Talked to Gary Sund 4-4-85 - two different aquifers he asked that we go with the deeper well on this for 2000 GPM and he would ~~fi~~ file another application for the shallow well

Ron

7. REMARKS

IF 10 ACRE-FEET OR MORE OF WATER IS TO BE STORED AND/OR IF THE WATER DEPTH WILL BE 10 FEET OR MORE AT THE DEEPEST POINT, A STORAGE PERMIT MUST BE FILED IN ADDITION TO THIS PERMIT. THESE FORMS CAN BE SECURED, TOGETHER WITH INSTRUCTIONS, FROM THE DEPARTMENT OF ECOLOGY.

SIGNATURES

Gary M. Sund

Gary M. Sund, City Engineer
APPLICANT'S SIGNATURE

Robert W. & Lois H. Catterall
LEGAL LANDOWNERS NAME
(PLEASE PRINT)

Ron Catterall Lois H. Catterall
LEGAL LANDOWNER'S SIGNATURE

160 N.W. Gilman Blvd., Issaquah, WA. 98027
LEGAL LANDOWNER'S ADDRESS

FOR OFFICE USE ONLY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY } ss.

This is to certify that I have examined this application together with the accompanying maps and data, and am returning it for correction or completion as follows: ....

....

....

In order to retain its priority date, this application must be returned to the Department of Ecology, with corrections, on or before.........., 19..........

Witness my hand this..........*day of*.........., 19......

....
Department of Ecology

ECY-040-1-14
Rev. 3/81

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
April 2, 1985	G1-24633		

NAME
City of Issaquah

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 E. Sunset Way (P.O. Box 1307)	Issaquah	Washington	98027-1307

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Well 16" X 412'

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	1000	1600*

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal water supply - continuously

*Supplemental to existing rights

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
375 feet south and 600 feet east of the northwest corner of Section 28

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼NE¼	28	24	6 E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Issaquah

DESCRIPTION OF PROPOSED WORKS

Well 16" X 412'
200 - 250 HP pump

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	1 year from permit issuance	2 years from permit issuance

REPORT

Background:

On April 2, 1985, the City of Issaquah submitted this application requesting 2,000 gallons per minute from a well for the purpose of municipal water supply.

Notice was published in the Issaquah Press on April 24 and May 1, 1985. No protests were received.

Investigation:

Evaluation for this application consists of review of office records and conversations with the applicant and the applicant's groundwater geologists firm of Robinson and Noble, Inc.

The city currently holds the following water rights:

Cert. No.	Source	Inst. Q.	Annual Quantity
G.W. 6343	Well #1	630 GPM	1,000
G.W. 7031	Well #2	1200 GPM	1,600
G1-22733C	Well #3	300 GPM	119) Supplemental to existing
G1-22734C	Well #4	500 GPM	645) certificates - total annual withdrawal not to exceed 2600 acre-feet.

The City selected a site south of Interstate 90, north of Gilman Road, and east of Issaquah Creek for two new wells to supplement their water supply.

When the two wells were constructed and tested, it was found that each was tapping a different aquifer. A second application is being prepared for the shallow, less productive well. This application represents the deep large production well.

This well was drilled in June 1985 to a completed depth of 412 feet deep. In September, the well was tested at a pumping rate of 1000 which resulted in a drawdown of 128 feet after 24 hours. Prior to starting the pump test, the static water level was recorded at 7.5 feet below the top of the well. Three hours after the pump test, the water level in the well returned to pre-test levels.

Due to the proximity of the large production well to Issaquah Creek which is closed to appropriation of water, significant hydraulic continuity must be considered. However, based on Robinson and Noble's report data, the evidence of a clay and silt aquatard above the water zone of this well thereby isolating it from waters connected with Issaquah Creek, there would be no significant continuity between the well and the creek flows.

The report prepared by Robinson and Noble based on the test results stated that data clearly showed that the well was tapping from an aquifer isolated from above by a silt and clay aquatard.

The firm of Robinson and Noble have recommended that the well be designed to pump at a maximum rate of 1000 gallons per minute. Based on their testing and recommendation, the quantity for this application should reflect the designed capacity of the well for a safe sustained yield.

Since the previous rights held by the City total 2,600 acre-feet per year which is adequate to service a population in excess of 10,000, this application would be considered totally supplemental to the existing rights.

Conclusion:

In accordance with Section 90.03 and 90.44 RCW, I find that there is water available for appropriation from the source in question and that the appropriation as recommended above will not impair existing rights or be detrimental to the public welfare. Therefore, permit should issue subject to existing rights and indicated provisions.

Recommendation:

A permit should issue for 1000 gallons per minute, 1600 acre-feet per year, supplemental to existing rights from a well for the purpose of municipal supply.

on Permit This is a supplemental right to primary ground water certificates 6343 and 7031. Total annual withdrawals from all sources shall not exceed 2600 acre-feet per year previously approved on primary rights.

A certificate of water right will not be issued until a final investigation is made.

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508-64-020 through WAC 508-64-040 (Installation, operation and maintenance requirements attached hereto).

REPORT BY: [signature] DATE: 2/13/86

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

PERMIT

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
April 2, 1985	G1-24633	G1-24633P	

NAME

City of Issaquah

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 E. Sunset Way (P.O. Box 1307)	Issaquah	Washington	98027-1307

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE

Well 16" X 412'

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	1000	1600*

QUANTITY, TYPE OF USE, PERIOD OF USE

Municipal water supply - continuously

*Supplemental to existing rights

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

375 feet south and 600 feet east of the northwest corner of Section 28

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼NE¼	28	24	6 E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Issaquah

DESCRIPTION OF PROPOSED WORKS

Well 16" X 412'
200 - 250 HP pump

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	April 15, 1987 88	April 15, ~~1988~~ 89

PROVISIONS

This is a supplemental right to primary ground water certificates 6343 and 7031. Total annual withdrawals from all sources shall not exceed 2600 acre-feet per year previously approved on primary rights.

A certificate of water right will not be issued until a final investigation is made.

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508-64-020 through WAC 508-64-040 (Installation, operation and maintenance requirements attached hereto).

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Redmond, *Washington, this* 15 *day*

of April, *19* 86

Department of Ecology

ENGINEERING DATA

OK JJ

by John K. Thomas
John K. Thomas, Regional Manager

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
April 2, 1985	G1-24633	G1-24633P	G1-24633C

NAME
City of Issaquah

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
130 E. Sunset Way (P.O. Box 1307)	Issaquah	Washington	98027-1307

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
Well 16" X 412'

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	1000	1600*

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal water supply - continuously

*Supplemental to existing rights

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
375 feet south and 600 feet east of the northwest corner of Section 28

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼NE¼	28	24	6 E	8	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Issaquah

(SEE REVERSE SIDE)

PROVISIONS

This is a supplemental right to primary ground water certificates 6343 and 7031. Total annual withdrawals from all sources shall not exceed 2600 acre-feet per year previously approved on primary rights.

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508-64-020 through WAC 508-64-040 (Installation, operation and maintenance requirements attached hereto).

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 Redmond *Washington, this* 15th *day of* February, *19* 90.

Department of Ecology

ENGINEERING DATA
OK

by Herman H. Huggins
Herman H. Huggins, Section Supervisor Water Resources

FOR COUNTY USE ONLY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

COMPUTER INPUT
☐ APPLICATION
☐ PERMIT
☐ CERTIFICATE
☐ OTHER

PROGRESS SHEET

☐ SURFACE WATER ☒ GROUND WATER

NAME: City of Issaquah
TELEPHONE NO.: 391-1004 / ~~392-7595~~

ADDRESS: 130 E. Sunset Way (P.O. Box 1307) (CITY) Issaquah (STATE) Washington (ZIP CODE) 98027-1307

ASSIGNED TO: | TELEPHONE NO.: | DATE ASSIGNED:

ADDRESS: (CITY) (STATE) (ZIP CODE)

APPLICATION NO.: G 124633 | PERMIT NO.: G124633P | CERTIFICATION NO.: G1-24633C

DATE AMENDED: | DATE CANCELLED: | W.R.I.A.:

APPLICATION

DATE APPLICATION RECEIVED: April 2, 1985 | INITIAL $10.00 FEE RECEIVED: ☒ YES ☐ NO | DATE FEE RECEIVED: April 2, 1985

STATEMENT OF ADDITIONAL EXAMINATION FEE $ | DATE SENT: | DATE RECEIVED:

DATE RETURNED FOR COMPLETION OR CORRECTION: | DATE RECEIVED:

TEMPORARY PERMIT

APPROVED BY: | DATE ISSUED:

PUBLICATION

APPROVED BY: | DATE APPROVED: | DATE NOTICE SENT: 4·19·85

PROTESTED BY AND DATE:

DATE AFFIDAVIT RECEIVED: 7-24-85 | CHECKED BY: JJ | TIME EXPIRED: 6-1 | DATE AMENDED NOTICE SENT: | DATE AFFIDAVIT RECEIVED: | TIME EXPIRED:

DEPARTMENT OF GAME AND FISHERIES REPORT

APPROVED: | PROVISO: | PROTEST:

EXAMINATION

DATE EXAMINATION MADE: waived | MADE BY: JJ | DATE REPORT OF EXAM. WRITTEN: 12-85 | WRITTEN BY: JJ | CHECKED BY: [illegible]

DATE PERMIT FEE REQUESTED: 2·13·86 | AMOUNT DUE: 20.00 | DATE RECEIVED: 3-10-86 OK FOR PERMIT JJ

PERMIT

PERMIT APPROVED BY: JJ | DATE APPROVED: 4-15-86 | PERMIT NO.: G124633P | DATE ISSUED: 4·15·86

BEGINNING OF CONSTRUCTION

DATE NOTICE SENT: | DATE FILED: | EXTENSION FEE:

EXTENDED TO: | EXTENDED TO:

WELL DRILLER'S AND/OR CONSTRUCTION REPORT

DATE SENT: | DATE FILED:

COMPLETION OF CONSTRUCTION

DATE NOTICE SENT: 4·15·86 | DATE FILED: 6/30/88 | EXTENSION FEE: 5.00

EXTENDED TO: 4/15/88 | EXTENDED TO:

PROOF OF APPROPRIATION

DATE SENT: 7·6·88 | DATE FILED: 9-8-89 | EXTENSION FEE: | EXTENDED TO:

DATE CERTIFICATE FEE REQUESTED: | AMOUNT DUE: | DATE RECEIVED: 9-8-89 | DATE APPROVED FOR CERTIFICATE: 1-26-90 | APPROVED BY: JJ

CERTIFICATION

PROOF EXAM. REQUIRED: ☒ YES ☐ NO | CERTIFICATE NUMBER: G1-24633C | DATE ISSUED: 2·15·90

REMARKS

ECY 040-1-80

PROGRESS

Appendix H. Department of Health Water Quality Monitoring Schedule for the Year 2017

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Water Quality Monitoring Schedule

System: ISSAQUAH WATER SYSTEM
Contact: BRET HEATH

PWS ID: 36350 5
Group: A - Comm

Region: NORTHWEST
County: KING

NOTE: To receive credit for compliance samples, you must fill out laboratory and sample paperwork completely, send your samples to a laboratory accredited by Washington State to conduct the analyses, AND ensure the results are submitted to DOH Office of Drinking Water. There is often a lag time between when you collect your sample, when we credit your system with meeting the monitoring requirement, and when we generate the new monitoring requirement.

Coliform Monitoring Requirements

	May 2017	Jun 2017	Jul 2017	Aug 2017	Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018
Coliform Monitoring Population	31208	31219	30333	30333	31219	36696	31219	31208	31208	31242	31208	31219
Number of Routine Samples Required	30	30	30	30	30	40	30	30	30	30	30	30

- Collect samples from representative points throughout the distribution system.
- Collect required repeat samples following an unsatisfactory sample. In addition, collect a sample from each operating groundwater source.
- For systems that chlorinate, record chlorine residual (measured when the coliform sample is collected) on the coliform lab slip.

Chemical Monitoring Requirements

Distribution Monitoring

Water Quality Monitoring Schedule

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S01 — WELL # 1 — Well — Use - Permanent — Susceptility - Moderate

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	07/25/2016	
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	09/16/2015	
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/25/2016	
Pesticides	0	Jan 2017 - Dec 2019	waiver - 3 year	08/21/2007	
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2014 - Dec 2019	standard - 6 year	09/16/2015	
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	09/16/2015	

Source S02 — WELL # 2 — Well — Use - Permanent — Susceptility - Moderate

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2017 - Dec 2017	standard - 1 year	07/25/2016	***Jul 2017***
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	07/25/2016	
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	09/16/2015	
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/25/2016	
Pesticides	0	Jan 2017 - Dec 2019	waiver - 3 year	08/21/2007	
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2017 - Dec 2019	standard - 3 year	09/16/2015	Sep 2018
Radium 228	1	Jan 2017 - Dec 2019	standard - 3 year	09/16/2015	Sep 2018

Source S04 — WELL #4 — Well — Use - Permanent — Susceptility - Low

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2017 - Dec 2017	standard - 1 year	07/25/2016	***Jul 2017***

Water Quality Monitoring Schedule

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S04 WELL #4 — Well — Use - Permanent — Susceptility - Low

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	07/25/2016	
Arsenic	1	Jan 2017 - Dec 2019	standard - 3 year	07/25/2016	Sep 2019
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	05/07/2012	May 2018
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/25/2016	
Pesticides	0	Jan 2017 - Dec 2019	waiver - 3 year	08/21/2007	
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2014 - Dec 2019	standard - 6 year	09/16/2015	
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	09/16/2015	

Source S05 WELL #5 — Well — Use - Permanent — Susceptility - Low

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2017 - Dec 2017	standard - 1 year	07/25/2016	***Jul 2017***
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	07/25/2016	
Arsenic	1	Jan 2017 - Dec 2019	standard - 3 year	07/25/2016	Oct 2019
Manganese	1	Jan 2017 - Dec 2019	standard - 3 year	07/25/2016	May 2019
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	05/07/2012	May 2018
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/25/2016	
Pesticides	0	Jan 2017 - Dec 2019	waiver - 3 year	08/21/2007	
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2014 - Dec 2019	standard - 6 year	09/16/2015	
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	09/16/2015	

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

Water Quality Monitoring Schedule

Other Information

Other Reporting Schedules	*Due Date*
Measure chlorine residuals and submit monthly reports if your system uses continuous chlorination:	monthly
Submit Consumer Confidence Report (CCR) to customers and ODW (Community systems only):	07/01/2017
Submit CCR certification form to ODW (Community systems only):	10/01/2017
Submit Water Use Efficiency report online to ODW and to customers (Community and other municipal water systems only):	07/01/2017
Send notices of lead and copper sample results to the customers sampled:	30 days after you receive the laboratory results
Submit Certification of customer notification of lead and copper results to ODW:	90 days after you notify customers

Special Notes

None

Northwest Regional Water Quality Monitoring Contacts

For questions regarding chemical monitoring:	Steve Hulsman: (253) 395-6777 or Steve.Hulsman@doh.wa.gov
For questions regarding DBPs:	Steve Hulsman: (253) 395-6777 or Steve.Hulsman@doh.wa.gov
For questions regarding coliform bacteria and microbial issues:	Carol Stuckey or Ingrid Salmon: (253) 395-6775: or carol.stuckey@doh.wa.gov or ingrid.salmon@doh.wa.gov

Additional Notes

The information on this monitoring schedule is valid as of the date in the upper left corner on the first page. However, the information may change with subsequent updates in our water quality monitoring database as we receive new data or revise monitoring schedules. There is often a lag time between when you collect your sample and when we credit your system with meeting the monitoring requirement.

We have not designed this monitoring schedule to display all compliance requirements. The purpose of this schedule is to assist water systems with planning for most water quality monitoring, and to allow systems to compare their records with DOH ODW records. Please be aware that this monitoring schedule does not include constituents that require a special monitoring frequency, such as monitoring affiliated with treatment.

Any inaccuracies on this schedule will not relieve the water system owner and operator of the requirement to comply with applicable regulations.

If you have any questions about your monitoring requirements, please contact the regional office staff listed above.

Appendix I. Water Facilities Inventory Form

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

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 05/09/2017
Printed: 1/12/2018
WFI Printed For: On-Demand
Submission Reason: Pop/Connect Update

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
36350 5	ISSAQUAH WATER SYSTEM	KING	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. OWNER NUMBER: 002776
BRET HEATH [MANAGER] PO BOX 1307 ISSAQUAH, WA 98027-1307	ISSAQUAH, CITY OF BRET HEATH PO BOX 1307 ISSAQUAH, WA 98027-1307	 MANAGER
STREET ADDRESS IF DIFFERENT FROM ABOVE	**STREET ADDRESS IF DIFFERENT FROM ABOVE**	
ATTN ADDRESS CITY STATE ZIP	ATTN ADDRESS CITY STATE ZIP	

9. 24 HOUR PRIMARY CONTACT INFORMATION		10. OWNER CONTACT INFORMATION	
Primary Contact Daytime Phone:	(425) 837-3470	Owner Daytime Phone:	(425) 837-3470
Primary Contact Mobile/Cell Phone:	(425) 677-4391	Owner Mobile/Cell Phone:	(425) 677-4391
Primary Contact Evening Phone:	(xxx)-xxx-xxxx	Owner Evening Phone:	(xxx)-xxx-xxxx
Fax: (425) 837-3479	E-mail: xxxxxxxxxxxxxxxxxxxx	Fax: (425) 837-3479	E-mail: xxxxxxxxxxxxxxxxxxxx

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

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

- ☒ Not applicable (Skip to #12)
- ☐ Owned and Managed
- ☐ Managed Only
- ☐ Owned Only

SMA NAME: ____________ SMA Number:

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

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

13. WATER SYSTEM OWNERSHIP (mark only one)

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

14. STORAGE CAPACITY (gallons)

12,664,000

- 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
36350 5	ISSAQUAH WATER SYSTEM	KING	A	Comm

15	16 SOURCE NAME	17 INTERTIE	18 SOURCE CATEGORY										19 USE			20	21 TREATMENT						22 DEPTH	23	24 SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRINGFIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	WELL # 1		X										X			Y		X					90	450	SW NE	27	24N	06E
S02	WELL # 2		X										X			Y		X					82	1050	SW NE	27	24N	06E
S03	InAct 11/23/1992 WELL #3		X												X		X						100	300	NE SE	34	24N	06E
S04	WELL #4		X										X			Y		X	X			X	77	250	NW NE	28	24N	06E
S05	WELL #5		X										X			Y		X				X	323	1150	NW NE	28	24N	06E
S06	05575B/BELLEVUE	05575 B											X			Y	X							2500			00N	00E
S07	05575B/BELLEVUE	05575 B											X				X							2000			00N	00E
S08	SAMMAMISH PLATEAU	40900 9													X	Y	X							425	SW NW	27	24N	06E
S09	SAMMAMISH PLATEAU	40900 9													X	Y	X							2800	SW NE	21	24N	06E
S10	AA374C/Cascade Water Alliance	AA374 C											X			Y	X							5780			00N	00E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
36350 5	ISSAQUAH WATER SYSTEM	KING	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?)		19233	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	6131		
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	943		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	13102		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	704	704	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	482	482	
28. TOTAL SERVICE CONNECTIONS		20419	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 29900

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?	9865	9865	9865	9865	9865	9865	9865	9865	9865	180000	9865	9865
B. How many days per month is water accessible to the public?	31	28	31	30	31	30	31	31	30	31	30	31

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?	990	990	990	990	990	990	115	115	990	990	990	990
B. How many days per month are they present?	21	19	21	22	17	20	22	22	20	23	18	7

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
* Requirement is exception from WAC 246-290	30	30	30	30	30	30	30	30	30	40	30	30

34. NITRATE SCHEDULE	QUARTERLY	ANNUALLY	ONCE EVERY 3 YEARS
(One Sample per source by time period)			

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
36350	ISSAQUAH WATER SYSTEM

Total WFI Printed: 1

Appendix J. Water Quality Reports from 2012 to 2016

CITY OF ISSAQUAH WASHINGTON

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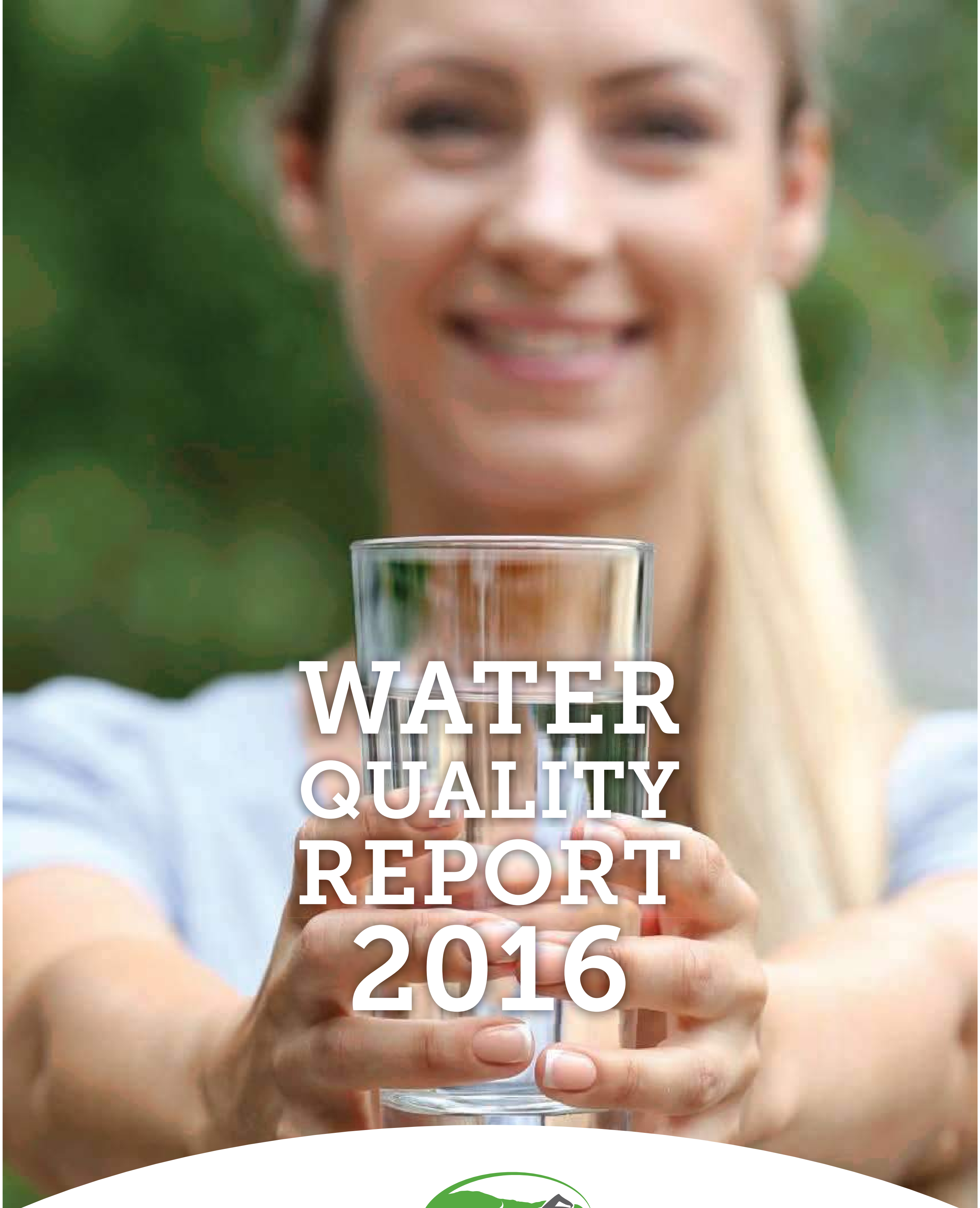


WATER QUALITY REPORT 2016

CITY OF
ISSAQUAH
WASHINGTON

Issaquah's Commitment: Safe Drinking Water

Each year, we publish a water-quality report to educate you — our valued customers — about where your water comes from, how it's delivered and how to conserve it.

Our top priority is simple: Providing you the highest-quality water possible.

Once again, as you'll see in this report, we have met all water quality requirements.

Meanwhile, our dedication to conservation will help ensure our region's water remains safe, clean and reliable for generations to come.

Questions? Please Ask!

If you have any questions, please call us at 425-837-3470, visit issaquahwa.gov/water or connect with us via social media.

Would you like to get involved? Share your opinions on the City's drinking water! The Issaquah City Council meets at 7 p.m. the first and third Monday of each month at City Hall South, 135 E. Sunset Way.

The Council Infrastructure Committee also meets at 6:30 p.m. the third Thursday of each month in the Council Chambers, 135 E. Sunset Way.

City Starts Well 4 Water Filtration

Issaquah is now pumping from Well 4, thanks to a new filtration system that removes perfluorochemicals, or PFCs, from the water before it enters the City's distribution system.

Monthly test results show the system is working – there are no detections of PFCs from Well 4.

Issaquah participates in the Environmental Protection Agency's (EPA) unregulated monitoring program by performing additional tests on our drinking water.

During that testing, detections of PFCs were found in Well 4, the City's smallest well. In the winter of 2016, the City stopped running Well 4 until the filtration system was installed and tested.

Issaquah meets all standards set for safe drinking water.

Based on the latest science, the EPA recently released drinking water health advisories (which are not enforceable or regulated) on two PFCs, called PFOA and PFOS. Issaquah meets these advisories.

Meanwhile, more stringent testing has been conducted – even below levels defined by EPA as an actual detection – to better understand the potential sources of PFCs. All of Issaquah's wells have tested below EPA's detection threshold for PFCs.

Learn more at issaquahwa.gov/PFCs.

Resource-Efficient Water Management

Water conservation protects our local and regional streams, and helps Issaquah use our infrastructure wisely. As warmer, drier summers become more frequent, it is even more important to conserve.

Water use is tracked as a Sustainable City Indicator to help gauge progress toward our long-term goals. Together with the community, the City works to reduce the amount of water used in Issaquah.

In 2016, the City focused on reducing peak-season demand from commercial irrigation. Customers received reminders to adjust their irrigation settings, and they heard more about best practices to use water efficiently, while also saving money.

In addition, the City helps to reduce water leakage with investments in water mains, reservoirs and other infrastructure. Ongoing operational improvements, meter testing, and other programs continue to keep this figure below the state-required 10 percent.

2016 Water Production and System Leakage

Water production and purchases	871.59 million gallons
Authorized consumption	808.42 million gallons
Distribution system leakage	63.17 million gallons
2016 leakage	7.25%
3-year average	8.15%

The City is a member of the Cascade Water Alliance, and has adopted regional water use efficiency goals. The following regional goal was adopted for 2014 – 2019: Cascade will dedicate resources necessary to achieve a cumulative drinking water savings of 0.6 million gallons per day on an annual basis and 1 million gallons per day on a peak season (June – September) basis by 2020.

Both the City and Cascade provide water efficiency programs and services for water customers in Issaquah and in the region. In 2016, Cascade programs and services resulted in approximately 20,000 direct customer interactions promoting water efficiency and a savings of an estimated 257,728 gallons of water per day, or 43% of Cascade's 2014-19 goal.

For more information about the water conservation programs, go to issaquahwa.gov/sustainability or call 425-837-3400.

Where Does Our **Water Come From?**

In 2016, the City of Issaquah provided 871 million gallons of high-quality drinking water to about 29,900 customers through more than 12,800 water connections. Most of Issaquah's water is produced from four groundwater wells, which range in depth from 100 to 400 feet. Chlorine is added at the well sites to disinfect the drinking water, which is then conveyed through 112 miles of water main and 13 water booster stations before it's stored in one of 21 reservoirs, which hold a total of 12 million gallons.

Along with well water, Issaquah also purchases regional water from Cascade Water Alliance (CWA). Talus and South Cove-area residents currently receive this regional water, while Issaquah Highlands receives a blend of regional and well water. CWA also includes the cities of Bellevue, Kirkland, Redmond and Tukwila, as well as the Sammamish Plateau and Skyway water and sewer districts.

The alliance currently gets its water from the City of Seattle water system, which sources from the Tolt and Cedar river watersheds.

With the exception of Issaquah Highlands, the City's well water and CWA water are not mixed, as the distribution systems are separated. Water purchased from the CWA is fluoridated, while Issaquah well water is not.

Several years ago, CWA also purchased Lake Tapps in eastern Pierce County as the region's newest water supply in decades. As a result of customers' wise use of water, responsible plumbing codes and water-efficient appliances, CWA will have enough water for the future and likely won't develop Lake Tapps until it is needed. Planning for water takes time. That's why we are planning now for that future!

HEALTH INFORMATION

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or water.epa.gov/drink/hotline.

SUBSTANCES THAT COULD BE IN WATER

In order to ensure that tap water is safe to drink, the U.S. EPA and/or the Washington state board of health prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. U.S. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals, in some cases, radioactive material; and substances resulting from the presence of animals or from human activity. Substances that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria (which may come from sewage treatment plants); septic systems; agricultural livestock operations; or wildlife.
- Inorganic contaminants, such as salts and metals (which can be naturally occurring or may result from urban stormwater runoff), industrial or domestic wastewater discharges; oil and gas production; mining; or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture; urban stormwater runoff; and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals (which are by-products of industrial processes and petroleum production), and may also come from gas stations; urban stormwater runoff; and septic systems.
- Radioactive contaminants, which can be naturally occurring or may be the result of oil and gas production and mining activities.

For more information about contaminants and potential health effects, call the U.S. EPA's Safe Drinking Water Hotline at 800-426-4791.

CRYPTOSPORIDIUM

Cryptosporidium is a microbial parasite found in surface water throughout the United States. Although filtration removes cryptosporidium, the most commonly used filtration methods cannot guarantee 100 percent removal. Symptoms of infection include nausea, diarrhea and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immune-compromised people are at greater risk of developing life-threatening illness. Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water.

Since the Lower Issaquah Valley Aquifer is a groundwater source, it is not required to be tested for cryptosporidium. The CWA water sources (the Cedar and Tolt supplies), were tested for cryptosporidium in 2016 with no detections from the Tolt supply (12 samples). It was detected in 2 of 12 samples from the Cedar supply. This monitoring is not required for the wells. Ozone disinfection, which is used at the Cedar and Tolt treatment plants, is very effective at destroying cryptosporidium and other microbes. The U.S. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or water.epa.gov/drink/hotline.

LEAD IN HOME PLUMBING

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Issaquah is responsible for providing high-quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at epa.gov/safewater/lead.

HELP KEEP OUR WATER SAFE

If you have a water connection to an irrigation or fire sprinkler system, boiler, pool/spa, water feature or photo development equipment, state law requires that you install a backflow prevention assembly and have it tested annually.

A backflow prevention assembly will prevent contaminated water from flowing back into your drinking water or into the City's water system. Most residences and businesses with backflow prevention assemblies are registered with the City of Issaquah.

If you haven't been testing your backflow assembly, call 425-837-3470 for assistance in finding a tester to help protect the water you drink. Please also call us if you know of a potential threat to our drinking water.

ARSENIC IN WATER

While your drinking water meets U.S. EPA's standard for arsenic, it does contain low levels of arsenic. U.S. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. U.S. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Water Quality Results 2016 (PWSID#: 363505)

During the past year, we have taken hundreds of water samples in order to determine the presence of any herbicides, biological, inorganic, volatile organic or synthetic organic contaminants. The table below shows only those contaminants that were detected in the water. The state requires us to monitor for certain

Finished Water				Lower Issaquah Valley Aquifer (Wells 1,2,4,5-Talus-Issaquah Highlands)		CWA-Cedar Supply (Montreux, Lakemont, Issaquah Highlands, Talus)	
Substance	Year Sampled	MCL [MRDL]	MCLG [MRDLG]	Range Low-High	Average Amount Detected	Range Low-High	Average Amount Detected
Arsenic (ppb)	2016	10	0	2 to 9	4	0.4 to 0.6	0.5
Barium (ppb)	2016	2000	2000	3 to 13	6	1.5 to 1.8	1.6
Bromate ^ (ppb)	2016	10	0	NA	NA	ND	ND
Chloride (ppm)	2016	250	NA	3.8 to 5.73	4.6	NA	NA
Chlorine (ppm)	2016	[4]	[4]	0.03 to 1.35	0.44	0.02 to 1.61	0.68
Chromium (ppb)	2016	100	100	NA	NA	0.25 to 0.33	0.27
Color (Color Units)	2016	15	NA	5 to 6	5.75	NA	NA
Copper (ppm)	2016	1.3	1.3	ND to .005	0.001	NA	NA
Electrical Conductivity (µS/cm)	2016	700	NA	158 to 293	215	NA	NA
Hardness as Calcium Carbonate (ppm)	2016	NA	NA	52.6 to 100.2	74	NA	NA
Fluoride (ppm)	2016	4	4	NA	NA	0.6 to 0.9	0.7
Halaocetic Acids [HAA]- Stage 2 (ppb)	2016	60	NA	NA	NA	17.5 to 56.6	36.9
Manganese (ppm)	2016	0.05	NA	ND to 0.062	0.02	NA	NA
Nitrate-N (ppm)	2016	10	10	ND to .54	0.32	(one sample)	0.02
Sodium (ppm)	2016	NA	NA	8.1 to 23.3	12.25	NA	NA
Sulfate (ppm)	2016	250	NA	6 to 30	12.9	NA	NA
Total Trihalomethanes [TTHMs]- Stage 2 (ppb)	2016	80	NA	NA	NA	30.7 to 51.5	47.4
Turbidity (NTU)	2016	TT	NA	ND to 0.16	0.04	0.2 to 2.3	0.3

^ Note from Seattle Public Utilities - We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not your drinking water meets health standards. During June 2016, we did not collect the monthly sample for bromate for the Tolt supply, and therefore cannot be sure of the quality of your

Raw Water				Lower Issaquah Valley Aquifer (Wells 1,2,4,5-Talus-Issaquah Highlands)		CWA-Cedar Supply (Montreux, Lakemont, Issaquah Highlands, Talus)	
Total Organic Carbon (ppm)	2016	NA	NA	NA	NA	0.3 to 2.1	0.8
Cryptosporidium (#/100L)	2016	NA	NA	NA	NA	ND to 2	0.3

Lead and Copper	Year Sampled	AL	MCLG	Amount Detected 90th Percentile	Sites above AL/Total sites	Violation	Typical Source
Copper (ppm)	2015	1.3	1.3	0.364	0/51	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb)	2015	15	0	0.001	0/51	No	

substances less often than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent data are included, along with the year in which the sample was taken.

CWA-Tolt Supply: (Montreux,Lakemont, Issaquah Highlands, Talus)			
Range Low-High	Average Amount Detected	Violation	Typical Source
0.4 to 0.6	0.5	No	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics waste
1.0 to 1.6	1.3	No	Discharge of drilling wastes; discharge from metal refineries; Erosion of natural deposits
ND to 1	0.1	No	By-product of drinking water disinfection
NA	NA	No	Erosion of natural deposits
0.02 to 1.61	0.68	No	Water additive used to control microbes
ND to 0.24	0.2	No	Erosion of natural deposits
NA	NA	No	Erosion of natural deposits
NA	NA	No	Corrosion of household plumbing systems; Erosion of natural deposits.
NA	NA	No	Erosion of natural deposits
NA	NA	No	Erosion of natural deposits
0.6 to 0.9	0.7	No	Water additive, which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories
17.5 to 56.6	36.9	No	By-product of drinking water chlorination
NA	NA	No	Erosion of natural deposits
(one sample)	0.09	No	Runoff from Fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
NA	NA	No	Erosion of natural deposits
NA	NA	No	Erosion of natural deposits
30.7 to 51.5	47.4	No	By-product of drinking water chlorination
0.01 to 0.2	0.07	No	Soil runoff

drinking water during that time. Based on historical data, most bromate results for the Tolt supply are non-detect.

CWA-Tolt Supply: (Montreux, Lakemont, Issaquah Highlands, Talus)			
1.2 to 1.7	1.4	No	Naturally present in the environment
ND	ND	No	Naturally present in the environment

Definitions

AL: Action Level - The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL: Maximum Contaminant Level - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG: Maximum Contaminant Level Goal - 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.

MRDL: Maximum Residual Disinfectant Level - The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG: Maximum Residual Disinfectant Level Goal - The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not Applicable

ND: Not Detected - Indicates that the substance was not found by laboratory analysis.

NTU: Nephelometric Turbidity Unit - Turbidity is a measure of how clear the water looks. The turbidity MCL that applied to the Cedar supply in 2015 is 5 NTU, and for the Tolt it was 0.3 NTU for at least 95% of the samples in a month. 99.96% of the samples from the Tolt in December 2015 were below 0.3 NTU. 100% of the samples for the remainder of the year were below 0.3 NTU.

pCi/L: Picocuries per liter

ppb: 1 part per billion = 1 ug/L = 1 microgram per liter

ppm: 1 part per million = 1 mg/L = 1 milligram per liter

1 ppm: 1000 ppb

TT: Treatment Technique - A required process intended to reduce the level of a contaminant in drinking water.

Be Water Smart!

Play a role in using water wisely, and you can save money at the same time! Here are a few simple tips that conserve a lot of water:

Take a five minute shower! Every time you shave minutes off your use of hot water, you also save energy and keep dollars in your pocket.

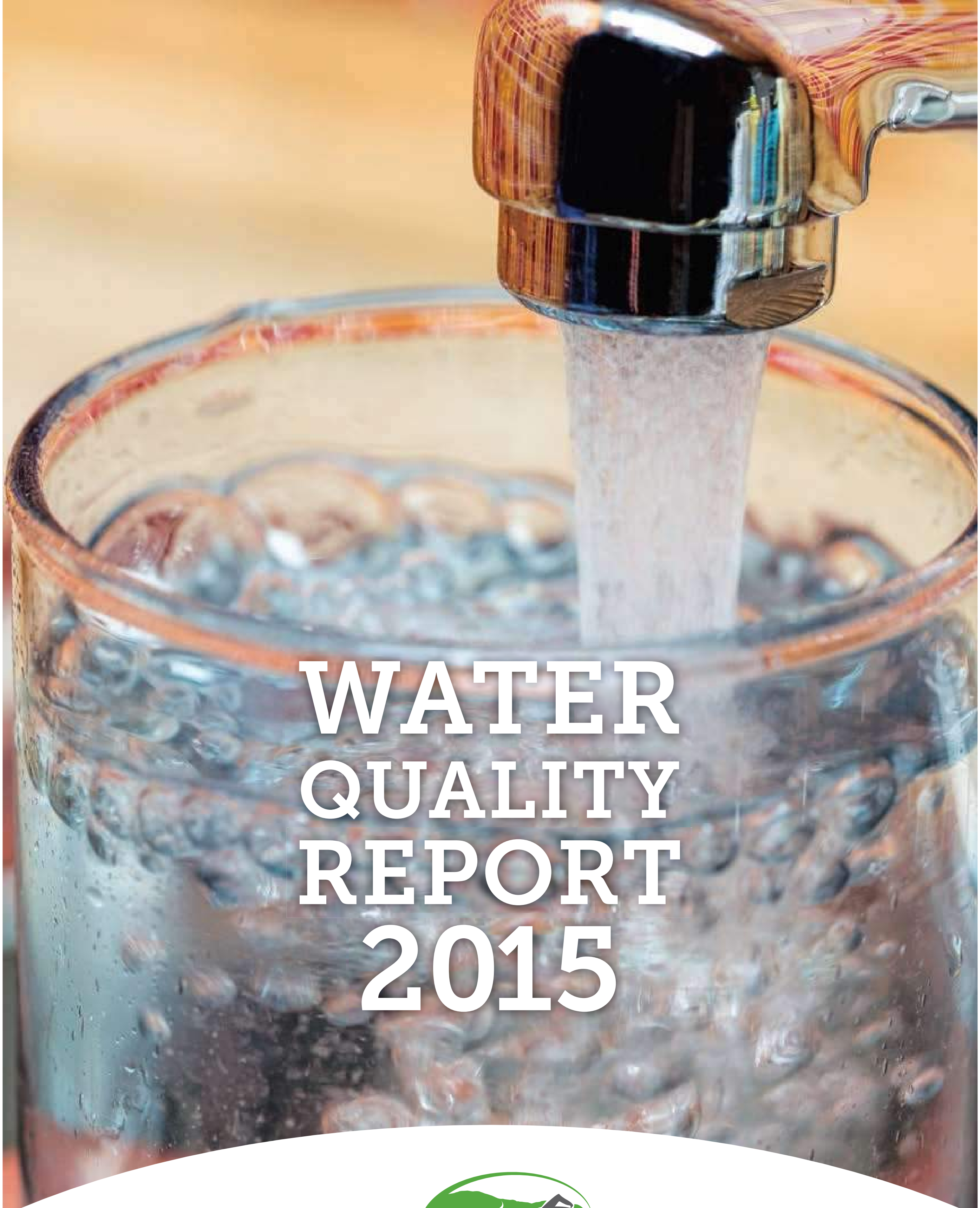
Adjust settings for your clothes washer. Nearly 22% of indoor home water use comes from doing laundry. Save water by making sure to adjust the settings on your machine to the proper load size.

Pay attention to outdoor water use. Water your lawn in the early morning or evening to reduce evaporation and avoid big water bills. Or consider allowing your lawn to go dormant for the summer, it will come back in the fall.

Turn off the tap! This is an easy way to save water when brushing your teeth, shaving or washing dishes.

Shop for WaterSense labeled faucets, toilets and showerheads – they've been tested to reduce water use and provide exceptional performance.

Contact the Office of Sustainability if you have questions or to order a free shower timer. Learn more at issaquahwa.gov/sustainability.



WATER QUALITY REPORT 2015

CITY OF
ISSAQUAH
WASHINGTON

Issaquah's Commitment: Safe Drinking Water

Each year, we publish a water-quality report to educate you — our valued customers — about where your water comes from, how it's delivered and how to conserve it.

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Meanwhile, our dedication to conservation will help ensure our region's water remains safe, clean and reliable for generations to come.

Questions? Please Ask!

If you have any questions, please call us at 425-837-3470, visit issaquahwa.gov/water or connect with us via social media.

Would you like to get involved? Share your opinions on the City's drinking water! The Issaquah City Council meets at 7 p.m. the first and third Monday of each month at City Hall South, 135 E. Sunset Way.

The Council Infrastructure Committee also meets at 5:30 p.m. the third Thursday of each month in the Pickering Room of City Hall Northwest, 1175 12th Ave. N.W.

Update: PFCs in Well Water

Issaquah participates in the Environmental Protection Agency's (EPA) unregulated monitoring program by performing additional tests on our drinking water. During that testing, detections of "perfluorochemicals," or PFCs, were found in the smallest of Issaquah's four wells, called Well 4.

Issaquah meets all standards set for safe drinking water. Based on the latest science, the EPA recently released drinking water health advisories (which are not enforceable or regulated) on two PFCs, called PFOA and PFOS. Issaquah meets these advisories. In the winter of 2016, the City stopped running Well 4, and recently installed a filtration system that will be used to remove PFCs from Well 4's water starting this summer.

In addition, Issaquah's other wells have tested below EPA's detection threshold for PFCs. These chemicals can have an impact on the development of fetuses and breastfed or formula-fed infants. If you are concerned about potential health effects from exposure to PFCs, contact your doctor or health care professional. For more information, go to issaquahwa.gov/waterquality.

PFC Test Results

Substance (units of measurement)	At Well 4 (2013)	At Well 4 (2014)[1]	At Well 4 (2015)	At the Tap Maximum Level (Nov. 2015)	At the Tap Maximum Level (Feb. 2016)[2]	EPA Provisional Health Advisory (issued 2009)	At the Tap Maximum Level (May 2016)[3]	EPA Lifetime Health Advisory (issued May 2016)
PFBS (ppb)	ND	ND	0.0695	ND	ND	None	ND	None
PFHpA (ppb)	0.0258	0.0234	0.0207	0.00531	ND	None	ND	None
PFHxS (ppb)	0.241	0.201	0.194	0.0473	0.0375	None	ND	None
PFNA (ppb)	0.0280	0.0266	0.0221	ND	ND	None	ND	None
PFOA (ppb)	0.0215	0.0200	0.0181	ND	ND	0.4	ND	0.07 (combined PFOA and PFOS levels)
PFOS (ppb)	0.600	0.514	0.472	0.106	0.0772	0.2	ND	0.07 (combined PFOA and PFOS levels)

Notes: ND — Not detected. For the test results taken "At Well 4," this water was then blended with at least one other well before it was distributed. (1) After publication of its 2014 Water Quality Report, the City of Issaquah received the following corrected information from the testing lab. (2) This test was conducted after the City reduced the amount of water pumped from Well 4. (3) This test was conducted after the City stopped pumping from Well 4 in the winter of 2016.

Resource-Efficient Water Management

Water conservation protects our local and regional streams, and helps Issaquah use our infrastructure wisely. For decades, the City has worked with the community to help ensure efficient use of water. Total water use has declined significantly during the last decade, thanks to changes in land-use patterns, increased efficiency and your efforts to use water wisely. Thank you! The City also supports water-efficient homes and commercial buildings, and provides rate incentives for lower water use. In addition, Issaquah reduces water leakage with investments in water mains, reservoirs and other infrastructure. For more information, visit issaquahwa.gov/sustainability or call 425-837-3400.

2015 Water Production and System Leakage

Water production and purchases	881.87 million gallons
Authorized consumption	800.01 million gallons
Distribution system leakage	81.86 million gallons
2015 leakage	9.3%
3-year average	8.5%

The City is also a member of the Cascade Water Alliance, and has adopted regional water use efficiency goals. The following regional goal was adopted for 2014-19: Cascade will dedicate resources necessary to achieve a cumulative drinking water savings of 0.6 million gallons per day on an annual basis and 1 million gallons per day on a peak season (June-September) basis by 2020. Both the City and Cascade provide water efficiency programs and services for water customers in Issaquah and in the region. In 2015, Cascade programs and services resulted in approximately 20,000 direct customer interactions promoting water efficiency and a savings of an estimated 79,205 gallons of water per day, or 13 percent of Cascade's 2014-19 goal.

Where Does Our **Water Come From?**

In 2015, the City of Issaquah provided 881.8 million gallons of high-quality drinking water to about 24,490 customers through more than 11,700 water connections. Most of Issaquah's water is produced from four groundwater wells, which range in depth from 100 to 400 feet. Chlorine is added at the well sites to disinfect the drinking water, which is then conveyed through 110 miles of water main and 13 water booster stations before it's stored in one of 21 reservoirs, which hold a total of 12 million gallons.

Along with well water, Issaquah also purchases regional water from Cascade Water Alliance (CWA). Talus residents currently receive this regional water, while Issaquah Highlands receives a blend of regional and well water. CWA also includes the cities of Bellevue, Kirkland, Redmond and Tukwila, as well as the Sammamish Plateau and Skyway water and sewer districts.

The alliance currently gets its water from the City of Seattle water system, which sources from the Tolt and Cedar river watersheds.

With the exception of Issaquah Highlands, the City's well water and CWA water are not mixed, as the distribution systems are separated. Water purchased from the CWA is fluoridated, while Issaquah well water is not.

Several years ago, CWA also purchased Lake Tapps in eastern Pierce County as the region's newest water supply in decades. As a result of customers' wise use of water, responsible plumbing codes and water-efficient appliances, CWA will have enough water for the future and likely won't develop Lake Tapps until it is needed. Planning for water takes time. That's why we are planning now for that future!

HEALTH INFORMATION

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or water.epa.gov/drink/hotline.

SUBSTANCES THAT COULD BE IN WATER

In order to ensure that tap water is safe to drink, the U.S. EPA and/or the Washington state board of health prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. U.S. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals, in some cases, radioactive material; and substances resulting from the presence of animals or from human activity. Substances that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria (which may come from sewage treatment plants); septic systems; agricultural livestock operations; or wildlife.
- Inorganic contaminants, such as salts and metals (which can be naturally occurring or may result from urban stormwater runoff), industrial or domestic wastewater discharges; oil and gas production; mining; or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture; urban stormwater runoff; and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals (which are by-products of industrial processes and petroleum production), and may also come from gas stations; urban stormwater runoff; and septic systems.
- Radioactive contaminants, which can be naturally occurring or may be the result of oil and gas production and mining activities.

For more information about contaminants and potential health effects, call the U.S. EPA's Safe Drinking Water Hotline at 800-426-4791.

CRYPTOSPORIDIUM

Cryptosporidium is a microbial parasite found in surface water throughout the United States. Although filtration removes cryptosporidium, the most commonly used filtration methods cannot guarantee 100 percent removal. Symptoms of infection include nausea, diarrhea and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immune-compromised people are at greater risk of developing life-threatening illness. Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water.

Since the Lower Issaquah Valley Aquifer is a groundwater source, it is not required to be tested for cryptosporidium. The CWA water sources (the Cedar and Tolt supplies), were tested for cryptosporidium in 2015 with no detections from the Tolt supply (10 samples). It was detected in 2 of 9 samples from the Cedar supply. This monitoring is not required for the wells. Ozone disinfection, which is used at the Cedar and Tolt treatment plants, is very effective at destroying cryptosporidium and other microbes. The U.S. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or water.epa.gov/drink/hotline.

LEAD IN HOME PLUMBING

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Issaquah is responsible for providing high-quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at epa.gov/safewater/lead.

HELP KEEP OUR WATER SAFE

If you have a water connection to an irrigation or fire sprinkler system, boiler, pool/spa, water feature or photo development equipment, state law requires that you install a backflow prevention assembly and have it tested annually.

A backflow prevention assembly will prevent contaminated water from flowing back into your drinking water or into the City's water system. Most residences and businesses with backflow prevention assemblies are registered with the City of Issaquah.

If you haven't been testing your backflow assembly, call 425-837-3470 for assistance in finding a tester to help protect the water you drink. Please also call us if you know of a potential threat to our drinking water.

ARSENIC IN WATER

While your drinking water meets U.S. EPA's standard for arsenic, it does contain low levels of arsenic. U.S. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. U.S. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Water Quality Results 2015 (PWSID#: 363505)

During the past year, we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic or synthetic organic contaminants. The table below shows only those contaminants that were detected in the water. The state requires us to monitor for certain

REGULATED SUBSTANCES

Finished Water				Lower Issaquah Valley Aquifer-(Wells 1,2,4,5-Talus-Issaquah Highlands)		CWA-Cedar Supply (Montreux, Lakemont, Issaquah Highlands, Talus)	
Substance	Year sampled	MCL [MRDL]	MCLG [MRDLG]	Amount Detected	Range Low-High	Amount Detected	Range Low-High
Arsenic (ppb)	2015	10	0	9 [1]	One sample [1]	0.5	0.4 - 0.7
Barium (ppb)	2015	2000	2000	NA	NA	1.6	One sample
Bromate (ppb)	2015	10	0	NA	NA	ND	ND
Chlorine (ppm)	2015	[4]	[4]	0.44	0.03 - 1.30	0.69	0.01 - 1.69
Chromium (ppb)	2015	100	100	NA	NA	0.27	0.25 - 0.33
Fluoride (ppm)	2015	4	4	0.8 [2]	0.6 - 1.0 [2]	0.8	0.7 - 0.9
Haloacetic Acids [HAA] (ppb)	2015	60	NA	NA	NA	31.43	12 - 39.9
Manganese [3] (ppm)	2015	0.05 [1]	NA	0.079	One sample	NA	NA
Nitrate-N (ppm)	2015	10	10	0.31	ND -0.49	0.01	One sample
Radium 228 (pCi/L)	2015	5	NA	0.22	ND - 1.10	NA	NA
Selenium (ppb)	2015	50	50	NA	NA	ND	ND
Total Trihalomethanes [TTHMs] (ppb)	2015	80	NA	NA	NA	56.1	33.5 - 67.2
Turbidity [4] (NTU)	2015	TT	NA	NA	NA	0.4	.1 - 1.2
Uranium (ppb)	2015	30	0	NA	NA	ND	ND

Footnote 1 Sampled one well that historically has these substances. This well water is then blended with other water to further dilute it (a Washington State Department of Health-recommended practice). **Footnote 2** Talus Urban Village and the Issaquah Highlands areas only. **Footnote 3** Manganese is a secondary standard. Secondary standards are standards based on factors other than health effects. **Footnote 4** Turbidity is a measure of the cloudiness of the water. It is monitored because it is a good indicator of water quality and the effectiveness of disinfectants. ^On December 29, 2015, turbidity for the Tolt supply exceeded 1.0 NTU for about 17 minutes. Turbidity has no health effects, however, it can interfere with disinfection and provide a medium of microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. Customers did not need to take any action at the time, as Issaquah was not using any water from Seattle during this time.

Raw Water				Lower Issaquah Valley Aquifer-(Wells 1,2,4,5-Talus-Issaquah Highlands)		CWA-Cedar Supply (Montreux, Lakemont, Issaquah Highlands, Talus)	
Substance	Year sampled	MCL [MRDL]	MCLG [MRDLG]	Amount Detected	Range Low-High	Amount Detected	Range Low-High
Total Organic Carbon (ppm)	2015	TT	NA	NA	NA	0.7	0.5 -1.5
Cryptosporidium (#/100L)	2015	NA	NA	NA	NA	1	ND - 8

Lead and Copper	Year sampled	AL	MCLG	Amount Detected 90th Percentile	Sites above AL/Total sites	Violation	Typical Source
Copper (ppm)	2015	1.3	1.3	0.364	0/51	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb)	2015	15	0	0.001	0/51	No	

substances less often than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent data are included, along with the year in which the sample was taken.

CWA-Tolt Supply: (Montreux, Lakemont, Issaquah Highlands, Talus)		CWA-Levels in Seattle Well Water [5]			
Amount Detected	Range Low-High	Amount Detected	Range Low-High	Violation	Typical Source
0.6	0.4 - 0.7	3.9	1.7 -7.9	No	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics waste
1.3	One sample	3	2.2 - 4.6	No	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
0.4	ND - 2	NA	NA	No	By-product of drinking water disinfection
0.69	0.01 - 1.69	NA	NA	No	Water additive used to control microbes
0.2	ND - 0.24	0.7	0.3 - 1.3	No	Erosion of natural deposits
0.8	0.7 - 0.9	0.7	0.5 - 1.0	No	Water additive, which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories
31.43	12 - 39.9	NA	NA	No	By-product of drinking water chlorination
NA	NA	NA	NA	No	Erosion of natural deposits
0.1	One sample	ND	ND	No	Runoff from Fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
NA	NA	NA	NA	No	Erosion of natural deposits
ND	ND	0.7	0.1 - 1.1	No	Erosion of natural deposits
56.1	33.5 - 67.2	NA	NA	No	By-product of drinking water chlorination
0.07	.04 to 1.4^	0.2	0.1 - 0.3	No	Soil runoff
ND	ND	0.4	ND - 0.7	No	Erosion of natural deposits

Your water was and continues to be safe to drink. **Footnote 5** Values presented represent 100% Seattle well water. All Seattle well water was blended with Cedar supply water before delivery to customers. The Seattle wells operated from July to November 2015.

Additional information for Seattle water quality data for non-regulated parameters, such as pH, alkalinity, hardness, and conductivity, are provided at: seattle.gov/util/MyServices/Water/Water_Quality/WaterQualityAnalyses/index.htm (once you get to this web page, click on 2015 2nd Quarter Analysis).

CWA-Tolt Supply: (Montreux, Lakemont, Issaquah Highlands, Talus)		CWA-Levels in Seattle Well Water		
Amount Detected	Range Low-High	Amount Detected	Range Low-High	Typical Source
1.5	1.2 - 1.8	NA	NA	Naturally present in the environment
ND	ND	NA	NA	Naturally present in the environment

Definitions

AL: Action Level - The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL: Maximum Contaminant Level - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG: Maximum Contaminant Level Goal - 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.

MRDL: Maximum Residual Disinfectant Level - The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG: Maximum Residual Disinfectant Level Goal - The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not Applicable

ND: Not Detected - Indicates that the substance was not found by laboratory analysis.

NTU: Nephelometric Turbidity Unit - Turbidity is a measure of how clear the water looks. The turbidity MCL that applied to the Cedar supply in 2015 is 5 NTU, and for the Tolt it was 0.3 NTU for at least 95% of the samples in a month. 99.96% of the samples from the Tolt in December 2015 were below 0.3 NTU. 100% of the samples for the remainder of the year were below 0.3 NTU.

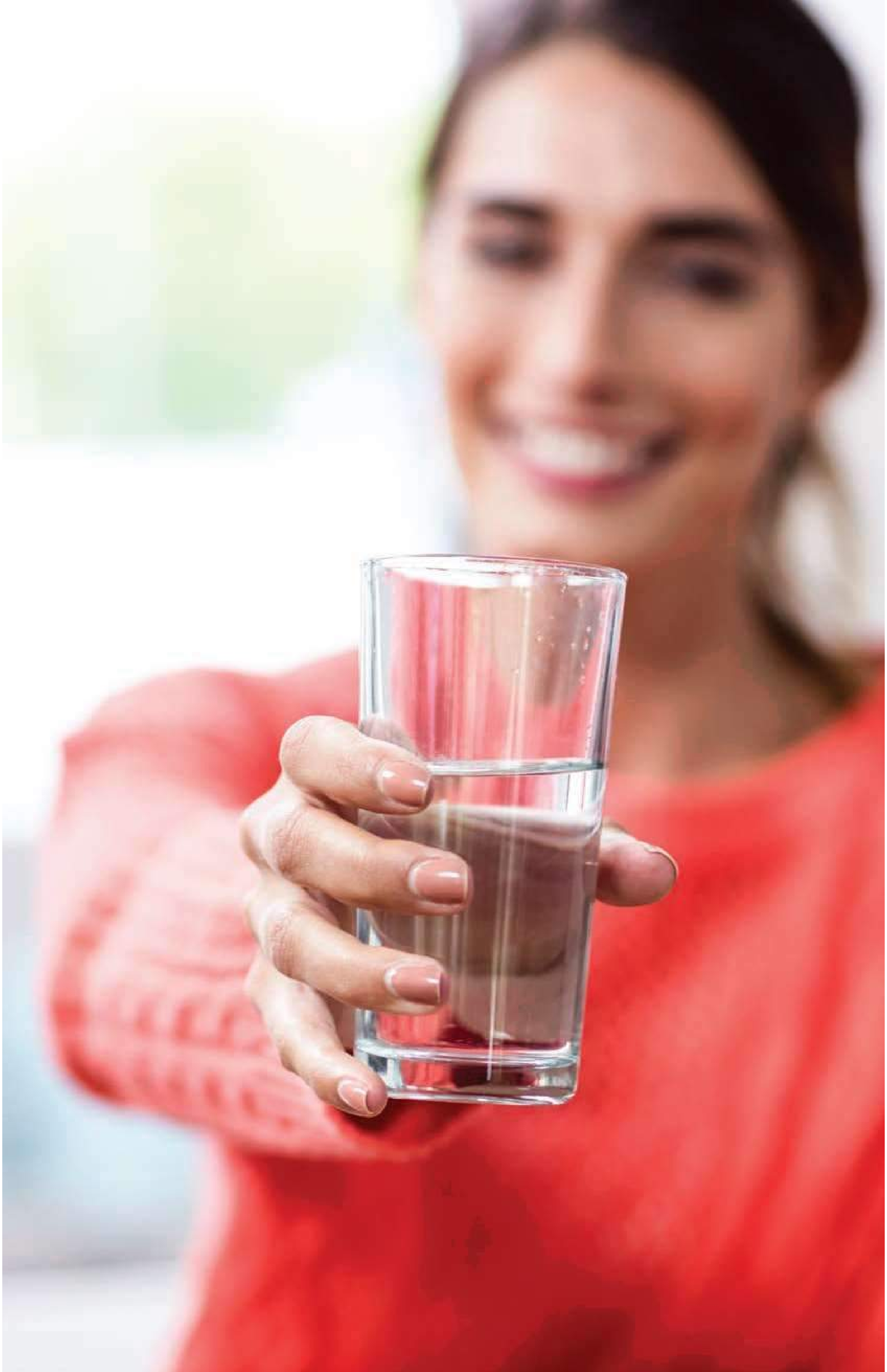
pCi/L: Picocuries per liter

ppb: 1 part per billion = 1 ug/L = 1 microgram per liter

ppm: 1 part per million = 1 mg/L = 1 milligram per liter

1 ppm: 1000 ppb

TT: Treatment Technique - A required process intended to reduce the level of a contaminant in drinking water.



Be Water Smart!

Play a role in using water wisely, and you can save money at the same time! Here are a few simple tips that conserve a lot of water:

Take a five minute shower! Every time you shave minutes off your use of hot water, you also save energy and keep dollars in your pocket.

Adjust settings for your clothes washer. Nearly 22% of indoor home water use comes from doing laundry. Save water by making sure to adjust the settings on your machine to the proper load size.

Pay attention to outdoor water use. Water your lawn in the early morning or evening to reduce evaporation and avoid big water bills. Or consider allowing your lawn to go dormant for the summer, it will come back in the fall.

Turn off the tap! This is an easy way to save water when brushing your teeth, shaving or washing dishes.

Shop for WaterSense labeled faucets, toilets and showerheads – they've been tested to reduce water use and provide exceptional performance.

Contact the Office of Sustainability if you have questions or to order a free shower timer. Visit us online at: Issaquahwa.gov/sustainability.

ANNUAL WATER QUALITY REPORT

Water Testing Performed in 2014

Presented By

CITY OF ISSAQUAH WASHINGTON

PWS ID#: 363505

A Clean Report

By Mayor Fred Butler

Each year, we issue this water-quality report to educate you, our valued customers, about where your water comes from, how it's delivered and how to conserve it.

The City of Issaquah is committed to providing you the highest-quality water possible.

And once again, as you'll see in this report, we have met all safety guidelines and water quality requirements.

Meanwhile, our dedication to environmental sustainability will help ensure our region's water remains safe, clean, and reliable for generations to come.

If you have any questions about this report, please call us at 425-837-3470 or visit issaquahwa.gov/water.

Thank you.

Be Water Smart!

You play a role in using water wisely and can save money in the process. Be conscious of the amount of water your household uses and look for ways to avoid waste. Here are a few tips:

1. Turn off the tap! This is an easy way to save water when brushing your teeth, shaving, or washing dishes.
2. Wash only full loads. Dishwashers and most clothes washers use the same amount of water with every cycle.
3. Take a 5-minute shower! You'll find it's plenty of time: Try it and see! Get a free shower timer for you and your kids.
4. Check toilets for leaks every year. Put a few drops of food coloring in the tank and wait 10 minutes. If color shows in the bowl, you have a leak. Many leaks are silent and waste hundreds of gallons a day.
5. Pay attention to outdoor water use. Water your lawn in the early morning or evening to reduce evaporation and avoid big water bills. Use timers or irrigation controllers (but be sure to adjust weekly as plant needs change dramatically from spring to summer and fall).
6. Shop for WaterSense-labeled faucets, toilets, and shower heads; they've been tested to reduce water use and provide exceptional performance.

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Community Participation

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The Council Infrastructure Committee meets at 5:30 p.m. the third Thursday of each month in the Pickering Room of City Hall Northwest, 1175 12th Ave. N.W. Find a full calendar at issaquahwa.gov.

Substances That Could Be in Water

In order to ensure that tap water is safe to drink, the U.S. EPA and/or the Washington State board of health prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. U.S. Food and Drug Administration regulations establish limits for contaminants in bottled water that must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk.

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For more information about contaminants and potential health effects, call the U.S. EPA's Safe Drinking Water Hotline at 800-426-4791.

Lead in Home Plumbing

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high-quality drinking water, but we cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead.

Preventing Backflow Contamination

If you have a water connection to an irrigation or fire sprinkler system, boiler, pool/spa, water feature, or photo development equipment, State law requires that you install a backflow prevention assembly and have it tested annually.

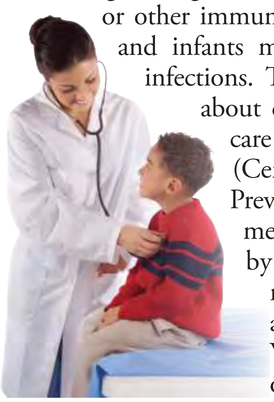
A backflow prevention assembly will prevent contaminated water from flowing back into your drinking water or into the City's water system. Most residences and businesses with backflow prevention assemblies are registered with the City of Issaquah.

If you haven't been testing your backflow assembly, call 425-837-3470 for assistance in finding a tester to help protect the water you drink. Please also call us if you know of a potential threat to our drinking water.

Important Health Information

While your drinking water meets the U.S. EPA's standard for arsenic, it does contain low levels of arsenic. The EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. The EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as those with cancer undergoing chemotherapy, those who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or water.epa.gov/drink/hotline.



Cryptosporidium

Cryptosporidium is a microbial parasite found in surface water throughout the United States. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immune-compromised people are at greater risk of developing life-threatening illness. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

The Lower Issaquah Valley Aquifer water source is a groundwater source, and therefore is not required to be tested for *Cryptosporidium*.

The CWA water sources, the Cedar and Tolt supplies, were tested for *Cryptosporidium* in 2014 with no detections. Although chlorination is not effective against *Cryptosporidium*, ozone disinfection, which is used at the Cedar and Tolt treatment plants, is very effective at destroying *Cryptosporidium* and other microbes.

The U.S. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or from water.epa.gov/drink/hotline.

QUESTIONS?

For more information about this report or your drinking water, call Gregory P. Keith, the City's Water Operations Manager, at 425-837-3470. You can also connect with us on Facebook, Twitter, and more at issaquahwa.gov/social.

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In 2014, the City of Issaquah provided 787 million gallons of high-quality drinking water to about 23,000 customers through more than 10,700 water connections.

Most of Issaquah's water is produced from four groundwater wells, which range in depth from 100 to 400 feet.

Chlorine is added at the well sites to disinfect the drinking water. The water is then conveyed through 110 miles of water main and 12 water booster stations before it's stored in one of 19 reservoirs, which hold a total of 12 million gallons.

Issaquah is a member of the Cascade Water Alliance (CWA), which also includes the cities of Bellevue, Kirkland, Redmond, and Tukwila and the Sammamish Plateau and Skyway water and sewer districts.

Currently, CWA gets its water from the City of Seattle water system originating in the Tolt and Cedar river watersheds.

Locally, the CWA water is delivered to the Montreux and Lakemont neighborhoods. It is also delivered to Issaquah Highlands where it's blended with well water.

With the exception of Issaquah Highlands, the City's well water and CWA water are not mixed, as the distribution systems are separated. Water purchased from the CWA is fluoridated, while Issaquah well water is not (with the exception of the Issaquah Highlands and Talus neighborhoods). See a map of the fluoridated areas at issaquahwa.gov/water.

Several years ago, CWA also purchased Lake Tapps in east Pierce County as the region's newest water supply in decades. As a result of customers' wise use of water, responsible plumbing codes, and water-efficient appliances, CWA will have enough water for the future and likely won't develop Lake Tapps until it is needed.

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Conservation and efficient use of water are important strategies for protecting our local and regional streams as well as using our infrastructure wisely. For decades, the City of Issaquah has worked with the community to help ensure efficient use of water.

Water use is tracked as a Sustainable City Indicator to help gauge progress toward long-term community goals. Total water use has declined significantly over the last decade due to changes in land use patterns, increased efficiency, changing water use, and your efforts to use water wisely.

The City is a member of the Cascade Water Alliance, and has adopted regional water use efficiency goals. The following regional goal was adopted for 2014 – 2019:

Cascade will dedicate resources necessary to achieve a cumulative drinking water savings of 0.6 million gallons per day on an annual basis and 1.0 million gallons per day on a peak season (June – September) basis by 2020.

Both the City and Cascade provide water efficiency programs and services for water customers in Issaquah and in the region. In 2014, Cascade programs have resulted in work with over 12,000 customers with estimated water savings of 178,459 gallons of water per day, or 29.7% of Cascade's 2014 – 2019 goal.

The City also supports water-efficient, green-certified homes and commercial buildings and provides rate incentives for lower water use. In addition, City public works professionals help to reduce water leakage with investments in water mains, reservoirs, and other infrastructure. In 2014, water system leakage was estimated at 7.92%. Ongoing operational improvements, meter testing, and other programs seek to continue to keep this figure below the State-required 10 percent limit.

For more information about the water conservation programs offered by the City of Issaquah, visit issaquahwa.gov/sustainability or call 425-837-3400.

2014 Water Production and System Leakage

Water production and purchases	787.6 million gallons
Authorized consumption	725.2 million gallons
Distribution system leakage	62.4 million gallons
2014 leakage	7.9%
3-year average	7.5%

Sampling Results

During the past year, we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The tables below show only those contaminants that were detected in the water. The State requires us to monitor for certain substances less often than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent data are included, along with the year in which the sample was taken.

We participated in the 3rd stage of the EPA's Unregulated Contaminant Monitoring Regulation (UCMR3) program by performing additional tests on our drinking water. UCMR3 benefits the environment and public health by providing the EPA with data on the occurrence of contaminants suspected to be in drinking water, in order to determine if the EPA needs to introduce new regulatory standards to improve drinking water quality. Any UCMR3 detections are shown in the data tables in this report. More information on UCMR3 can be found at water.epa.gov.

REGULATED SUBSTANCES

				Lower Issaquah Valley Aquifer: (Wells 1,2,4,5–Talus–Issaquah Highlands)		CWA-Cedar Supply: (Montreux, Lakemont, Issaquah Highlands)		CWA-Tolt Supply: (Montreux, Lakemont, Issaquah Highlands)			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	MCLG [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Arsenic (ppb)	2007	10	0	9.9[1]	ND–9.9[1]	NA	NA	NA	NA	No	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics production wastes
Barium (ppm)	2014	2	2	NA	NA	0.0014	One Sample	0.0012	One Sample	No	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Bromate (ppb)	2014	10	0	NA	NA	NA	NA	0.2	ND–1.5	No	By-product of drinking water disinfection
Chlorine (ppm)	2014	[4]	[4]	0.47	0.03–0.97	0.70	ND–1.48	0.70	ND–1.48	No	Water additive used to control microbes
Fluoride (ppm)	2014	4	4	0.80[2]	0.66–0.94[2]	0.8	0.70–0.85	0.8	0.7–0.9	No	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Haloacetic Acids [HAAs]–Stage 2 (ppb)	2014	60	NA	NA	NA	27.43	12.5–36.4	27.43	12.5–36.4	No	By-product of drinking water disinfection
Nitrate (ppm)	2014	10	10	0.32	ND–0.51	0.02	One Sample	0.11	One Sample	No	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
TTHMs [Total Trihalomethanes]–Stage 2 (ppb)	2014	80	NA	NA	NA	40.85	19.4–48.1	40.85	19.4–48.1	No	By-product of drinking water disinfection
Total Organic Carbon (ppm)	2014	TT	NA	NA	NA	0.9	0.4–1.9	1.3	1.1–1.7	No	Naturally present in the environment
Turbidity[3] (NTU)	2014	TT	NA	NA	NA	1.6	0.2–1.6	0.28	0.05–0.28	No	Soil runoff
Turbidity (Lowest monthly percent of samples meeting limit)	2014	TT=95% of samples <0.3 NTU	NA	NA	NA	NA	NA	100	NA	No	Soil runoff

Tap water samples were collected for lead and copper analyses from sample sites throughout the community.

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	MCLG	AMOUNT DETECTED (90TH%TILE)	SITES ABOVE AL/TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2012	1.3	1.3	0.342	0/49	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb)	2012	15	0	1	0/49	No	Corrosion of household plumbing systems; Erosion of natural deposits

UNREGULATED CONTAMINANT MONITORING REGULATION 3 (UCMR3) LOWER ISSAQUAH VALLEY AQUIFER			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH
Chromium (ppb)	2014	0.13	ND–0.3
Hexavalent Chromium (ppb)	2014	0.083	ND–0.164
Molybdenum (ppb)	2014	0.13	ND–1
Strontium (ppb)	2014	74.88	55–104
Vanadium (ppb)	2014	0.29	ND–0.4

[1] This represents the highest reading, which was found only in one well. This well water is then blended with other water to further dilute it (a Washington State Department of Health-recommended practice).

[2] Talus Urban Village and the Issaquah Highlands areas only.

[3] Turbidity is a measure of the cloudiness of the water. It is monitored because it is a good indicator of water quality and the effectiveness of disinfectants.

Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG (Maximum Contaminant Level Goal): 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.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not applicable

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

Annual WATER QUALITY REPORT

Reporting Year 2013

Presented By

CITY OF
ISSAQUAH
WASHINGTON

PWS ID#: 363505

A Clean Report

By Mayor Fred Butler

This report will help you – our valued customer – understand Issaquah's commitment to providing you the highest quality water possible.

Rest assured – Issaquah has met all safety guidelines and water quality requirements once again.

Meanwhile, we are also a dedicated steward of this region's water, both for today and the future.

Using this report, learn more about where your water comes from, how it's delivered, and how to conserve it. If you have any questions, please call us at 425-837-3470 or visit issaquahwa.gov/water.

Thank you.

Resource-Efficient Water Management

Conservation – as well as using our infrastructure wisely – are important strategies for protecting our local and regional streams and lakes. For more than 18 years, the City of Issaquah has worked with the community to help conserve and protect our water resources.

One of our Sustainable City Indicators – total water use – has declined significantly over the past decade, thanks to changes in land use patterns, increased efficiency, operational improvements, and your efforts to use water wisely. Issaquah's water use per person is among the lowest in the region!

The City's water system exceeded its goals of saving 51,000 gallons of water per day on an annual average basis by 2013. Issaquah reached a cumulative annual average of 84,150 gallons of water per day over the past five years, or more than 30.7 million gallons of water – the equivalent of water use by 400 homes.

Investments in water mains, reservoirs, and other infrastructure reduce system leakage. In 2013, the City water system's unaccounted-for water is estimated at 8.3%. Ongoing operations and maintenance investments such as meter testing, replacement of aging water mains, reservoir management, and other programs have reduced losses, which continues performance better than the state-required 10 percent limit.

For more information about our water conservation programs, go to issaquahwa.gov/sustainability or call 425-837-3400.

Substances That Could Be in Water

In order to ensure that tap water is safe to drink, the U.S. EPA and/or the Washington State Board of Health prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. U.S. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals, in some cases, radioactive material; and substances resulting from the presence of animals or from human activity. Substances that may be present in source water include: **Microbial Contaminants**, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations or wildlife; **Inorganic Contaminants**, such as salts and metals, which can be naturally occurring or may result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming; **Pesticides and Herbicides**, which may come from a variety of sources such as agriculture, urban stormwater runoff and residential uses; **Organic Chemical Contaminants**, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and may also come from gas stations, urban stormwater runoff and septic systems; **Radioactive Contaminants**, which can be naturally occurring or may be the result of oil and gas production and mining activities.

For more information about contaminants and potential health effects, call the U.S. EPA's Safe Drinking Water Hotline at 800-426-4791.

QUESTIONS?

For more information about this report or your drinking water, call Gregory P. Keith, the City's Water Operations Manager, at 425-837-3470. You can also connect with us on Facebook, Twitter, and more at issaquahwa.gov/social.

Lead in Home Plumbing

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high-quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at 800-426-4791 or at epa.gov/safewater/lead.

Community Participation

Would you like to get involved? Share your opinions on the City's drinking water! The Issaquah City Council meets at 7 p.m. the first and third Mondays of each month at City Hall South, 135 E. Sunset Way.

The Council Infrastructure Committee meets at 5:30 p.m. the third Thursday of each month in the Pickering Room of City Hall Northwest, 1175 12th Ave. N.W. Find a full calendar at issaquahwa.gov.

Seek WaterSense

Shop for WaterSense labeled products for your home, yard, and businesses. Whether faucets, toilets, shower heads, irrigation supplies, or even homes, these products have been tested to reduce water use and provide exceptional performance.

Take simple steps to use water wisely and save every day:

- Turn off the tap. This step is easy when brushing your teeth, shaving or washing dishes.
- Take five-minute showers. You'll find it's plenty of time! Get a free shower timer for you and your kids.
- Wash full loads. Dishwashers and most clothes washers use the same amount of water with every cycle.
- Check for leaks every year. Check your toilets, irrigation, and at your meter. Look for tips online. Get a free toilet leak detection kit.
- Pay attention to outdoor water use. Summer irrigation water use is more expensive - water your lawn and garden wisely to avoid big water bills. Use timers, irrigation controllers (be sure to adjust them every week) and rain sensors. The amount of water needed changes throughout the season – use less in the spring and fall.
- Contact us for a free shower timer or toilet leak detection kit at issaquahwa.gov/sustainability.

Cryptosporidium

Cryptosporidium is a microbial parasite found in surface water throughout the United States. Although filtration removes Cryptosporidium, the most commonly used filtration methods cannot guarantee 100 percent removal. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immune-compromised people are at greater risk of developing life-threatening illness. Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water.

The Lower Issaquah Valley Aquifer water source is a groundwater source, and therefore is not required to be tested for Cryptosporidium.

The CWA water sources were tested for Cryptosporidium in 2013. Cryptosporidium was not detected in any of the three samples from the Cedar raw water supply. The Tolt had one detection out of four samples taken. Although chlorination is not effective against Cryptosporidium, ozone disinfection, which is used at the Cedar and Tolt treatment plants, is very effective at destroying Cryptosporidium and other microbes.

The U.S. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or water.epa.gov/drink/hotline.

2013 Water Production and System Leakage

Water production and purchases	768.0 million gallons
Authorized consumption	704.3 million gallons
Distribution system leakage	63.7 million gallons (8.3%)
Three-year average of distribution system leakage	8.2%

Preventing Backflow Contamination

If you have a water connection to an irrigation or fire sprinkler system, boiler, pool/spa, water feature or photo development equipment, state law requires that you install a backflow prevention assembly and have it tested annually.

A backflow prevention assembly will prevent contaminated water from flowing back into your drinking water or into the City's water system. Most residences and businesses with backflow prevention assemblies are registered with the City of Issaquah.

If you haven't been testing your backflow assembly, call 425-837-3470 for assistance in finding a tester to help protect the water you drink. Please also call us if you know of a potential threat to our drinking water.

Important Health Information

While your drinking water meets U.S. EPA's standard for arsenic, it does contain low levels of arsenic. U.S. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. U.S. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or water.epa.gov/drink/hotline.

Where Does My Water Come From?

In 2013, the City of Issaquah provided 768 million gallons of high-quality drinking water to about 23,000 (2013 DOH calculation) customers through more than 10,700 (2013 DOH calculation) water connections.

Most of Issaquah's water is produced from four groundwater wells, which range in depth from 100 to 400 feet.

Chlorine is added at the well sites to prevent any harmful microorganisms. The water is then conveyed through 110 miles of water main and 12 water booster stations before it's stored in one of 19 reservoirs, which hold a total of 12 million gallons.

Issaquah also purchases drinking water from the Cascade Water Alliance (CWA) and delivers it to the Montreux and Lakemont neighborhoods. Purchased water is also delivered to Issaquah Highlands, where it's blended with well water. The Issaquah Highlands and Talus neighborhoods both have the capability to receive 100% well water, 100% purchased water, or a blend of the two sources.

With the exception of Issaquah Highlands, the City's well water and purchased water are not mixed, as the distribution systems are separated. Water purchased from the CWA is fluoridated, while Issaquah well water is not (with the exception of the Issaquah Highlands and Talus neighborhoods).

The members of CWA include the cities of Issaquah, Bellevue, Kirkland, Redmond, and Tukwila as well as the Sammamish Plateau and Skyway water and sewer districts.

Currently, CWA gets its water from the City of Seattle water system originating in the Tolt and Cedar river watersheds.

Several years ago, CWA also purchased Lake Tapps in east Pierce County as the region's newest water supply in decades. As a result of customers' wise use of water, responsible plumbing codes and water-efficient appliances, CWA will have enough water for the future and likely won't develop Lake Tapps until it is needed.

Planning for water takes time. That's why we are planning now for that future!

Sampling Results

During the past year, we have taken hundreds of water samples in order to determine the presence of any biological, inorganic, volatile organic or synthetic organic contaminants. The table below shows only those contaminants that were detected in the water. The state requires us to monitor for certain substances less often than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent data are included, along with the year in which the sample was taken.

We participated in the third stage of the EPA's Unregulated Contaminant Monitoring Regulation (UCMR3) program by performing additional tests on our drinking water. UCMR3 benefits the environment and public health by providing the EPA with data on the occurrence of contaminants suspected to be in drinking water, in order to determine if EPA needs to introduce new regulatory standards to improve drinking water quality. Any UCMR3 detections are shown in the data tables in this report. More information on UCMR3 can be found

REGULATED SUBSTANCES

				Lower Issaquah Valley Aquifer: (Wells 1,2,4,5-Talus-Issaquah Highlands)		CWA-Cedar Supply: (Montreux, Lakemont, Issaquah Highlands)		CWA-Tolt Supply: (Montreux, Lakemont, Issaquah Highlands)			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	MCLG [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Arsenic (ppb)	2007	10	0	9.9[1]	ND–9.9	NA	NA	NA	NA	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes
Barium (ppm)	2013	2	2	NA	NA	0.0018	NA	0.0019	NA	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Bromate (ppb)	2013	10	0	NA	NA	0.08	ND–2	NA	NA	No	By-product of drinking water disinfection
Chlorine (ppm)	2013	[4]	[4]	0.34	0.08–0.60	0.62	ND–1.29	0.62	ND–1.29	No	Water additive used to control microbes
Fluoride (ppm)	2013	4	4	0.78[2]	0.64–0.97[2]	0.8	0.7–0.8	0.8	0.7–0.9	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Haloacetic Acids [HAA]–Stage 2 (ppb)	2013	60	NA	NA	NA	23.55	12.7–30.5	23.55	12.7–30.5	No	By-product of drinking water disinfection
Nitrate (ppm)	2013	10	10	0.31	ND–0.5	NA	NA	NA	NA	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
TTHMs [Total Trihalomethanes]–Stage 2 (ppb)	2013	80	NA	NA	NA	42.975	21.3–47.3	42.975	21.3–47.3	No	By-product of drinking water disinfection
Total Organic Carbon (ppm)	2013	TT	NA	NA	NA	0.8	0.4–1.4	1.3	1.2–1.4	No	Naturally present in the environment
Turbidity[3] (NTU)	2013	TT	NA	NA	NA	2.7	0.2–2.7	0.14	0.04–0.14	No	Soil runoff
Turbidity (Lowest monthly percent of samples meeting limit)	2013	TT=95% of samples <0.3 NTU	NA	NA	NA	NA	NA	100	NA	No	Soil runoff

Tap water samples were collected for lead and copper analyses from sample sites throughout the community

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	MCLG	AMOUNT DETECTED (90TH%TILE)	SITES ABOVE AL/ TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2012	1.3	1.3	0.342	0/49	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb)	2012	15	0	1	0/49	No	Corrosion of household plumbing systems; Erosion of natural deposits

OTHER SUBSTANCES (LOWER ISSAQUAH VALLEY AQUIFER: (WELLS 1,2,4,5 - TALUS - ISSAQUAH HIGHLANDS))		
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	RANGE LOW-HIGH
1,3-Butadiene (ppb)	2013	<0.1–<0.1
1,1-Dichloroethane (ppb)	2013	<0.03–<0.03
1,4-Dioxane (ppb)	2013	<0.07–<0.07
1,2,3-Trichloropropane (ppb)	2013	<0.03–<0.03
Bromochloromethane (ppb)	2013	<0.06–<0.06
Bromomethane (ppb)	2013	<0.2–<0.2
Chlorate (ppb)	2013	22–49
Chlorodifluoromethane (ppb)	2013	<0.08–<0.08
Chloromethane (ppb)	2013	<0.2–<0.2
Chromium [Total] (ppb)	2013	<0.2–0.25
Chromium-6 (ppb)	2013	<0.03–0.157
Cobalt (ppb)	2013	<1–<1
Molybdenum (ppb)	2013	<1–1.05
PFBS (ppb)	2013	<0.09–<0.09
PFHpA (ppb)	2013	<0.01–0.0258
PFHxS (ppb)	2013	<0.03–0.241
PFNA (ppb)	2013	<0.02–0.028
PFOA (ppb)	2013	<0.02–0.0215
PFOS (ppb)	2013	<0.04–0.6
Strontium (ppb)	2013	69.3–137
Vanadium (ppb)	2013	<0.2–0.62

[1] This represents the highest reading, which was only found in one well. This well is then blended with other water to further dilute it (a Washington State Department of Health - recommended practice).

[2] Talus Urban Village and the Issaquah Highlands areas only

[3] Turbidity is a measure of the cloudiness of the water. It is monitored because it is a good indicator of water quality, the effectiveness of disinfectants and the filtration system.

Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG (Maximum Contaminant Level Goal): 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.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not applicable

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

Annual

WATER QUALITY REPORT

Reporting Year 2012

Presented By

CITY OF ISSAQUAH WASHINGTON

PWS ID#: 363505

A Clean Report

By Mayor Ava Frisinger

Water is the lifeblood of Issaquah, from your kitchen tap to the streams that bring our iconic salmon home.

Lately, the loud voices of a few have twisted the facts. This water quality report, which covers 2012, sets the record straight.

It shows that we've, once again, met all safety guidelines and water quality requirements.

As you'll see from the information in this report, the City of Issaquah is a responsible steward of water, today and for the future.

Rest assured – we are focused on conserving this precious natural resource, while delivering the highest-quality product possible to you, our customer.

More information is available at issaquahwa.gov/ourwater.

Be Water Smart

Using water wisely can save you money! Here are a few tips:

- Turn off the tap when brushing your teeth.
- Take a five-minute shower. You'll find it's plenty of time! Get a free shower timer for you and your kids.
- Dishwashers and most clothes washers use the same amount of water with every cycle. Get more for your money and wash only full loads!
- Check toilets for leaks every year. Put a few drops of food coloring in the tank and wait 10 minutes. If color shows in the bowl, you have a leak. Many leaks are silent and waste hundreds of gallons a day. Fix it and save more than 30,000 gallons a year!
- Pay attention to outdoor water use. Water your lawn and garden wisely to avoid big water bills. Use timers or irrigation controllers (but be sure to adjust them every week). Plants' needs change dramatically, depending on the weather.
- Shop for WaterSense labeled faucets, toilets, and shower heads. They've been tested to reduce water use and provide exceptional performance.

Contact us for a free shower timer or toilet leak detection kit at issaquahwa.gov/sustainability.

Substances That Could Be in Water

In order to ensure that tap water is safe to drink, the U.S. EPA and/or the Washington State Department of Health prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. U.S. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals, in some cases, radioactive material, and substances resulting from the presence of animals or from human activity. Substances that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, or wildlife;

Inorganic Contaminants, such as salts and metals, which can be naturally occurring or may result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;

Pesticides and Herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production and may also come from gas stations, urban stormwater runoff, and septic systems;

Radioactive Contaminants, which can be naturally occurring or may be the result of oil and gas production and mining activities.

For more information about contaminants and potential health effects, call the U.S. EPA's Safe Drinking Water Hotline at 800-426-4791.

Lead in Home Plumbing

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high-quality drinking water, but we cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead.

Know Your Water Footprint

Saving water is easy, once you know where you can save. Check out a home-water calculator at home-water-works.org.

Resource-Efficient Water Management

Conservation and efficient use of water -– as well as using our infrastructure wisely -– are important strategies for protecting our local and regional streams. Since 1996, the City of Issaquah has worked with the community to help ensure efficient use of water.

Water use is tracked as a Sustainable City Indicator to help gauge progress toward long-term community goals. Total water use has declined significantly over the last decade, dropping to below 60 gallons per capita per day, thanks to changes in land use patterns, increased efficiency, changing water use, and your efforts to use water wisely. Issaquah's water use per person is among the lowest in the region!

The water system exceeded its goals of saving 51,000 gallons of water per day on an annual average basis by 2013. In total, more than 36 million gallons of water have been saved during the last five years.

Issaquah also reduces water leaks with investments in water mains, reservoirs, and other infrastructure. In 2012, the City's water system's unaccounted-for water is estimated at 6.17 percent. Ongoing operational improvements, meter testing, replacement of aging water mains, and other programs aim to keep this figure below the state-required 10 percent limit.

For more information about our water conservation programs, go to issaquahwa.gov/sustainability or call 425-837-3400.

Important Health Information

While your drinking water meets U.S. EPA's standard for arsenic, it does contain low levels of arsenic. U.S. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. U.S. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or http://water.epa.gov/drink/hotline.

QUESTIONS?

For more information about this report or your drinking water, call Gregory P. Keith, the City's water operations manager, at 425-837-3470.

You can also connect with us on Facebook, Twitter and more at issaquahwa.gov/social.

Preventing Backflow Contamination

If you have a water connection to an irrigation or fire sprinkler system, boiler, pool/spa, water feature, or photo development equipment, state law requires that you install a backflow prevention assembly and have it tested annually.

A backflow prevention assembly will prevent contaminated water from flowing back into your drinking water or into the City's water system. Most residences and businesses with backflow prevention assemblies are registered with the City of Issaquah.

If you haven't been testing your assembly, call 425-837-3470 for assistance in finding a tester to help protect the water you drink. Please also call us if you know of a potential threat to our drinking water.

Community Participation

Would you like to get involved? Share your opinions on the City's drinking water? The Issaquah City Council meets at 7 p.m. the first and third Mondays of each month at City Hall South, 135 E. Sunset Way.

The Council Infrastructure Committee meets at 5:30 p.m. the second Thursday of each month at the Pickering Room in City Hall Northwest, 1175 12th Ave. N.W. Find a full calendar at issaquahwa.gov.

Cryptosporidium

Cryptosporidium is a microbial parasite found in surface water throughout the United States. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immune-compromised people are at greater risk of developing life-threatening illness. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

The Lower Issaquah Valley Aquifer water source is a groundwater source, and therefore is not required to be tested for *Cryptosporidium*.

The CWA water sources were tested for *Cryptosporidium* in 2012. *Cryptosporidium* was not detected in samples from either the Tolt or Cedar raw water supplies. Although chlorination is not effective against *Cryptosporidium*, ozone disinfection, which is used at the Cedar and Tolt treatment plants, is very effective at destroying *Cryptosporidium* and other microbes.

The U.S. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791 or water.epa.gov/drink/hotline.

2012 Water Production and Purchases

Water production and purchases -	732.56 million gallons
Accounted-for water -	687.35 million gallons
2012 unaccounted-for water -	45.21 million gallons
2012 unaccounted-for water -	6.17 percent
3-year average -	8.62 percent

Where Does My Water Come From?

In 2012, the City of Issaquah provided 732 million gallons of high-quality drinking water to about 21,000 customers through more than 6,500 water connections.

Most of Issaquah's water is produced from four groundwater wells, which range in depth from 100 to 400 feet.

Chlorine is added at the well sites to prevent any harmful microorganisms. The water is then conveyed though 110 miles of water main and 12 water booster stations before it's stored in one of 19 reservoirs, which hold a total of 12 million gallons.

Issaquah also purchases drinking water from the Cascade Water Alliance (CWA) and delivers it to the Montreux and Lakemont neighborhoods. Purchased water is also delivered to Issaquah Highlands where it's blended with well water. The Issaquah Highlands and Talus neighborhoods both have the capability to receive 100 percent well water, 100 percent purchased water, or a blend of the two sources.

With the exception of Issaquah Highlands and Talus, the City's well water and purchased water are not mixed, as the distribution systems are separated. Water purchased from the CWA is fluoridated, while Issaquah well water is not (with the exception of the Issaquah Highlands and Talus neighborhoods).

CWA, which was formed in 1999, includes the cities of Issaquah, Bellevue, Kirkland, Redmond, and Tukwila, as well as the Sammamish Plateau and Skyway water and sewer districts.

Currently, CWA gets its water from the City of Seattle water system originating in the Tolt and Cedar River watersheds. In 2009, CWA purchased Lake Tapps in east Pierce County as the region's newest water supply in decades. As a result of customers' wise use of water, responsible plumbing codes, and water-efficient appliances, CWA will have enough water for the future and likely won't develop Lake Tapps for decades.

Planning for water takes time. That's why we are planning now for that future!

Sampling Results

During the past year, we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The tables below show only those contaminants that were detected in the water. The state requires us to monitor for certain substances less often than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

REGULATED SUBSTANCES

				Lower Issaquah Valley Aquifer: (Wells 1,2,4,5–Talus–Issaquah Highlands)		CWA-Cedar Supply: (Montreux, Lakemont, Issaquah Highlands)		CWA-Tolt Supply: (Montreux, Lakemont, Issaquah Highlands)			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	MCLG [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Arsenic (ppb)	2007	10	0	9.9[1]	ND–9.9	NA	NA	NA	NA	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes
Barium (ppm)	2012	2	2	NA	NA	0.0018	NA	0.0019	NA	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Cadmium (ppb)	2012	5	5	NA	NA	ND	NA	0.35	NA	No	Corrosion of galvanized pipes; Erosion of natural deposits; Discharge from metal refineries; Runoff from waste batteries and paints
Chlorine (ppm)	2012	[4]	[4]	0.38	0.1–0.63	0.72	0.05–1.19	0.72	0.05–1.19	No	Water additive used to control microbes
Fluoride (ppm)	2012	4	4	0.79[2]	0.72–0.83[2]	0.8	0.7–0.9	0.8	0.7–0.9	No	Erosion of natural deposits; Water additive that promotes strong teeth; Discharge from fertilizer and aluminum factories
Haloacetic Acids [HAAs]–Stage 2 (ppb)	2012	60	NA	1.08	ND–2.7	29.55	14.4–36.3	29.55	14.4–36.3	No	By-product of drinking water disinfection
Nitrate (ppm)	2012	10	10	0.31	ND–0.51	0.02	NA	0.13	NA	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
TTHMs [Total Trihalomethanes]–Stage 2 (ppb)	2012	80	NA	4.83	ND–9.0	36.9	15.5–49.6	36.9	15.5–49.6	No	By-product of drinking water disinfection
Total Organic Carbon (ppm)	2012	TT	NA	NA	NA	0.7	0.4–1.1	1.2	1.1–1.4	No	Naturally present in the environment
Turbidity[3] (NTU)	2012	TT	NA	NA	NA	2.3	0.2–2.3	0.38	0.04–0.38	No	Soil runoff
Turbidity (Lowest monthly percent of samples meeting limit)	2012	TT	NA	NA	NA	NA	NA	100	NA	No	Soil runoff

Tap water samples were collected for lead and copper analyses from sample sites throughout the community

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	MCLG	AMOUNT DETECTED (90TH%TILE)	SITES ABOVE AL/TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2012	1.3	1.3	0.342	0/49	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb)	2012	15	0	1	0/49	No	Corrosion of household plumbing systems; Erosion of natural deposits

[1] This represents the highest reading, which was only found in one well. This well is then blended with other water to further dilute it (a Washington State Department of Health-recommended practice).

[2] Talus Urban Village area only

[3] Turbidity is a measure of the cloudiness of the water. It is monitored because it is a good indicator of water quality and the effectiveness of disinfectants.

Definitions

AL (Action Level): The concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG (Maximum Contaminant Level Goal): 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.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not applicable

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

Appendix K. Coliform Monitoring Plan

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CITY OF
ISSAQUAH
WASHINGTON

Water System

Coliform Monitoring

Plan

2019

TABLE OF CONTENTS

WATER SYSTEM INFORMATION

WATER SYSTEM NAME	**CITY OF ISSAQUAH**
WATER SYSTEM ID NO.	**363505**
WATER SYSTEM CLASSIFICATION	**GROUP A**
TYPE OF OWNERSHIP	**MUNICIPAL**
OWNER NO.	**2776**
COUNTY	**KING**
ADDRESS	**PO BOX 1307 ISSAQUAH, WA. 98027-1307**
SYSTEM CONTACT PERSON	**BRET HEATH**
WATER SERVICE CONNECTIONS	**20,419 (WFI)**
POPULATION SERVED (Estimated)	**29,900 (WFI)**
DAY TIME PHONE	**425 - 837- 3470**

SOURCE INFORMATION:

Source	Name	Address	Connection Type
S01	Risdon Well #1	240 NE Gilman Blvd	
S02	Risdon Well #2	240 NE Gilman Blvd	
S04	Gilman Well #4	460 NW Gilman Blvd	
S05	Gilman Well #5	460 NW Gilman Blvd	
S06	Bellevue - Montreux	18001 SE 60th ST	Intertie
S07	Bellevue - Lakemont	17200 SE Newport Way	Intertie
S07	Bellevue – South Cove	4229 W Lake Sammamish Parkway	Intertie
S07	Bellevue – South Cove	4210 181st Ave SE	Emergency Intertie
S08	SPWS	SE 56 St. & 221Ave. SE	Emergency Intertie
S09	SPWS	940 1st Ave NE	Emergency Intertie
S10	CWA – Regional	16114 SE Newport Way	Intertie

TREATMENT:

Source	Name	Treatment
S01	Risdon Well #1	Sodium Hypochlorite at 12.5%
S02	Risdon Well #2	Sodium Hypochlorite at 12.5%
S04	Gilman Well #4	Sodium Hypochlorite at 12.5%
S05	Gilman Well #5	Sodium Hypochlorite at 12.5%
S04	Gilman Well #4	GAC Filtration for PFAs
S05	Gilman Well #5	Polyphosphate Sequestrant for manganese
	Talus P.S. 1	Sodium Fluoride *
	Talus P.S. 2	Sodium Fluoride *
	Holly P.S. 1 & 2 Blending System	Sodium Fluoride **

* We are maintaining fluoride levels in the Talus development for eventual return and blending of CWA-supplied water.

** Fluoride is added to match the CWA supplied water when non-fluoridated water is blended.

STORAGE:
13 Reservoirs sites with 22 vessels totaling 13-million gallons of storage.

BOOSTER PUMP STATIONS:
13 Booster pump stations that supply the reservoirs, from which the system is gravity-fed.

PRESSURE REDUCING STATIONS:
25 pressure reducing stations, to reduce and maintain pressures as needed due to elevation changes in the system.

COLIFORM SAMPLING INFORMATION:

Samples required by DOH regulations, per month — 31 (41 October only)

Total number of sample sites needed to represent all operating areas — 31 (41 October only)

The City of Issaquah has thirty-one sampling locations used for routine TCR sampling and four locations used for GWR source sampling.

For coliform sampling procedures and record queries reference the: Water Samples – Monthly Coliform Monitoring SOP.

ROUTINE SAMPLING LOCATIONS:

	Name	Routine Sample Address	Type	Source	Repeat Sample Address	Type	Press Zone
1	26th AVE NE sample stand	1487 26th Ave NE	Sample Stand	S10, S01, S02, S04, S05	2569 NE Daphne St 1479 26th Ave NE	Hyd 1175 Meter	1234
2	6748 266th Ct SE sample stand	6748 266th Ct SE	Sample Stand	S10, S01, S02, S04, S05	6756 266th Ct SE 6740 266th Ave SE	Hyd 1522 Hyd 1521	1337
3	15th AVE NE sample stand	1843 15th Ave NE	Sample Stand	S10, S01, S02, S04, S05	1480 NE Katsura St 1506 NE Jade St	Hyd 0864 Hyd 0861	742
4	227 NW Holly St sample stand	227 NW Holly St NW Holly St SS	Sample Stand	S01, S02, S04, S05	210 NW Holly St 280 NW Holly St	Hyd 0477 Hyd 0473	297
5	Valley North Costco sample stand	21037 SE 62nd St	Sample Stand	S01, S02, S04, S05	1435 11th Ave NW 1400 BLK 11th Ave NW	Hyd 0661 Hyd 0626	297
6	4678 192nd Ave SE sample stand	4678 192nd Ave SE	Sample Stand	S07	19100 BLK W Lk Samm Pkwy SE 19206 SE 46th St	Hyd 1633 Hyd 1570	271
7	4996 NW Village Park Dr sample stand	4996 NW Village Park Dr	Sample Stand	S06	4974 NW Village Park Dr 4992 NW Village Park Dr	Meter Hyd 0781	364

8	19299 SE 56th St sample stand	19299 SE 56th St	Sample Stand	S01, S02, S04, S05	19123 SE 56th St – Tank A 5605 193rd Pl SE	Faucet Hyd 0774	430
9	Talus Pump Station #2	1750 NW Talus Dr	Faucet	S01, S02, S04, S05, S10	1801 BLK NW Talus Dr 1701 BLK NW Talus Dr	Hyd 1014 Hyd 1016	616
10	681 Summerhill Ridge Dr NW sample stand	681 Summerhill Ridge Dr NW	Sample Stand	S01, S02, S04, S05, S10	700 Lingering Pine Dr NW 705 Lingering Pine Dr NW	Hyd 1026 Hyd 1025	752
11	Forest Rim Pump Station	820 MTN. Side Dr SW	Faucet	S01, S02, S04, S05	2005 Squak Mtn Lp SW 820 MTN Side Dr SW	Hyd 0256 Hyd 0255	1200
12	Mt. Hood Pump Station	325 Mt. Hood Dr SW	Faucet	S01, S02, S04, S05	480 Mt Park Blvd SW 345 Mt. Hood Dr SW	Hyd 0289 Hyd 0295	625
13	Cemetery Reservoir A	695 W Sunset Way	Faucet	S01, S02, S04, S05	Cemetery Reservoir B Mt Park pump station	Faucet Faucet	297
14	349 SE Crystal Creek Circle sample stand	349 SE Crystal Creek Circle	Sample Stand	S01, S02, S04, S05	341 SE Crystal Creek Circle 351 SE Crystal Creek Circle	Hyd 0021 Meter	480
15	1188 Sycamore Dr SE sample stand	1188 Sycamore Dr SE	Sample Stand	S01, S02, S04, S05	1160 Sycamore Dr SE 1170 Sycamore Dr SE	Hyd 0006 Hyd 0007	297
16	1965 NW Sammamish Rd sample stand	1965 NW Sammamish Rd	Sample Stand	S01, S02, S04, S05	1701 NW Samm. Rd 2001 NW Samm. Rd	Hyd 0702 Hyd 0712	297
17	Lakemont sample stand	18015 SE Newport Way	Sample Stand	S07	Bellevue water customer 18305 SE Newport Way Bldg Q	Meter Hyd 0827	520
18	5992 Oberland Pl NW sample stand	5985 Oberland Pl NW	Sample Stand	S06	18150 SE 60th St 5907 Oberland Pl NW	Hyd 1037 Hyd 0807	1005
19	Terra Pump Station	2706 NW Pinecone Dr	Faucet	S01, S02, S04, S05	2705 NW Pinecone Dr 2725 NW Pinecone Dr	Hyd 0769 Hyd 0770	430
20	Westside Res sample stand	2084 NW James Bush Rd	Sample Stand	S01, S02, S04, S05	1705 Newport Way NW 1705 Newport Way NW	Hyd 0745 Hyd 0748	297

21	MTN View Res. A	426 Shangri-La Way NW	Faucet	S01, S02, S04, S05	Shangri-La P.S. (in vault) 2570 NW Stoney Creek Way	Tap Hyd 1223	752
22	54 Cougar Ridge Rd NW sample stand	54 Cougar Ridge Rd NW	Sample Stand	S01, S02, S04, S05	73 Sky Ridge Rd NW 63 Cougar Ridge Rd NW	Hyd 1102 Hyd 1106	616
23	12th Ave. Pump Station	955 12th Ave NW	Faucet	S01, S02, S04, S05	950 12th Ave NW 1145 NW Inneswood Dr - IRR	Hyd 0336 Meter	480
24	Forest Rim Res. sample stand	2283 Squak Mountain Loop SW	Sample Stand	S01, S02, S04, S05	2320 Squak MTN Lp SW 2250 Squak MTN Lp SW	Hyd 0265 Hyd 0263	1200
25	Wildwood Pump Station	740 SW Highwood Dr	Faucet	S01, S02, S04, S05	525 Mt Hood Dr SW 735 Idlywood Dr SW	Hyd 0297 Hyd 0240	920
26	MT Park Pump Station	475 W Sunset Way	Faucet	S01, S02, S04, S05	340 W Sunset Way 210 Mt Park Blvd SW	Hyd 0365 Hyd 0278	480
27	2nd & Darst sample stand	410 2nd Ave SE	Sample Stand	S01, S02, S04, S05	240 SE Darst St 2nd Ave SE & SE Evans	Meter Hyd 0058	297
28	972 10th Pl NE sample stand	972 10th Pl NE	Sample Stand	S10, S01, S02, S04, S05	983 10th Loop NE 973 10th Pl NE	Hyd 1384 Hyd 1385	742
29	Central Park Pump Station	1901 NE Park Dr	Faucet	S10, S01, S02, S04, S05	1902 NE Killian Ln 1693 30th Ave NE	Hyd 0884 Hyd 0922	742
30	2070 NE Natalie Way sample stand	2070 NE Natalie Way	Sample Stand	S10, S01, S02, S04, S05	2101 NE Natalie Way 2058 NE Natalie Way	Meter Meter	622
31	2004 18th Ave NE sample stand	2004 18th Ave NE	Sample Stand	S10, S01, S02, S04, S05	2009 NE Katsura St 1957 18th Pl NE	Hyd 0893 Hyd 0894	1000
32	Locust St NW Atlas sample stand	520 NW Locust St	Sample Stand	S01, S02, S04, S05	600 NW Locust St 600 NW Locust St	Hyd 1666 Hyd 1671	297
33	Cougar Ridge Res A	19123 SE 56th St	Faucet	S01, S02, S04, S05	19297 SE 56th ST 19303 SE 57th Pl	Sample Stand Hyd 0775	430

34	2251 NW Stoney Creek Dr sample stand	2251 NW Stoney Creek Dr	Sample Stand	S01, S02, S04, S05, S10	2250 NW Stoney Creek Dr 2200 NW Stoney Creek Dr	Hyd 1226 Meter	752
35	Shangri-La Res Outer sample stand	163 Foothils Dr NW	Sample Stand	S01, S02, S04, S05, S10	Shangri-La P.S. (in vault) Shangri-La Way NW	Tap Hyd 1058	616
36	Wildwood Res	740 Highwood Dr SW	Faucet	S01, S02, S04, S05	525 Mt Hood Dr SW 820 SW Cedar Glade Dr	Hyd 0297 Hyd 0229	625
37	Mt Hood Res	325 Mt Hood Dr SW	Faucet	S01, S02, S04, S05	595 Mt Fury Cir SW Mt Hood Res Sample Stand	Hyd 0290 Sample Stand	480
38	Memorial Field sample stand	169 NE Creek Way	Sample Stand	S01, S02, S04, S05	220 1st Ave NE 210 NE Birch St	Hyd 1650 Hyd 0066	297
39	Summit Res A sample stand	3800 NE Harrison Dr	Sample Stand	S10, S01, S02, S04, S05	3352 NE Harrison Dr 1785 Harrison Way NE	Meter Hyd 1178	1234

SOURCE SAMPLING LOCATIONS: WHEN REQUIRED

	Name	Source Address	Type	Source	Repeat Sample Address	Type
40	Risdon Well #1	240 NE Gilman Blvd	Faucet	S01		
41	Risdon Well #2	240 NE Gilman Blvd	Faucet	S02		
42	Gilman Well #4	460 NW Gilman Blvd	Faucet	S04		
43	Gilman Well #5	460 NW Gilman Blvd	Faucet	S05		

UNSATISFACTORY SAMPLES: WAC 246-290-320

Regulations require repeat samples to be collected at the same location, and within five active service locations on both the downstream and upstream side of the positive sample location. Repeat samples are taken as soon as possible but always within 24 hours of notification from laboratory. Repeat sample locations have been identified in the table on page 4.

REPEAT SAMPLE LOCATION FLUSHING:

Repeat sample locations that are not active services, or are determined to have a low usage, will be flushed and cleaned semi-annually.

SOURCE WATER MONITORING FOR THE GROUND WATER RULE (GWR):

To comply with the GWR requirement for Triggered Source Water Monitoring, we shall sample all four of our ground water sources should a sample be found to be Coliform-positive in the distribution system fed by these sources. These samples will be collected at the same time as the required repeat samples. Samples should be marked as "Triggered" Raw water samples and analyzed under special method "Presence/Absence."

NOTIFICATIONS: WAC 246-290-480
Bacteriological: A coliform present lab result must be reported to DOH within ten days of notification by the laboratory. Fecal coliform or Ecoli presence must be reported to DOH by the end of business day in which reported by the laboratory.

ASSESSMENTS:
Within 30 days of a revised total coliform rule Treatment Technique Trigger (TTT)* a Level 1 Assessment must be submitted to DOH. A Level 2 Assessment would be required if a second TTT occurred within 12 months of another TTT, or if an E. coli MCL violation occurred.
*A TTT happens if two or more coliform-present compliance samples are collected in on month.

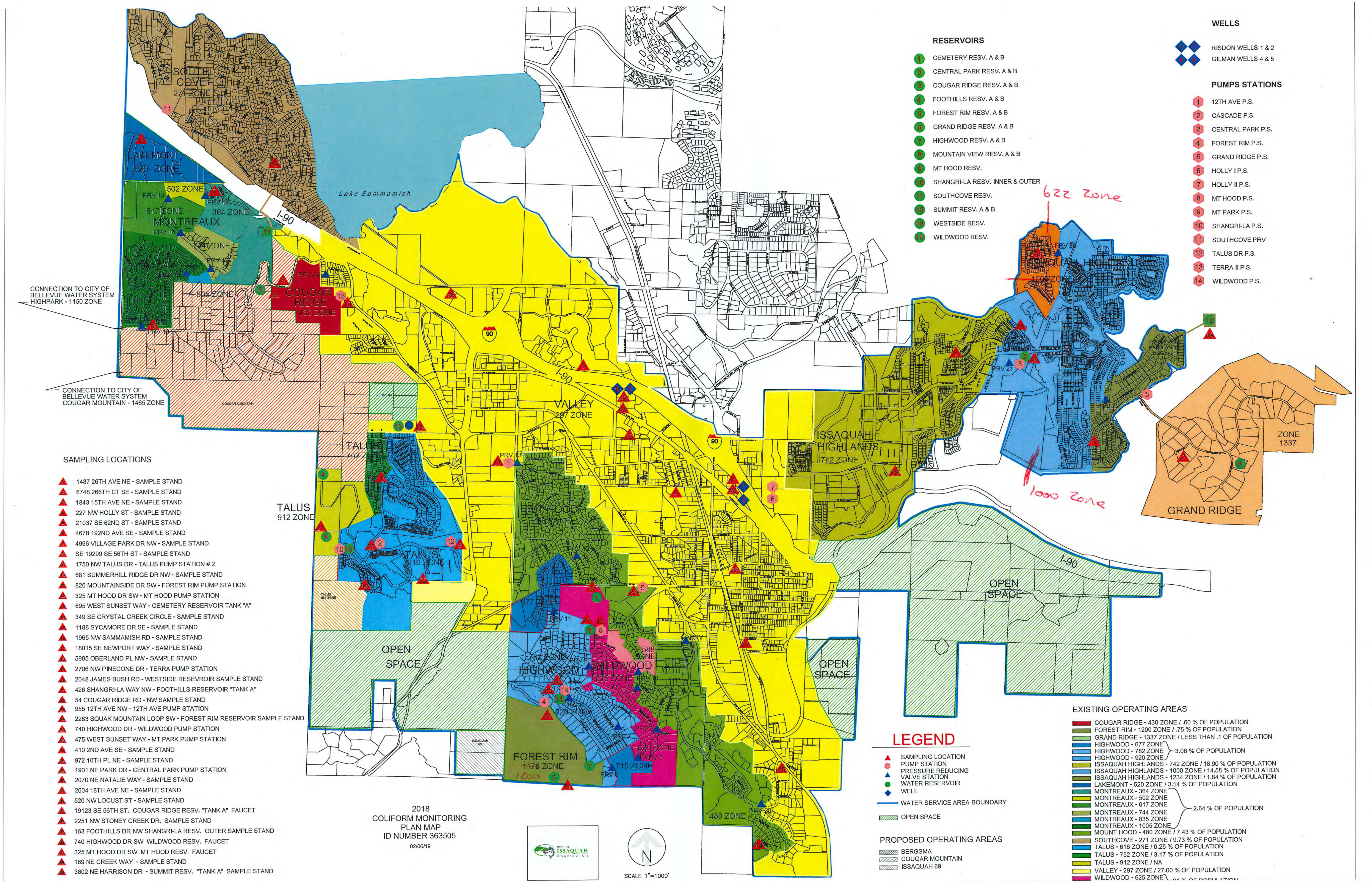
MONTH FOLLOWING UNSATISFACTORY SAMPLES:
Regulations require a minimum of five routine samples in the month following an unsatisfactory routine sample. As we collect over five samples each month, this requirement is addressed by routine sampling.

ROUTINE SAMPLING SCHEDULE:

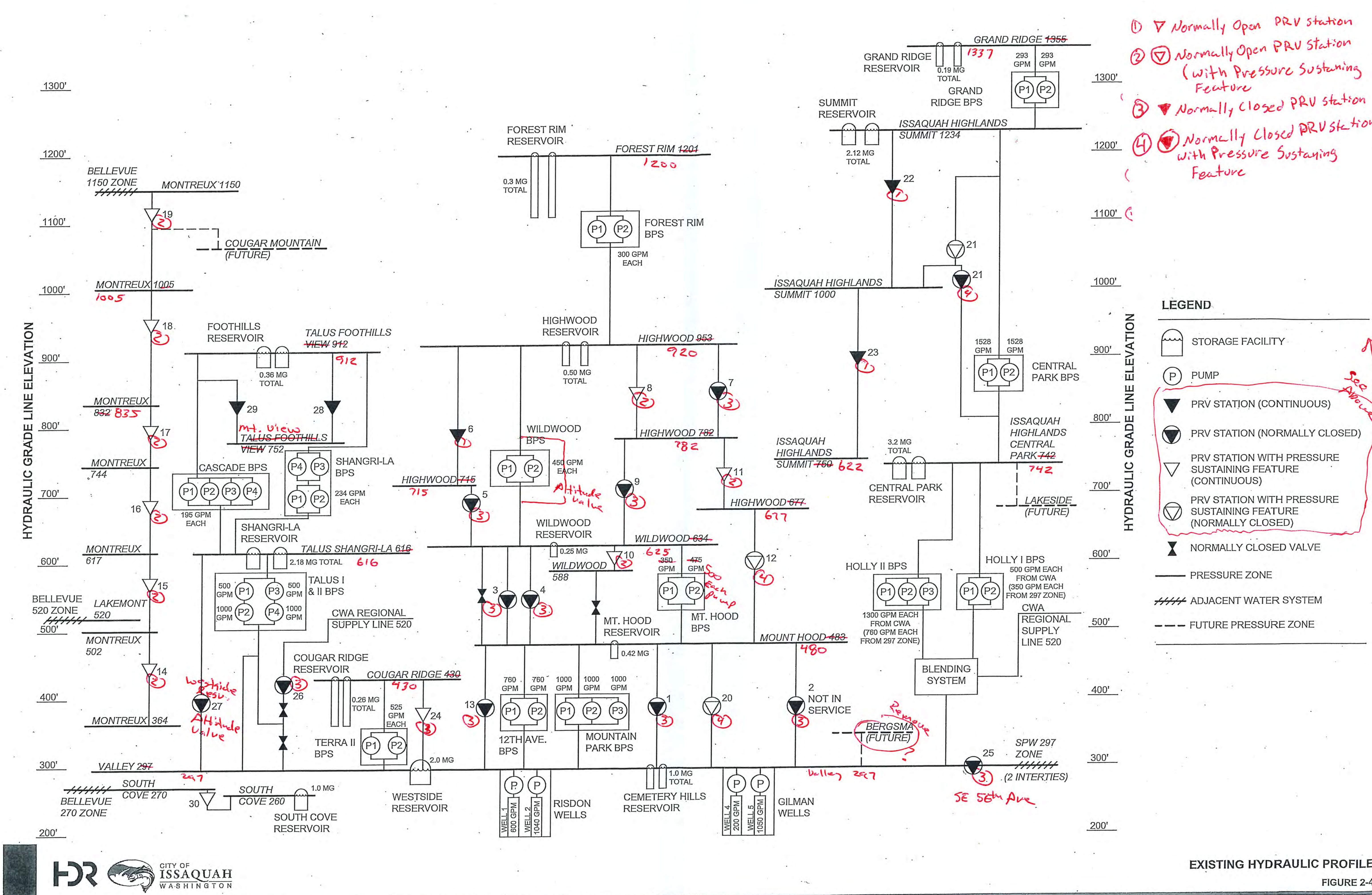
Month	Week	Sample Site Number
January - December	Week #1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,15
January - December	Week #3	16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
October	Week #2	32, 33, 34, 35, 36, 37, 38, 39, 41, 43

PREPARATION INFORMATION:

System Name: **City of Issaquah ID # 363505**	Date Plan Completed: **3/9/12**	Dates Modified: **10/22/12, 01/31/15, 03/16/16, 04/27/17, 8/27/18, 10/24/18, 02/05/19**
Plan Prepared By: **Alan Munson**	Position: **Water Utility Technician Certification # 10390**	Daytime Phone: **(425) 837-3470**
Issaquah Internal Review By: **Gregory P. Keith**	Position: **Water Operation Manager Certification # 5414**	Daytime Phone: **(425) 837-3470**
State Reviewer	Date Approved:	Date Last Review:



2018
COLIFORM MONITORING
PLAN MAP
ID NUMBER 363505
02/06/19
SCALE 1"=1000'
N
ISSAQUAH WASHINGTON
SAMPLING LOCATIONS
1 1487 26TH AVE NE - SAMPLE STAND
2 6748 266TH CT SE - SAMPLE STAND
3 1843 15TH AVE NE - SAMPLE STAND
4 227 NW HOLLY ST - SAMPLE STAND
5 21037 SE 62ND ST - SAMPLE STAND
6 4678 192ND AVE SE - SAMPLE STAND
7 4996 VILLAGE PARK DR NW - SAMPLE STAND
8 SE 19299 SE 56TH ST - SAMPLE STAND
9 1750 NW TALUS DR - TALUS PUMP STATION # 2
10 681 SUMMERHILL RIDGE DR NW - SAMPLE STAND
11 820 MOUNTAINSIDE DR SW - FOREST RIM PUMP STATION
12 325 MT HOOD DR SW - MT HOOD PUMP STATION
13 695 WEST SUNSET WAY - CEMETERY RESERVOIR TANK "A"
14 349 SE CRYSTAL CREEK CIRCLE - SAMPLE STAND
15 1188 SYCAMORE DR SE - SAMPLE STAND
16 1965 NW SAMMAMISH RD - SAMPLE STAND
17 18015 SE NEWPORT WAY - SAMPLE STAND
18 5985 OBERLAND PL NW - SAMPLE STAND
19 2706 NW PINECONE DR - TERRA PUMP STATION
20 2048 JAMES BUSH RD - WESTSIDE RESEVROIR SAMPLE STAND
21 426 SHANGRI-LA WAY NW - FOOTHILLS RESERVOIR "TANK A"
22 54 COUGAR RIDGE RD - NW SAMPLE STAND
23 955 12TH AVE NW - 12TH AVE PUMP STATION
24 2283 SQUAK MOUNTAIN LOOP SW - FOREST RIM RESERVOIR SAMPLE STAND
25 740 HIGHWOOD DR - WILDWOOD PUMP STATION
26 475 WEST SUNSET WAY - MT PARK PUMP STATION
27 410 2ND AVE SE - SAMPLE STAND
28 972 10TH PL NE - SAMPLE STAND
29 1901 NE PARK DR - CENTRAL PARK PUMP STATION
30 2070 NE NATALIE WAY - SAMPLE STAND
31 2004 18TH AVE NE - SAMPLE STAND
32 520 NW LOCUST ST - SAMPLE STAND
33 19123 SE 56TH ST. COUGAR RIDGE RESV. "TANK A" FAUCET
34 2251 NW STONEY CREEK DR. SAMPLE STAND
35 163 FOOTHILLS DR NW SHANGRI-LA RESV. OUTER SAMPLE STAND
36 740 HIGHWOOD DR SW WILDWOOD RESV. FAUCET
37 325 MT HOOD DR SW MT HOOD RESV. FAUCET
38 169 NE CREEK WAY - SAMPLE STAND
39 3802 NE HARRISON DR - SUMMIT RESV. "TANK A" SAMPLE STAND
RESERVOIRS
1 CEMETERY RESV. A & B
2 CENTRAL PARK RESV. A & B
3 COUGAR RIDGE RESV. A & B
4 FOOTHILLS RESV. A & B
5 FOREST RIM RESV. A & B
6 GRAND RIDGE RESV. A & B
7 HIGHWOOD RESV. A & B
8 MOUNTAIN VIEW RESV. A & B
9 MT HOOD RESV.
10 SHANGRI-LA RESV. INNER & OUTER
11 SOUTHCOVE RESV.
12 SUMMIT RESV. A & B
13 WESTSIDE RESV.
14 WILDWOOD RESV.
WELLS
RISDON WELLS 1 & 2
GILMAN WELLS 4 & 5
PUMPS STATIONS
1 12TH AVE P.S.
2 CASCADE P.S.
3 CENTRAL PARK P.S.
4 FOREST RIM P.S.
5 GRAND RIDGE P.S.
6 HOLLY I P.S.
7 HOLLY II P.S.
8 MT HOOD P.S.
9 MT PARK P.S.
10 SHANGRI-LA P.S.
11 SOUTHCOVE PRV
12 TALUS DR P.S.
13 TERRA II P.S.
14 WILDWOOD P.S.
LEGEND
SAMPLING LOCATION
PUMP STATION
PRESSURE REDUCING VALVE STATION
WATER RESERVOIR
WELL
WATER SERVICE AREA BOUNDARY
OPEN SPACE
PROPOSED OPERATING AREAS
BERGSMA
COUGAR MOUNTAIN
ISSAQUAH 69
EXISTING OPERATING AREAS
COUGAR RIDGE - 430 ZONE / .60 % OF POPULATION
FOREST RIM - 1200 ZONE / .75 % OF POPULATION
GRAND RIDGE - 1337 ZONE / LESS THAN .1 OF POPULATION
HIGHWOOD - 677 ZONE
HIGHWOOD - 782 ZONE
HIGHWOOD - 920 ZONE
3.06 % OF POPULATION
ISSAQUAH HIGHLANDS - 742 ZONE / 18.90 % OF POPULATION
ISSAQUAH HIGHLANDS - 1000 ZONE / 14.58 % OF POPULATION
ISSAQUAH HIGHLANDS - 1234 ZONE / 1.84 % OF POPULATION
LAKEMONT - 520 ZONE / 3.14 % OF POPULATION
MONTREAUX - 364 ZONE
MONTREAUX - 502 ZONE
MONTREAUX - 617 ZONE
MONTREAUX - 744 ZONE
MONTREAUX - 835 ZONE
MONTREAUX - 1005 ZONE
2.64 % OF POPULATION
MOUNT HOOD - 480 ZONE / 7.43 % OF POPULATION
SOUTHCOVE - 271 ZONE / 9.73 % OF POPULATION
TALUS - 616 ZONE / 6.25 % OF POPULATION
TALUS - 752 ZONE / 3.17 % OF POPULATION
TALUS - 912 ZONE / NA
VALLEY - 297 ZONE / 27.00 % OF POPULATION
WILDWOOD - 625 ZONE
CONNECTION TO CITY OF BELLEVUE WATER SYSTEM HIGHPARK - 1150 ZONE
CONNECTION TO CITY OF BELLEVUE WATER SYSTEM COUGAR MOUNTAIN - 1465 ZONE
SOUTH COVE 271 ZONE
LAKEMONT 520 ZONE
502 ZONE
617 ZONE
364 ZONE
MONTREAUX
835 ZONE
COUGAR RIDGE 430 ZONE
Lake Sammamish
I-90
VALLEY 297 ZONE
TALUS 752 ZONE
TALUS 912 ZONE
TALUS 616 ZONE
MT HOOD
677 ZONE
HIGHWOOD
WILDWOOD 625 ZONE
588 ZONE
920 ZONE
FOREST RIM 1178 ZONE
1200
715 ZONE
480 ZONE
OPEN SPACE
OPEN SPACE
OPEN SPACE
ISSAQUAH HIGHLANDS 742 ZONE
ISSAQUAH HIGHLANDS
622 Zone
1000 Zone
ZONE 1337
GRAND RIDGE



EXISTING HYDRAULIC PROFILE

FIGURE 2-4

Appendix L. Stage 2 DBPR Compliance Monitoring Plan

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

DOH 331-464
December 2011

Stage 2 Disinfection Byproducts Monitoring Plan Form

System Name	City of Issaquah
PWSID#	363505
Date	1/11/2012
Completed by	Alan Munson
Population	21984

IDSE IDSE Completed and Approved

Schedule Schedule 1

Source Water Both (Surface & Groundwater)

Click Here to Continue

Please note: This template is intended to be used for systems that use chlorine or chloramines only. It does not address systems that use chlorine dioxide. For those systems that use ozone (in addition to or instead of chlorine), you may still use this template, but will have to add the monthly (or reduced quarterly) bromate monitoring requirement.

If you need this publication in an alternate format, call (800) 525-0127. For TTY/TDD call (800) 833-6388.

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water
DOH 331-464
December 2011

Stage 2 DBP Monitoring Plan - Surface Water (Routine Monitoring)

System Name	City of Issaquah
PWSID#	363505
Date	1/11/2012
Completed by	Alan Munson
Population	21984

Initial Stage 2 Sampling Period First sampling period following **April 1, 2012**

Number of Samples Required 4 Dual Sample Sets per Quarter

Stage 2 Compliance Monitoring Site ID		Projected Sampling Date (Date or week) - every 90 days			
		Period 1	Period 2	Period 3	Period 4
Highest TTHM	#1 Summit Res. Sample Stand	First full week of May	First full week of August	First full week of November	First full week of February
Highest HAA5	#2 Central Park Pump Station	First full week of May	First full week of August	First full week of November	First full week of February
Highest HAA5 STG1	#3 4992 NW Village Park Dr SS	First full week of May	First full week of August	First full week of November	First full week of February
2nd Highest TTHM	#4 2052 NE Natalie Way SS	First full week of May	First full week of August	First full week of November	First full week of February

Determining Compliance for TTHM and HAA5

Our system is required to monitor quarterly. Each quarter we will calculate a locational running annual average (LRAA) for TTHM and HAA5 at each monitoring location. Compliance will be achieved if the TTHM and the HAA5 LRAA at each monitoring location for the four most recent quarters is less than or equal to 0.080 mg/L for TTHM and less than or equal to 0.060 mg/l for HAA5.

Disinfectant Monitoring

Chlorine residuals must be measured at the same time and place as routine or repeat coliform samples

MRDL for chlorine and chloramines = 4.0 mg/l as Cl_2

Determining Compliance for disinfectant residuals

Compliance is based on the running annual average (RAA) of 12 consecutive months

Daily residual measurements will / ***will not*** be included in the compliance calculations (circle one)

Attach a distribution map with sample locations

Comments
Site #3: Name has been changed from "Montreux Sample Stand" (for IDSE) to "4992 NW Village Park Dr Sample Stand"
Site #4: Name has been changed from "NE Natalie Way Sample Stand" (for IDSE) to "2052 NE Natalie Way Sample Stand"

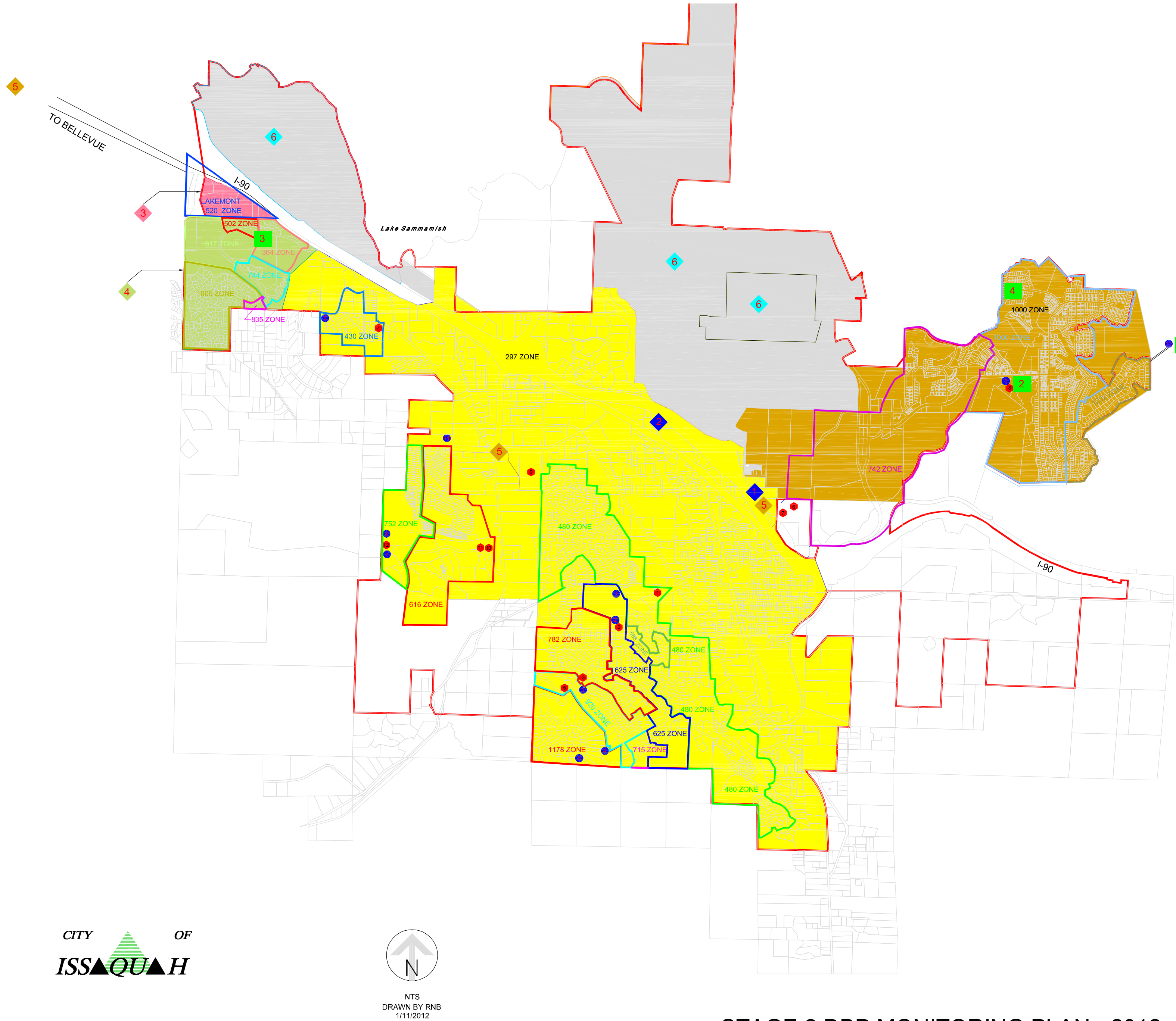
Send copy of completed form to:

☐Eastern Regional Drinking Water Office, 16201 E Indiana Ave, Suite 1500, Spokane Valley, WA 99216
Phone: (509) 329-2100 Fax (509) 329-2104

☐Northwest Regional Drinking Water Office, 20435 72nd Ave S, Suite 200, Kent, WA 98032
Phone: (253) 395-6750 Fax: (253) 395-6760

☐Southwest Regional Drinking Water Office, PO Box 47823, Olympia, WA 98504-7823
Phone: (360) 236-3030 Fax to (360) 664-8058

If you need this publication in an alternate format, call (800) 525-0127. For TTY/TDD call (800) 833-6388.



LEGEND

STAGE 2 COMPLIANCE MONITORING SITES

1. SUMMIT RESERVOIR SAMPLE STAND
2. CENTRAL PARK PUMP STATION
3. 4992 NW VILLAGE PARK DR SAMPLE STAND
4. 2052 NE NATALIE WAY SAMPLE STAND

WATER ENTRY SOURCES

1. RISDON WELLS
2. GILMAN WELLS

(1 and 2: WATER BLENDED)

3. LAKEMONT (CITY OF BELLEVUE CONNECTION)
4. MONTREUX (CITY OF BELLEVUE CONNECTION)
5. REGIONAL CONNECTION
6. OUTSIDE OF ISSAQUAH WATER SERVICE AREA

RESERVOIR SITES

1. CEMETERY RESERVOIR
2. MT. HOOD RESERVOIR
3. WILDWOOD RESERVOIR
4. HIGHWOOD RESERVOIR
5. FOREST RIM RESERVOIR
6. COUGAR RIDGE RESERVOIR
7. SHANGRI-LA RESERVOIR
8. MOUNTAIN VIEW RESERVOIR
9. CENTRAL PARK RESERVOIR
10. SUMMIT RESERVOIR
11. WESTSIDE RESERVOIR

PUMP STATIONS

1. MT. PARK
2. MT. HOOD
3. WILDWOOD
4. TERRA II
5. FOREST RIM
6. HOLLY ST I
7. HOLLY ST II
8. CENTRAL PARK
9. 12th AVE
10. TALUS I
11. TALUS II
12. SHANGRI-LA

STAGE 2 DBP MONITORING PLAN - 2012

Appendix M. Initial Distribution System Evaluation Report

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IDSE Report for Standard Monitoring

I. GENERAL INFORMATION

A. PWS Information*

B. Date Submitted* 12/24/2008

PWSID: WA5336350
PWS Name: City of Issaquah
Mailing Address: P.O. Box 1307
City: Issaquah State: WA Zip: 98027
Population Served: 15,000

System Type: (X)		Source Water Type: (X)		Buying / Selling Relationships: (X)	
X	CWS	X	Subpart H	X	Consecutive System
	NTNCWS		Ground		Wholesale System
					Neither

C. PWS Operations

Residual Disinfectant Type: (X)

X	Chlorine		Chloramines		Other:

Number of Disinfected Sources:

	Surface		GWUDI	2	Ground	3	Purchased

D. Contact Person*

Name: Gregory P. Keith, MPA
Title: Water Manager
Phone #: (425)-837-3470 Fax #: (425)-837-3479
E-mail: GregK@ci.issaquah.wa.us

II. STAGE 2 REQUIREMENTS*

A. Number of Compliance Monitoring Sites		B. Schedule		C. Compliance Monitoring Frequency	
1	Existing Stage 1	1	Schedule 1		During peak historical month (1 monitoring period)
2	Highest TTHM		Schedule 2		
1	Highest HAA5		Schedule 3	X	Every 90 days (4 monitoring periods)
4	**Total**		Schedule 4		

IDSE Report for Standard Monitoring

III. MONITORING RESULTS*

A. Did you deviate in any way from your approved standard monitoring plan? X **Yes** ____ **No**

If YES, explain (attach additional pages if necessary):

Please see attachment.

B. Where were your TTHM and HAA5 samples analyzed?

In-House ____

Is your in-house laboratory certified? ____ **Yes** ____ **No**

Certified Laboratory X

Name of certified laboratory: Pace Analytical(formally Laucks)/Underwriter Labs/ Edge

C. What method(s) was used to analyze your TTHM and HAA5 samples?

	TTHM		HAA5
____	EPA 502.2	____	EPA 552.1
X	EPA 524.2	X	EPA 552.2
____	EPA 551.1	____	EPA 552.3
		____	SM 6251 B

IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

D. IDSE Standard Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)						LRAA
Standard Monitoring Site #1	Sample Date	10/2/2007	12/5/2007	2/5/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0189	0.0660	0.0088	0.0197	0.0257	0.0152	0.0257
Standard Monitoring Site #2	Sample Date	10/2/2007	12/5/2007	2/5/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0666	0.0619	0.0367	0.0375	0.0425	0.0461	0.0486
Standard Monitoring Site #3	Sample Date	10/2/2007	12/5/2007	2/5/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0664	0.0649	0.0366	0.0364	0.0425	0.0451	0.0487
Standard Monitoring Site #4	Sample Date	10/2/2007	12/5/2007	2/5/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0015	0.0006	0.0000	0.0000	0.0006	0.0000	0.0005
Standard Monitoring Site #5	Sample Date	10/2/2007	12/5/2007	2/5/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0708	0.0200	0.0418	0.0375	0.0340	0.0045	0.0348
Standard Monitoring Site #6	Sample Date	10/2/2007	12/5/2007	2/5/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0645	0.0618	0.0377	0.0343	0.0416	0.0440	0.0473
Standard Monitoring Site #7	Sample Date	10/2/2008	12/5/2007	2/5/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0583	0.0616	0.0313	0.0269	0.0330	0.0387	0.0416
Standard Monitoring Site #8	Sample Date	10/2/2007	12/85/07	2/5/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0027	0.0000	0.0000	0.0000	0.0013	0.0000	0.0007

[1]Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

E. IDSE Standard Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)						LRAA
Standard Monitoring Site #1	Sample Date	10/2/2007	12/5/2007	2/22/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0274	0.0310	0.0254	0.0215	0.0304	0.0274	0.0272
Standard Monitoring Site #2	Sample Date	10/2/2007	12/5/2007	2/22/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0179	0.0289	0.0253	0.0240	0.0108	0.0226	0.0216
Standard Monitoring Site #3	Sample Date	10/2/2007	12/5/2007	2/22/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0194	0.0287	0.0265	0.0302	0.0129	0.0295	0.0245
Standard Monitoring Site #4	Sample Date	10/2/2007	12/5/2007	2/22/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0000	0.0000	0.0000	0.0000	0.0000	0.0050	0.0008
Standard Monitoring Site #5	Sample Date	10/2/2007	12/5/2007	2/22/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0181	0.0223	0.0230	0.0281	0.0219	0.0014	0.0191
Standard Monitoring Site #6	Sample Date	10/2/2007	12/5/2007	2/22/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0249	0.0303	0.0250	0.0258	0.0149	0.0517	0.0288
Standard Monitoring Site #7	Sample Date	10/2/2007	12/5/2007	2/22/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0268	0.0330	0.0300	0.0246	0.0231	0.0449	0.0304
Standard Monitoring Site #8	Sample Date	10/2/2007	12/5/2007	2/22/2008	4/7/2008	6/3/2008	8/5/2008	
	Sample Result	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

[1]Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

F. Stage 1 DBPR Compliance Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)						LRAA
Stage 1 Site #1	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0045	0.0018	0.0045	0.0067			0.0044
Stage 1 Site #2	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0005	0.0006	0.0015	0.0024			0.0013
Stage 1 Site #3	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0017	0.0000	0.0026	0.0056			0.0025
Stage 1 Site #4	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0000	0.0000			0.0000
Stage 1 Site #5	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0000	0.0000			0.0000
Stage 1 Site #6	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0019	0.0000	0.0015	0.0047			0.0020
Stage 1 Site #7	Sample Date	21/5/07	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0055	0.0022	0.0053	0.0074			0.0051
Stage 1 Site #8	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0018	0.0005	0.0017	0.0015			0.0014

[1]Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

F. Stage 1 DBPR Compliance Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)						LRAA
Stage 1 Site #9	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0534	0.0329	0.0383	0.0548			0.0449
Stage 1 Site #10	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0221	0.0095	0.0133	0.0218			0.0167
Stage 1 Site #11	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0525	0.0307	0.0413	0.0063			0.0327
Stage 1 Site #12	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0637	0.0153	0.0186	0.0364			0.0335
	Sample Date							
	Sample Result							#DIV/0!
	Sample Date							
	Sample Result							#DIV/0!
	Sample Date							
	Sample Result							#DIV/0!
	Sample Date							
	Sample Result							#DIV/0!

[1]Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

G. Stage 1 DBPR Compliance Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)						LRAA
Stage 1 site #1	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0012	0.0000			0.0003
Stage 1 site #2	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0000	0.0000			0.0000
Stage 1 site #3	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0007	0.0000			0.0002
Stage 1 site #4	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0000	0.0000			0.0000
Stage 1 site #5	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0000	0.0000			0.0000
Stage 1 site #6	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0008	0.0000			0.0002
Stage 1 site #7	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0019	0.0000			0.0005
Stage 1 site #8	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0000	0.0000	0.0008	0.0000			0.0002

[1]Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

G. Stage 1 DBPR Compliance Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)						LRAA
Stage 1 site #9	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0309	0.0194	0.0194	0.0178			0.0219
Stage 1 site #10	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0260	0.0120	0.0163	0.0153			0.0174
Stage 1 site #11	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0248	0.0234	0.0247	0.0000			0.0182
Stage 1 site #12	Sample Date	12/5/2007	3/4/2008	6/3/2008	9/4/2008			
	Sample Result	0.0367	0.0163	0.0143	0.0180			0.0213
	Sample Date							
	Sample Result							#DIV/0!
	Sample Date							
	Sample Result							#DIV/0!
	Sample Date							
	Sample Result							#DIV/0!
	Sample Date							
	Sample Result							#DIV/0!

[1]Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

IDSE Report for Standard Monitoring

IV. JUSTIFICATION OF STAGE 2 DBPR COMPLIANCE MONITORING SITES*

Stage 2 Compliance Monitoring Site ID	Site Type	Justification
Standard Monitoring site # 3	X Highest TTHM ___ Highest HAA5 ___ Stage 1 DBPR	This site had the highest TTHM LRAA among all of the sites.
Standard Monitoring site # 7	___ Highest TTHM X Highest HAA5 ___ Stage 1 DBPR	This site had the highest HAA5 LRAA of all of the sites.
Stage 1 site #9	___ Highest TTHM ___ Highest HAA5 X Stage 1 DBPR	This site had the highest HAA5 LRAA of all of the stage 1 sites.
Standard monitoring site # 2	X Highest TTHM ___ Highest HAA5 ___ Stage 1 DBPR	This site had the 2nd highest TTHM LRAA of all of the sites and had not been used yet.
	___ Highest TTHM ___ Highest HAA5 ___ Stage 1 DBPR	
	___ Highest TTHM ___ Highest HAA5 ___ Stage 1 DBPR	
	___ Highest TTHM ___ Highest HAA5 ___ Stage 1 DBPR	
	___ Highest TTHM ___ Highest HAA5 ___ Stage 1 DBPR	
	___ Highest TTHM ___ Highest HAA5 ___ Stage 1 DBPR	

Attach additional copies of this sheet if you need more room.

IDSE Report for Standard Monitoring

V. PEAK HISTORICAL MONTH AND STAGE 2 DBPR COMPLIANCE MONITORING SCHEDULE

A. Peak Historical Month* October

B. Is Your Peak Historical Month the Same as in Your IDSE Standard Monitoring Plan?

_____ Yes __X__ No

If no, explain how you selected your new peak historical month (attach additional sheets if needed)

Our original peak historical month was August. After conducting the IDSE standard monitoring the results showed that October actually had higher THM's.
After reviewing the data it was determine that October would be our new Peak Historical Month.

C. Proposed Stage 2 DBPR Compliance Monitoring Schedule*

Stage 2 Compliance Monitoring Site ID	Projected Sampling Date (date or week) [1]			
	period 1	period 2	period 3	period 4
SM site # 3	wk 1 January	wk 1 April	wk 1 July	wk 1 October
SM site # 7	wk 1 January	wk 1 April	wk 1 July	wk 1 October
Stage 1 #9	wk 1 January	wk 1 April	wk 1 July	wk 1 October
SM site # 2	wk 1 January	wk 1 April	wk 1 July	wk 1 October

[1] *period = monitoring period. Complete for the number of monitoring periods from Section II.C.*

Attach additional copies of this sheet if you need more room.

IDSE Report for Standard Monitoring

VI. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system if it has changed since you submitted your Standard Monitoring Plan.

VII. ATTACHMENTS

~ Additional sheets for explaining how and why you deviated from your standard monitoring plan (Section III).

~ Additional sheets for Standard Monitoring Results (Section III). **REQUIRED** if you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people.**

~ Additional sheets for Stage 2 DBPR Compliance Monitoring Sites (Section IV). **REQUIRED** if you are a subpart H system serving **more than 249,999 people.**

~ Additional sheets for explaining how you selected the peak historical month (Section V).

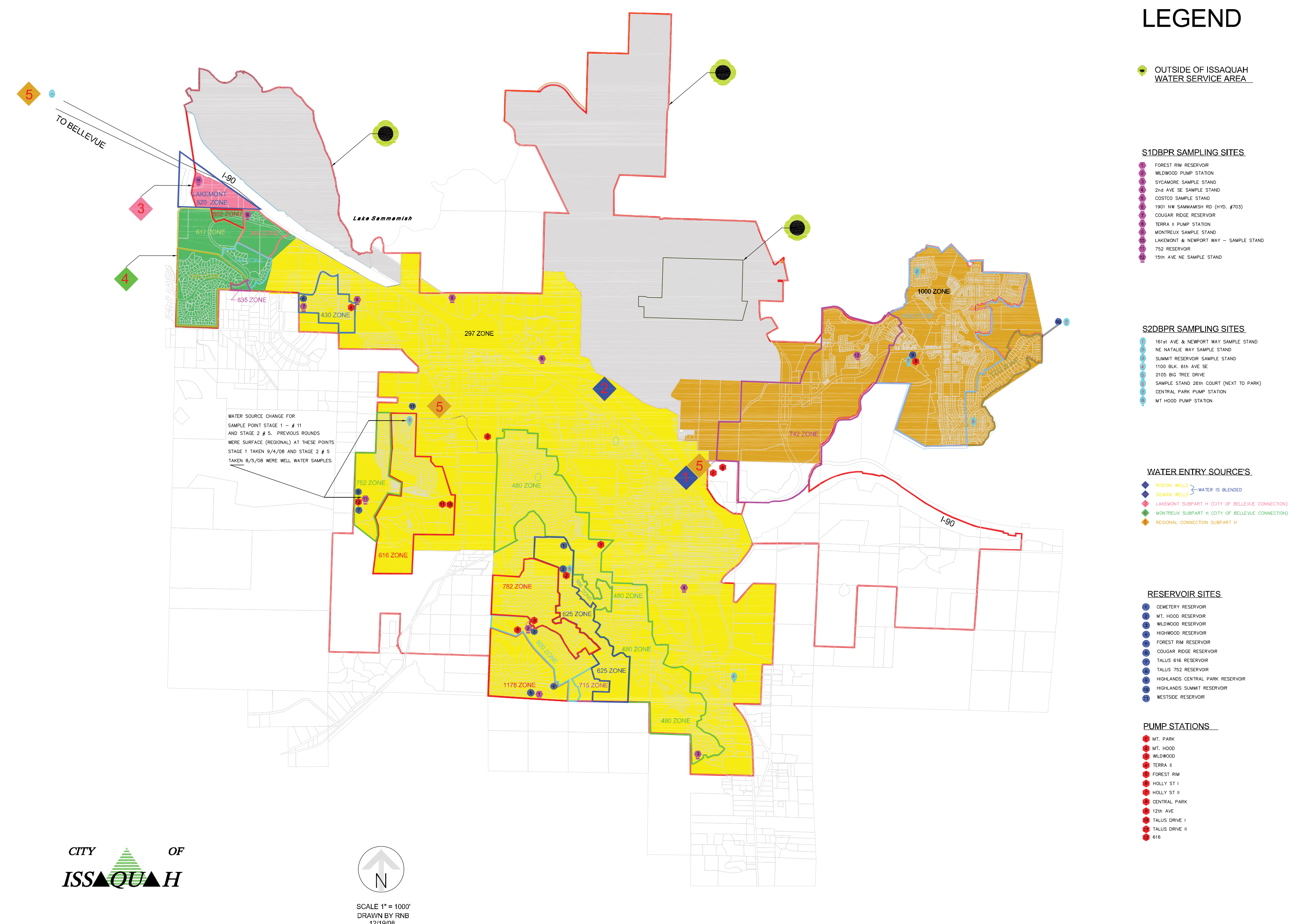
~ Additional sheets for proposed Stage 2 DBPR peak historical month and compliance monitoring schedule (Section V). **REQUIRED** if you are a subpart H system serving **more than 249,999 people.**

~ Distribution system schematic* (Section VI). **REQUIRED if it has changed from your approved IDSE standard monitoring plan.**

~ Compliance calculation procedures (for Stage 2 Compliance Monitoring Plan).

Total Number of Pages in Your Report: 13 plus Schematic

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR.



STAGE 2 DISINFECTANTS AND BYPRODUCTS PLAN/
IDSE MONITORING REPORT

Appendix N. Wellhead Protection Plan for the Lower Issaquah Valley

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Sammamish Plateau
Water and Sewer District

City of Issaquah

Lower Issaquah Valley Wellhead Protection Plan

Volume I - Report

Submitted by:

Golder Associates

In Association with
Carr/Associates and
The Barton Group

November 1993

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Golder Associates

FINAL DRAFT REPORT

TO

SAMMAMISH PLATEAU WATER
AND SEWER DISTRICT

ON

LOWER ISSAQUAH VALLEY WELLHEAD PROTECTION PLAN

Prepared by

Golder Associates Inc.
Redmond, Washington

In Association with:

Carr Associates
and
The Barton Group

November 15, 1993

913-1252.009

EXECUTIVE SUMMARY

A Wellhead Protection Plan (WHPP) has been prepared for the Lower Issaquah Valley (LIV) as part of ongoing groundwater management activities in the area. The WHPP is a technical assessment of groundwater resources in the area with an emphasis on groundwater quality protection. Through an understanding of hydrogeologic conditions, current and future growth in the LIV can be managed without endangering a currently invaluable groundwater resource. The wells in the Lower Issaquah Valley supply potable drinking water to residents and businesses in both the City of Issaquah and Sammamish Plateau. Both these communities are isolated from the regional water-supply distribution system serving many other Eastside communities, and groundwater represents the sole source of drinking water both now and for the foreseeable future. An intertie to a regional water supply may be as many as 15 years away.

This document fulfills regulatory requirements for wellhead protection planning and groundwater quality protection. There are many facets to groundwater quality protection and the Wellhead Protection Plan is intended to serve as an on-going guide for local administrators to assess the potential impacts of land-use on groundwater quality in the LIV. Implementation of wellhead protection strategies offered in this document will take place through future activities within the governing jurisdictions in the LIV. In its present draft form, the WHPP does not present a detailed plan for implementation. The following executive summary discusses the main components and results of the WHPP.

Hydrogeology and Delineation of Wellhead Protection Areas (WHPAs)

The technical evaluation of the LIV aquifer consisted of a thorough review of available hydrogeologic and groundwater-quality data compiled from a number of different sources in addition to the collection of new data as part of the WHPP. The conceptual hydrogeologic model for the LIV aquifer is based on the geologic history of the LIV. The present-day LIV was once at the bottom of Lake Sammammish, and deltas were built out into the ancient lake. These deltas are composed of hundreds of feet of sand, gravel and silt, and lie beneath the present-day ground surface of the LIV. Delta deposits are exposed along the eastern margins of the LIV at the Lakeside Gravel Pit; on western Grand Ridge; and on the Lake Tradition Plateau. The delta deposits constitute the primary water-bearing aquifer for water-supply wells in the LIV. The deposits plunge beneath the ground surface in the LIV, and are tapped by production wells ranging from 100 to 250 feet in depth.

The LIV aquifer is estimated to be approximately 300 feet thick, and, on a regional scale, behaves as a single unconfined aquifer. Discontinuous silt layers exist at depth and may provide varying levels of locally confined or semi-confined conditions. However, it is difficult to differentiate multiple aquifers with certainty, and a single aquifer is a defensible conservative assumption based on existing data. It is conservative in that no protection from contamination is offered by stratigraphic layers within the aquifer. Aquifer properties have been estimated from pumping tests performed on SPWSD production wells and from near-field single well tests performed on various other wells in the LIV. Hydraulic conductivity of the aquifer is estimated to be between 200 and 300 feet per day.

Groundwater recharge occurs primarily along more permeable surficial sediments located along the margins of the LIV, including the western portion of Grand Ridge and Lake Tradition Plateau; the western portion of the LIV and possibly via infiltration from Issaquah Creek, upstream of Central Issaquah. Hydrogeologic conditions on the eastern upland areas are not well known. Horizontal hydraulic conductivities are estimated to be between 600 and 800 feet per day. Vertical hydraulic conductivities are estimated to be between 0.8 and 2.7 feet per day.

The importance of recharge from the eastern margins of the LIV (i.e. Grand Ridge and Lake Tradition Plateau) is demonstrated by water-level data collected over the course of 1991-1992; by water-balance estimates based on hydrologic information; and by the results of a groundwater flow model used in developing wellhead protection areas. Water-level data show a shift in groundwater flow direction which is consistent with a "pulse" of groundwater recharge into the LIV from the eastern highland areas. Water-balance calculations indicate that up to 30% of annual recharge to the LIV may originate from the eastern highland areas. Groundwater flow modeling indicates that observed water-level conditions in the LIV can be adequately reproduced with up to 90% of recharge originating from the eastern highland areas.

The conceptual model of the aquifer, based on the available data, was integrated into a simple steady-state groundwater flow model. This model was then used as a predictive tool for determining the likely paths and velocities of groundwater flowing towards the supply wells in the LIV. The computer model was developed using existing data for calibration, so that the model simulates actual groundwater flow in the LIV, as accurately as the available data permits. The computer model contains boundaries at the Issaquah Gap (near the Hobart Junction), along bedrock boundaries on the eastern and western margins o the LIV, and at Lake Sammamish. A flux boundary was used along Grand Ridge and Lake Tradition Plateau to represent the transition between the upland areas (elevation 500 feet) and the lower valley (elevation 70 feet). Fluxes were assigned to these boundaries that were consistent with available water-balance data from these sub-catchments. The computer model was "calibrated" to reproduce observed water-levels in wells within the LIV.

Once the computer model was calibrated, predictive simulations of pathlines and capture zones were run to determine wellhead protection areas. The pathlines and velocities predicted by the model form the basis for delineating time-based capture zones for individual wells. Theoretically, a "particle" of water found within a one-year capture zone will reach a well within one-year. The "particle" is a mathematical aspect of the computer model which is used to track and display the flow field generated by the computer. The 1-year, 5-year, and 10-year capture zones were determined and used as the basis for delineation of wellhead protection areas. This is consistent with standard WHPP guidelines used throughout the country.

In addition to the modeled wellhead protection areas, hydrogeologic mapping was used to supplement wellhead protection delineations. Deposits of permeable deltaic and coarse glacial sediments are mapped at ground surface, primarily along Grand Ridge and Lake Tradition Plateau, represent recharge areas to the LIV aquifer. Though not explicitly incorporated into the computer-generated WHPA's, these recharge areas should also be protected from contamination sources.

Figure 18 from the WHPP shows the composite wellhead protection areas based on computer modeling and hydrogeologic mapping. Land-use planning in these areas must consider impacts to groundwater quality. The consequences of severe groundwater contamination are serious because of the present dependence on groundwater as a water supply.

Groundwater Quality and Contaminant Source Inventory

There are a variety of contaminants that are a health concern for drinking water supplies. They are broadly categorized into organic contaminants and inorganic contaminants. Organic contaminants include various petroleum products used for a variety of applications such as gasoline (benzene, toluene, xylene), de-greasing solvents (trichloroethylene), dry-cleaning solvents (tetrachloroethylene), pesticides and herbicides. Some organic compounds are denser than water (DNAPL) and others are lighter than water (LNAPL). Inorganic contaminants include metals (e.g. lead, chromium, arsenic) and nitrate. All of these contaminants have associated health risks and established maximum contaminant levels (MCL's) in drinking water. Transport of contaminants in groundwater is a complex field, and a comprehensive treatment of all possible contaminants is beyond the scope of the WHPP. However, the rate of contaminant movement in groundwater is dependent on specific properties of individual contaminants. Many organic contaminants are degraded or transformed by naturally-occurring microorganisms in soil or groundwater. Many metals are preferentially adsorbed to soil particles and do not travel rapidly in groundwater. A general recognition of these complexities is necessary for proper planning and responses to sources of groundwater contamination.

Groundwater quality in the LIV is presently excellent and well below regulatory MCL's in all wells sampled as part of the WHPP. One shallow well detected low levels of organic contamination, but was still below regulatory limits. Several shallow monitoring wells not sampled as part of the WHPP have detected varying levels of contamination from lead, and several organic contaminants. Most of these wells have been associated with gasoline storage tank leaks within the City of Issaquah.

An inventory of contaminant sources was conducted to establish the proximity of these sources to the capture zones determined from the hydrogeologic analyses. Sources of information for the inventory included WDOE databases, aerial photographs, land-use maps, and a telephone survey of area businesses. The LIV is not a major industrial area and relatively few potential point source contamination sites were identified:

- A total of 39 underground storage tanks containing petroleum products (e.g. gasoline) are present in the LIV. Of these 39 tanks, 16 are within the 5-year WHPA and contain approximately 350,000 gallons of product.

- A total of 16 businesses generate or store potentially hazardous contaminants such as solvents.

Chronic sources of contamination from urban run-off and other land-uses were evaluated based on mass loadings to groundwater:

- An estimated 2,600 kilograms of nitrate and 42 kilograms of lead per year are generated within residential and commercial land-uses from urban run-off and fertilizer applications. This contaminant load is equivalent to nitrate and lead concentrations in LIV production wells which are below the MCL for nitrate. Low levels are confirmed by direct sampling.

Contamination from transportation corridors was also evaluated. An estimated 70 million gallons of stormwater annually are discharged to the ground surface or stream network from Interstate 90. Although chronic long-term contamination has not been detected, the lack of a stormwater collection system significantly increases the risk of groundwater contamination from a traffic-related spill on the interstate. Accident rates on I-90 have increased steadily since 1988, though a serious contamination event has not yet occurred.

A simple risk screening using an EPA methodology was also carried out. Presently, there exists only low or moderate risks to groundwater quality, with transportation spills posing the highest risk relative to other contamination sources. The presently excellent groundwater quality, low contaminant loads and low to moderate risk of present sources indicates that future land-use probably represent the greatest risk to groundwater quality in the LIV.

Future Land-use Impacts to Groundwater Quality

Future land-use in the LIV is not yet well established. Continued development in the LIV, however, does pose a threat to existing groundwater quality. A variety of projects, such as the Grand Ridge MPD, Western Grand Ridge Urban Zone, East Sunset Bypass, and general increased commercial development in the City of Issaquah, could affect overall groundwater quality or directly contaminate the aquifer. Additional sources of contaminants, such as UST's or solvent use in commercial or industrial zoning should be managed carefully. Increased residential and commercial development on the eastern upland areas should address impacts to groundwater quality and recharge. Nitrate loads to the aquifer were estimated using available USGS, EPA, and King County data on stormwater run-off and residential applications. The results of these loading calculations indicate that the addition of 1,160 homes on the eastern recharge areas, using 1-acre lots and septic systems, causes excessive nitrate loads to the LIV aquifer and may result in nitrate levels above 5 mg/L (one-half the maximum contaminant level for nitrate). Development at 5-acre density reduces the nitrate load, but degradation of groundwater quality still occurs. Development on the recharge areas of Grand Ridge and Lake Tradition Plateau will require a carefully managed combination of open-space, municipal services, advanced engineering designs (e.g. stormwater infiltration) and prudent land-use policy in order to preserve groundwater quality.

Wellhead Protection Strategies

A variety of wellhead protection strategies are available to manage land-use, prevent groundwater contamination, and respond to groundwater contamination if it occurs. Administrative and planning aspects of Wellhead Protection need to be integrated and coordinated with ongoing state and county programs for groundwater quality protection. These include state hazardous waste programs, state anti-degradation policy and the soon-to-be-released Groundwater Management Plan for the Issaquah Basin. The strategies offered in the WHPP are presented in a general context and are intended to be embellished, discussed and refined in a public forum as groundwater management issues become more focused in the area. High priority recommendations for Wellhead Protection are summarized as follows:

- A Wellhead Protection administrative position should be created to specifically address groundwater quality issues in the LIV and serve to interface with planning, public works, environmental, and surface-water management departments of King County, the City of Issaquah, and SPWSD;

- A Wellhead Protection Committee (WHPC) should be created to address local groundwater management issues. Regional groundwater management issues in the Issaquah Basin should continue to be addressed by the Groundwater Advisory Committee (GWAC). The WHPC should maintain sufficient autonomy to resolve issues which specifically affect wellhead protection areas in the LIV.

- The City of Issaquah should begin developing emergency spill response capabilities as a pre-cursor to a detailed spill response plan involving City, State, and County emergency responders. Spill response training of City Fire Department personnel, purchase of basic spill response materials, and contracting with a clean-up contractor are immediate needs. More detailed aspects of spill response planning, such as hazard analyses and agency coordination, can be addressed in a more detailed spill response plan.

- Contingencies for groundwater supply should continue to be developed. The recent intertie between SPWSD and the City of Issaquah now provides additional source-redundancy should one or more wells be impacted by contamination. Additional contingencies such as wellfield operation strategies, artificial recharge, and identification of additional groundwater sources should be evaluated. Water rights issues surrounding hydraulic continuity of groundwater and surface water should continue to be addressed.

- Public involvement in Wellhead Protection Planning should begin immediately and should become a regular feature of City and County programs aimed at water quality. Consistent and persistent messages should be conveyed regarding the value of the groundwater resource and the rationale behind management strategies.

Detailed strategies for wellhead protection include land-use restrictions or prohibitions, changes in zoning, special permit requirements, site or project design specifications, contaminant inventory programs, and long-term monitoring. Preferred alternatives, detailed recommendations, or example ordinance/policy statements have not been provided in the WHPP at this time. The WHPP will continue to evolve as more technical information is collected and more detailed strategies are developed and implemented.

The Wellhead Protection Plan was developed for the Sammamish Plateau Water and Sewer District, which has no jurisdictional control over land-use in the LIV. The WHPP itself has no binding regulatory content, though it brings the need for decision-making regarding groundwater quality management into the proper forum. Decisions regarding preferred strategies, recommended ordinances, or permit requirements will remain firmly in the control of the City of Issaquah and King County. However, based on the information presented in this WHPP, the following observations are offered:

- The dependence on groundwater in the LIV is substantial and is likely to continue for some time. The implications of losing supply capacity in the face of accelerated development and growth are significant;

- The LIV aquifer is complex, and further refinement of the hydrogeologic understanding of the aquifer will not likely keep pace with the land-use pressures on the area. Decisions on groundwater management should therefore be made using conservative assumptions; and

- Restrictive land-use policies in some form are likely, but they can possibly be supplemented with special permitting which would ensure that wellhead protection and groundwater quality management goals are met while offering flexibility and design innovations to landowners. This also provides the opportunity for additional technical information on the aquifer to be collected and incorporated into the existing conceptual model of the aquifer system.

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1. INTRODUCTION

Wellhead protection is a federally-mandated, State-implemented program designed to protect groundwater-based drinking water supplies. The Federal mandate is provided under Section 1428 of the 1986 Safe Drinking Water Act Amendments, and the State Wellhead Protection Program is managed by the Washington State Department of Health (WDOH). The intent of the State's Wellhead Protection Program (WHPP) is to protect potable groundwater supplies through resource management strategies aimed at pollution prevention. The State WHPP operates in conjunction with the Groundwater Management Area (GWMA) Program, Aquifer Protection Program, Critical Aquifer Recharge Area (CARA) Protection Program, and State point and non-point pollution control programs. There are currently no requirements for wellhead protection in the Washington Administrative Code (WAC). However, Water System Plans required under WAC 246-290-100 and WAC 246-290-410 will require wellhead protection plans following a proposed modification to the State Board of Health's Drinking Water Regulations due in the summer of 1993.

The need for wellhead protection manifests itself in a number of ways. The demand for groundwater continues to increase in the Pacific Northwest and in particular Puget Sound and East King County. However, groundwater is an increasingly difficult resource to develop because of competing uses and potential environmental impacts. Thus, existing groundwater resources represent a resource with substantial present value which would be difficult and costly to replace, if damaged.

Public water purveyors have primary responsibility for developing and implementing local wellhead protection programs. Because of the purveyors often limited jurisdictional control, integration and coordination with state, county and local agencies involved in water-resource issues is essential. However, a key aspect of wellhead protection is the emphasis on local control of the wellhead. The nature of wellhead protection is such that local conditions, whether geologic or political, are key in developing working management strategies to protect a well or wells supplying drinking water.

The Lower Issaquah Valley (LIV) is a growing urban/rural area that relies solely on groundwater for drinking water supplies. Groundwater from the LIV is used by residents of the City of Issaquah and the Sammamish Plateau. The Wellhead Protection Plan for the LIV was initiated by the Sammamish Plateau Water and Sewer District (SPWSD), in conjunction with the City of Issaquah. The program was funded by both SPWSD and the City, with a matching grant from the Washington Department of Ecology (WDOE) Centennial Clean Water Fund.

1.1 Study Area

The Issaquah Basin encompasses approximately 61 square miles southeast of Bellevue, Washington (Figure 1). The basin is made up of eight-sub-basins as shown on Figure 2. The Lower Issaquah Valley (LIV) as defined in this report, encompasses approximately 40 square-miles area including four of the eight sub-basins of the Issaquah Basin (see Figure 2). The study area extends from the Issaquah-Hobart Gap to Lake Sammamish, and from Grand Ridge to Tibbetts Creek.

1.2 Background and Major Issues

The two jurisdictional entities in the LIV are the City of Issaquah and King County. The Tahoma and East Sammamish Planning Areas include portions of the LIV (Figure 3). The SPWSD wells are within King County jurisdiction and the City of Issaquah's wells are within City jurisdiction. The SPWSD and City of Issaquah have developed a good working relationship in developing this Plan, and on other water-related issues.

One of the major issues surrounding water resource management in the LIV is the complex interplay of growth management and water resource development. Groundwater represents the sole source of potable water for the City of Issaquah and residents on the Sammamish Plateau. At the same time, the Plateau area and City of Issaquah are growing rapidly and additional water supplies will be needed to meet projected population increases. The geographic location of the LIV, however, is such that inter-ties with regional water sources such as those that serve the City of Seattle and Bellevue are many years away, and may not be feasible in the near term. Thus, the implications of groundwater contamination in the LIV aquifer are serious.

More specific concerns regarding groundwater quality include:

- **Transportation:** The wells serving the City of Issaquah and SPWSD are directly adjacent to Interstate-90. A traffic-related spill of hazardous materials could jeopardize the wells and is a significant concern;

- **Underground Storage Tanks:** There are over 100 underground storage tanks (UST's) in the Issaquah area which store predominantly gasoline products. The impetus for initiating wellhead protection planning was provided in large part by a leaking underground storage tank (UST) in April 1990 at a gasoline service station in the City of Issaquah. The proximity of the spill to SPWSD wells 7 and 8 highlighted the vulnerability of the District's production wells to surface contamination. The District's well 8 has been used very sparingly since 1990, and no contamination has yet been detected in the well. Other UST leaks have occurred in the LIV, and several groundwater investigations, tank removals, leak-detection systems, and even an air-stripper have resulted;

- **Stormwater/Urban Run-off:** Increasing urbanization has resulted in increased stormwater run-off in the LIV. Surface-water studies have examined the effects of stormwater, and have focused on flooding impacts and water quality impacts to streams and wetlands. However, stormwater (when infiltrated to the subsurface) is also a potential chronic source of groundwater contamination, particularly nitrates, metals and petroleum products.

- **Zoning/Density:** Increased growth in the area will result in proposed changes in zoning or density which could affect groundwater quality. The present debate over the proposed Grand Ridge Development is an example of zoning issues. The development is presently within King County's rural zoning designation, with some urban zoning on the western margin. The question of jurisdictional control over land-use in this area is becoming increasingly important and involves some wellhead protection issues.

1.3 Objectives and Scope

There are multiple objectives to the Wellhead Protection Plan (WHPP), summarized as follows:

- Develop and document a technical hydrogeologic evaluation of the Lower Issaquah Valley using existing and newly collected data;
- Perform wellhead protection area delineations for the three existing production well pairs in the LIV;
- Extrapolate possible future WHPA's using projected groundwater withdrawals;
- Perform a land-use and contaminant inventory within the WHPA's;
- Develop a working database for hydrogeologic, water quality, and land-use/contaminant data;
- Identify and rank potential threats to groundwater quality within the WHPA's; and
- Identify management strategies that will reduce the threat of contamination to the LIV aquifer system.

The emphasis of the wellhead protection plan, at this time, has been placed on technical issues and general management recommendations. Specific management issues such ordinances, zoning changes or special permanent requirements are presented in a general context. Specific issues will be addressed in a more formal, jurisdictional forum, as wellhead protection planning matures in the future; becomes integrated into other planning activities in the LIV; and receives more public involvement.

2. SUMMARY OF DATA AND ANALYSES

There have been a number of technical reports and evaluations of the geology and water-resources of the Lower Issaquah Valley. In addition to previous studies, development of the Wellhead Protection Plan entailed a number of field investigations to further refine the understanding of the hydrogeology. The purpose of this section is to summarize the data used in developing the interpretations and summaries presented in the Sections 3 and 4. Section 3 and 4 form the basis for the discussion of wellhead protection area delineation.

There are over 50 wells in the LIV, including high-capacity production wells, domestic wells and environmental monitoring wells. A diverse range of well names have been assigned to the wells in various studies. Because the local names of these wells are most familiar to those involved with the groundwater issues in the LIV, no attempt has been made to re-assign well names or numbers. However, in developing the database, universal well identifiers have been assigned to each well to facilitate data transfer and database management tasks. In the body of the report, the local names of the wells are used.

Figure 4 shows the locations and types of wells present within the lower Issaquah valley and surrounding areas. The breakdown of wells is as follows:

- The City of Issaquah and SPWSD operate seven high-yield production wells (City wells: COI1, COI2, COI4, COI5; and SPWSD wells: SP7, SP8);
- Approximately six high-yield private wells, including Darigold, Lakeside Sand and Gravel, Bell, and Overdale wells;
- Approximately 10 small private wells also exist within the Lower Issaquah Valley;
- Nine monitoring wells were installed as part of a cooperative program between SPWSD and the City of Issaquah. These monitoring wells are comprised of a series of piezometers which are screened across different intervals. They are used for monitoring water-levels and collecting water quality samples from specific water-bearing zones.
- As part of the wellhead protection program, three additional wells were installed for the purposes of water-level and water-quality monitoring, in addition to providing further geologic information.

Table 1 presents the construction details of all of the wells described above. Appendix A contains selected well logs.

2.1 Data Sources

The data used in this study was obtained through a number of existing and on-going studies in the Issaquah Basin and from new data collected as part of the Wellhead Protection Plan. These data sources have been broken down by the agency, or independent group responsible for initiating the study. Consultants are noted as authors of many of the studies.

Sammamish Plateau Water and Sewer District (SPWSD)

Groundwater exploration and development by SPWSD has entailed several studies including:

Well 7/8 Installations & Testing, Carr Associates, 1982-1985. During this period, SPWSD installed and tested two high-capacity production wells in the LIV. Wells SP-7 and SP-8 are completed at depths of between 83 and 148 feet, and 105 and 179 feet below ground, respectively.

Lower Issaquah Valley Resistivity Survey, Carr Associates, 1987. A total of 17 shallow resistivity soundings were performed across the LIV, north of Interstate 90. A Wenner array was used with a maximum a-spacing of 190 feet. Data were somewhat noisy because of electrical and powerline noise.

VT-Series Well Installations, Carr Associates, 1989. A series of monitoring wells (VT-1 through VT-8) were installed as part of ongoing water-supply investigations by SPWSD. Several of these wells were installed in conjunction with the Issaquah Groundwater Management Area (GWMA) program.

SPWSD Well 8 72-hour Pumping Test, Carr Associates, 1990. Wells SP-7 and SP-8 were tested at a combined rate of 5,600 gpm in September, 1990. Water-levels were measured in 17 wells or piezometers and six surface water gages.

SPWSD Well 9 Installation and Testing, Carr Associates, 1993. A new production well (SP-9) was installed near the Lakeside Gravel Pit in 1991. The well is completed at a depth of between 194 and 219 feet at 24-inch diameter and is capable of yielding about 3,200 gpm. Water rights are pending on the well and it is not presently in service. A detailed pumping test was performed in 1992. The well was pumped at a rate of 2,340 gpm for 9 days in July 1992. Water-levels were monitored in 55 wells or piezometers and 15 surface water gages.

SPWSD Wells 7/8 Water Quality Monitoring, Carr Associates, 1991-1992. Regular monitoring of wells SP-7 and SP-8 for volatile organic compounds has been performed since April 1990, when a leaking UST was discovered at a nearby gas station.

Water Supply Contingency Plan, Kennedy Jenks Chilton, 1991. A contingency plan was prepared to identify water-supply options in light of possible limitations related to either aquifer contamination or administrative restrictions on water rights. Fourteen permanent alternatives were evaluated.

Puget Sound Power and Light

Tradition Lake Plateau, Jones Associates 1978. A study conducted for Puget Sound Power and Light investigated the potential impacts from a proposed electrical switching station near Lake Tradition. Field investigations included 11 test pits, six borings up to 54 feet in depth, surficial geologic mapping, and surface water quality sampling. No permanent wells were installed, but groundwater flow directions were inferred based on the exploration program.

Issaquah Basin Groundwater Management Area Program (1986-ongoing)

The Issaquah Basin Groundwater Management Area (GWMA) Program was started in 1986. A draft report on the hydrogeology of the Basin (Task 5) was prepared in March, 1993. Hydrogeologic investigations carried out as part of the program have included the following:

Development of a well log database;

One round of water quality sampling in the basin, including two wells in the LIV;

Water-level monitoring in the basin between 1989 and 1992, including wells located within the LIV;

Installation of one monitoring well at the Issaquah Gap;

Precipitation monitoring within the basin, including six stations in the LIV; and

Stream monitoring within the basin, including five gages within the LIV.

King County Surface Water Management

King County SWM have been active in water-resource related activities in the Issaquah area, focusing primarily on surface water. Two important studies recently completed by SWM include:

Current/Future Conditions & Source Identification Report (1991). This report documents surface water conditions in the Issaquah Creek basin planning area. Field investigations and hydraulic simulation modeling were performed during 1990 and 1991 to document current conditions and predict future conditions resulting from land-use changes.

Issaquah Basin Non-Point Pollution Plan, Draft, February, 1992. This plan is a combination of a basin plan and a non-point action plan. Basin planning aspects include stormwater management and stream and wetland habitat protection. Non-point pollution aspects include identifying actions to prevent and remedy pollution from non-point sources. The plan systematically identifies goals and approaches to solving various problems (e.g., flooding, water quality) and proposes specific recommendations for the basin as a whole and for specific sub-basins. Some of these approaches and recommendations overlap with WHPP elements.

Lakeside Sand & Gravel

Exploration associated with mining of the gravel pit has resulted in a number of boreholes on the western margin of Grand Ridge, and conceptual discussions of geologic processes in the area. Specific reports include:

Cascade Testing 1978: This study presented a geologic history and conceptual geologic model of the gravel pit area. A total of 12 borings were drilled up to 120-feet in depth to determine the extent of gravel materials and depth to till.

Meriwether Leachmen 1984: This study summarized previous work and updated the conceptual geologic model. A total of 11 borings were drilled up to 160 feet in depth to determine the extent of gravel materials and depth to till.

Other Studies: Additional geologic work at the gravel pit has included a geophysical survey, (Koenen 1980), and miscellaneous letters and reports relating to sand and gravel reserves.

Blackhawk/Port Blakely - Grand Ridge 1992

The proposed Grand Ridge Master Plan Development (MPD) has involved geotechnical and surface water investigations of the area. Finalized reports of these investigations are not yet complete but data and information collected on Grand Ridge has been provided by the property owner for use in developing the Wellhead Protection Plan. This information includes surface geologic mapping, well logs for eight monitoring wells, results of single well hydraulic tests (slug tests) in five of the eight monitoring wells, and water-level measurements in eight wells during November, 1992 and January, 1993. In addition, a geographic information system (GIS) was developed and provided to the WHPP containing graphical database information on geology, wetlands, soils, and topography.

Arco Corporation 1990-1992

The leakage of an unknown quantity of gasoline from an underground storage tank at the Arco station at the corner of Gilman Boulevard and Front Street resulted in a comprehensive evaluation of groundwater conditions and water quality at the site. Interim reports, water quality data and final assessments of the site were provided by the site owner to the Wellhead Protection Program. The cleanup action at the site included:

- Removal of six UST's and replacement with double-walled systems;
- Removal of 84,000 gallons of groundwater from the excavation;
- Removal of 1,540 cubic yards of soil;
- Installation, water-level monitoring, and water-quality sampling of 21 monitoring wells;
- An eight-hour pumping test;
- Installation of two recovery wells and pumping of 4 million gallons of groundwater; and
- Installation of a bio-venting system to remove hydrocarbons from soils.

Lower Issaquah Valley Wellhead Protection Plan 1991-1993

The Wellhead Protection Program involved a comprehensive hydrogeologic evaluation of the LIV based on extended monitoring, field data collection and groundwater modeling. The data collection activities carried out as part of this Plan include:

Monitoring Wells — Three monitoring wells were installed during August 1992 for the purpose of establishing groundwater quality monitoring capabilities in previously un-monitored areas that could potentially be affected by contamination. One well (WH-1) is located on East Sunset Way, along the eastern boundary of the LIV, and was positioned to monitor groundwater influx from the East Fork Issaquah Creek Valley. Two wells (WH-2 and WH-3) are located along Gilman Avenue, and were positioned to monitor groundwater flowing southwest through the commercial Central Issaquah area. Well logs are presented in Appendix A.

Water-level Monitoring — Water-levels have been measured from 26 wells throughout the lower Issaquah valley area. Five wells have been monitored regularly since 1989 or 1990 (COI1, COI2, COI4, COI5, SP-7, SP-8 SPVT3) through the GWMA program. Water-levels were also collected from a number of private domestic wells, private production wells, and monitoring wells. Water-levels in some of the wells were measured automatically using pressure transducers and data loggers. Water-levels in the remaining wells were measured by hand. Water-levels from monitoring wells installed near the ARCO service station were also supplied to the WHPP. Table 2 presents a summary of the water-level monitoring data collected from the wells throughout the LIV, and Figure 4 shows the well locations. Water-level hydrographs are presented in Appendix B.

Hydraulic Tests	Short-term single well permeability tests were performed in eight wells to determine near-field hydraulic conductivity. These data were used in conjunction with large-scale pumping test data to evaluate the hydraulic properties of the aquifer. Table 3 summarizes the hydraulic testing activities conducted as part of the WHPP. The results of these analyses are presented in Appendix C.
Geophysical Logging	Borehole geophysical logs were run in wells VT-5, VT-6, VT-7 and VT-8, in order to evaluate the geo-electrical properties of the underlying sediments. A Geonics EM-39 borehole induction EM tool was run in these boreholes to determine the relative electrical conductance of the sediments outside the borehole. The logs provided a basis for determining the feasibility of a comprehensive surface geophysical survey to map the location of potential low-permeability layers within the aquifer at depth. The results of these analyses are presented in Appendix D.
Resistivity	Six deep-penetration resistivity soundings were performed around the eastern margin of the LIV and on Grand Ridge to evaluate possible bedrock depths. The locations and results of these soundings are presented in Appendix D.
Stream gaging	A one-day stream gaging survey was carried out in May, 1992 to evaluate relative streamflows along the East Fork, North Fork, and Lower Fork of Issaquah Creek. The results of these analyses are presented in Appendix E.
Mini-piezometers	Shallow "mini-piezometers" were installed at six locations along the North Fork and Lower Fork of Issaquah Creek. These piezometers are designed to monitor water-level conditions directly beneath the stream, and provide information on the interaction between surface-water and groundwater. The location, design, and results of these installations are summarized in Appendix E.
Water Quality Monitoring	Water quality was monitored in a total of 25 wells during three sampling rounds conducted in May, 1992, August, 1992, and March 1993. The analyses and analytical procedures are summarized in Appendix F, and included priority pollutant metals, volatile organic compounds, pesticides, herbicides, basic cations and anions, and field parameters. All samples were collected according to QA/QC procedures outlined in the QA/QC and DCAP prepared for the WHPP Work Plan. Table 4 summarizes the water quality monitoring activities conducted as part of the WHPP. The results of these analyses are presented in Appendix F.
Dissolved Oxygen	Field analysis for dissolved oxygen was performed on 10 wells in August, 1993 to assess the potential for biological activity within the

aquifer that could be responsible for aerobic breakdown of dissolved hydrocarbon in groundwater. Table 4 summarizes the water quality monitoring activities conducted as part of the WHPP. The results of these analyses are presented in Appendix F.

2.2 Data Analysis Products

Analysis of the data described in Section 2.1 produced a number of interpretive results which form the basis for the delineation of wellhead protection areas. These analysis products include:

- Conceptual model of hydrogeologic processes in the LIV;
- Geologic cross-sections;
- Water-level elevation maps;
- Water-level hydrographs for wells in the LIV;
- Streamflow analysis of the Lower Issaquah Basin, North Fork Basin and East Fork Basin; and
- Analysis of horizontal and vertical hydraulic gradients;
- A water balance for the LIV;
- A groundwater flow model, calibrated to existing data and consistent with the conceptual hydrogeologic model; and
- A water-quality assessment of the LIV.

Much of the information utilized in this study was maintained in a geographic information system (GIS). A GIS provides capabilities for evaluating a variety of types of information in a map format, or as a relational database. An ArcInfo GIS was used to store, display, and review the following datasets or layers:

- Township, Range and Section;
- Northings/Eastings (NAD 87);
- Geology;
- Land-use;
- Transportation/Roads;
- Streams and Lakes;
- Wetlands;
- Wells; and
- Chemical Handlers/Underground Storage Tanks.

Many of these datasets were provided to the WHPP in a digital format and merged into a single GIS system. Overlays of various layers or queries regarding relational data were used in WHPP analyses. The GIS can constitute a basis for continued database management and presentation for on-going wellhead protection activities.

3. HYDROGEOLOGIC SETTING OF THE LIV AQUIFER SYSTEM

The hydrogeologic setting of the Lower Issaquah Valley forms the basis for the delineation of wellhead protection areas and an assessment of strategies for aquifer protection. The hydrogeology of the LIV is complex. Complexities arise from the topographic, geologic and hydrogeologic conditions that control groundwater flow in the Valley. The data collected for the WHPP provides a more complete understanding of the area, but uncertainty and data gaps remain. The scope of the Wellhead Protection Program, though broad, cannot address all remaining uncertainty. In order to propose conservative, consistent and manageable strategies for wellhead protection, simplification of the system is necessary. The purpose of this section is to summarize the geology and hydrogeology of the LIV based on existing information, and to outline the simplified conceptual models used in developing the Wellhead Protection Areas.

3.1 Geology

Glaciations that occurred throughout the Puget Sound area are largely responsible for the geologic features occurring in the Issaquah area. As such, glacial stratigraphy and depositional environments dominate the discussion of the geology. A geologic map of the LIV is presented on Figure 5.

3.1.1 Stratigraphic Units

Stratigraphic relationships are important in defining the hydrogeology of the LIV. The names assigned to various units provide a means of clearly describing the geology and hydrogeology of the area.

The pre-glacial bedrock geology of the LIV area consists of Tertiary-aged sandstones and volcanic rocks. This bedrock is exposed primarily in the higher elevations, on Squak Mountain and Tiger Mountain (south of Issaquah), on Grand Ridge (east of Issaquah), and in the area just north of the North Fork of Issaquah Creek.

Sediments deposited during the glacial and interglacial episodes are the most prevalent in the LIV and include:

- Coarse sands and gravels, termed outwash and ice-contact deposits, which are deposited at the front and sides of the advancing or retreating glacier;
- Glacial till which is deposited at the base of the glacial ice sheet; and
- Fine-grained silts and clays, which are deposited in lakes at the margins of the glacier.

Alluvial sediments deposited since the last glacial period range from sands and gravels to fine-grained silts and clays.

A recent study of the surficial geology of the Issaquah area (Booth, 1990) serves as the basis for the classification of the geologic stratigraphy of the Issaquah area. For the purposes of this work, the geology of the area has been grouped into seven units, including bedrock, recent Alluvium, Vashon Recessional Outwash, Vashon Till, Vashon Advance Outwash, older Nonglacial deposits, and older Undifferentiated Glacial deposits. The geologic stratigraphy of the LIV is summarized on Table 5.

3.1.2 Structural Features

The dominant bedrock structure in the area is the trough now occupied by Lake Sammamish. Prior to the glaciations, Tertiary-aged bedrock was faulted and folded by the tectonic forces responsible for the formation of the Cascade Mountain range. The trough now occupied by Lake Sammamish was formed by tectonic deformation and erosion prior to glacial activity (Curran, 1965). Another major structural feature is an inferred major bedrock fault trending east-west from Bainbridge Island to the East Lake Sammamish Basin (Gower and others, 1985). The fault creates one of the largest gravity anomalies in the country and is thought to plunge steeply to the north.

Glacial and unconsolidated deposits within the LIV area have been penetrated to depths of over 600 feet in the central portion of the valley. Glacial sediments occur along the margins of the valley to depths of at least 300 feet in places. Unconsolidated sediments thin eastward toward the higher elevations. The thickness of the unconsolidated deposits decreases southward towards the Issaquah Gap, and the study area boundary. Bedrock is encountered at depths of less than 100 feet in this area.

3.1.2 Geologic History

Glacial ice entered the Puget Sound in late Pleistocene time (maximum extent about 15,000 years ago). The ice that occupied the Puget Sound area is known as the Puget Lobe of the Cordilleran Ice Sheet, which occupied northwestern North America in the early to late Pleistocene. Within the Issaquah area, only deposits of the final glaciation, known as the Vashon Glaciation, can be differentiated with certainty. The Vashon glacier originated in British Columbia, and flowed in a southern to southeastern direction through the Issaquah area (Curran, 1965). A proglacial lake of limited extent formed in front of the advancing glacier. Melt waters flowed south through channels east and west of Squak Mountain, depositing sand and gravel. As the glacier advanced, it modified the previously existing topography and deposited glacial till. Outwash sediments in front of the advancing glacier were often destroyed and reworked by the glacier. At its maximum extent, the glacier extended far south of Issaquah and may have been more than 3,000 feet thick in the Issaquah area.

The glacier is thought to have begun receding approximately 13,000 years ago. The recessional phase of the Vashon Glaciation is the most important to the geologic history of the LIV. Based on evidence of a series of drainage channels, deltas, and ice-contact topography within the Issaquah area, Curran, 1965 reconstructed the recessional history of the Vashon glacier, which is summarized graphically on Figure 6 and discussed briefly below.

During recession of the Vashon Glacier, several episodes of ice stagnation occurred, which established stream drainages and associated depositional features and sediments. Curran (1965) recognizes seven periods of ice stagnation. Three of these stages are presented on Figure 6. During these periods of ice stagnation, depositional features formed within the LIV. Booth (1990), recognizes five depositional stages summarized as follows:

- Stage 1 (oldest): Consists of valley-wall and ice-contact sediments, located near the south end of Lake Sammamish, which were deposited when the glacier still occupied the Sammamish trough. Meltwater drainage was to the south along Issaquah Creek and Tibbetts Creek;

- Stage 2: As the glacier receded farther north through present-day Issaquah, Glacial Lake Sammamish formed in what is now the LIV. Melt waters flowed from the east along the North and East Forks of Issaquah Creek and deposited large deltas as they entered Glacial Lake Sammamish. Drainage out of Glacial Lake Sammamish at this time was still directed to the south through the Issaquah Gap and through Tibbetts Creek valley;

- Stage 3: The glacier continued to recede, and meltwaters entering Glacial Lake Sammamish through the North Fork of Issaquah Creek, where a large delta formed. The outlet drainage of Glacial Lake Sammamish continued to shift to the northwest through the Cedar Grove, Kennydale, and Eastgate Channels (now occupied by I-90). The deltas along the eastern shore of Glacial Lake Sammamish continued to form at this time;

- Stage 4: The glacier receded still farther, and the outlet drainage continued to shift farther to the north to the Inglewood channel. Streamflow through the eastern melt-water channels along the present North and East Forks of Issaquah Creek decreased substantially, as meltwaters began entering the lake from channels farther north. At this time, the lake occupied all of the present lake area and also the lower Issaquah valley area; and

- Stage 5 (Youngest): This deposit consists of a low delta located just south of Issaquah occurring at elevations of between 100 and 150 feet msl, which formed during the last stage of glacial recession.

The glacier continued to recede until melt waters eventually ceased entering the lake, and the present drainage to the north was established. Lake Sammamish reduced in size to near its present configuration during this time.

3.1.4 Surface and Sub-surface Geology

The surface geology in and adjacent to the LIV is shown on Figure 5. The map shows the surficial distribution of sediments in the LIV area. Of particular importance to this study is the distribution of recessional outwash and ice-contact deposits (shaded green). These coarse-grained high permeable materials readily transmit infiltration downwards to underlying aquifers. In the lower Issaquah valley area, a relatively thin veneer of alluvium occurs in association with the major streams and lowland areas. Beneath these sediments exist a complex series of sand and gravel units, separated by silt and finer-grained units. There is no indication of glacial till in logs of wells in the Valley floor.

Along the western margin of the lower Issaquah valley, older Undifferentiated pre-Vashon glacial sediments have been mapped near Tibbetts Creek.

Along the eastern margin, investigations at the Lakeside Gravel Pit have provided information on the nature and stratigraphy of the delta and older glacial deposits in the areas. Early exploratory drilling indicated the presence of older glacial sediments and a non-glacial interval at the site. A sequence of older glacial drift, inter-glacial sands, gravels and shallow lake deposits was hypothesized as underlying the Vashon deposits (Cascade Testing Laboratory, Inc., 1978). Later reports indicated that mining was depleting the deltaic materials and that recessional outwash materials (overlying the till) became the predominant material extracted from the pit. More recent investigations in the northeastern quarter of Section 27, suggest that the thickness of the recessional deposits which overlie Vashon till varies significantly (Meridian Mineral Company, 1985). The till occurring at ground surface in this area has been described as a sandy till in the exploration borehole logs. This till may be an ablation till which formed from materials occurring within and on top of the snout of the glacier. As such, this till may be considerably more permeable than the basal till which is typically over-consolidated as a result of compression by overriding ice.

Three geologic cross sections for the LIV are shown on Figures 7, 8 and 9. Cross-sections A-A' and B-B' are constructed east-west, across the deltaic landform. Cross section C-C' is constructed along the axis of the LIV from the Hobart Gap to Lake Sammamish. The general dip of sand and gravel units is from the east to the west at approximately 20 degrees. This is interpreted as forest bedding of the deltas that once formed at the mouths of the North and East Forks of Issaquah Creek. The interbedded sand, gravel and silts encountered between 240 and 450 feet in COI-TW is consistent with the dip of the forest beds of the delta. This suggests that the deltas may have extended into the LIV trough by as much as 3,000 feet.

The cross-section on Figure 9 shows the interpreted bedrock configuration, with an increase in depth to bedrock north of the East Fork of Issaquah Creek. There also appears to be a general decrease in coarse-grained sediment towards Lake Sammamish. This is consistent with increased deposition of lacustrine sediments in Glacial Lake Sammamish, at greater distance from the eastern stream inlets and their associated coarser-grained deltaic deposits.

3.1.5 Conceptual Geologic Model

The conceptual geologic model for the area is based on the depositional environments present within the LIV during the Vashon Glaciation.

The main components of the model are as follows:

- The pre-glacial bedrock (Sammamish trough) forms a deep bowl in the LIV between the East Fork and Lake Sammamish. This structure received large amounts of sediment from the North, East and Lower Forks of Issaquah Creek during glacial periods. Between the East Fork and Hobart Gap, bedrock depths are shallower and more uniform, typical of an erosional river channel;

- The receding glacial ice created a complex sequence of channel features and pro-glacial lakes in the LIV. Lake levels varied, but were as much as 450 feet above sea-level during recession of the glacier. Deltas prograded into the LIV along the North Fork and East Fork drainages, depositing coarse sands and gravels as well as finer silts and fine sands. The deltaic deposits plunge beneath the present valley floor, extending as much as 3,000 feet into the LIV. The deltaic sediments interfinger with finer-grained lacustrine deposits to the west and north;

- Continued glacial retreat lowered lake levels in the LIV and reduced the amount of sediment entering the LIV as alternative drainages were established to the north towards Redmond. Sediments deposited at this time overlie the deltaic sediments within the LIV. Post-delta sediments are highly variable, but generally finer grained than the deltaic deposits;

- Recent alluvial stream deposits, were finally deposited over most of the LIV and range from coarse sands and gravels to finer sands and silts; and

- The complexity of the stratigraphy within the valley is due in part to frequent changes in the level of Lake Sammamish and to changes in the discharge rates and sediment loads of the inlet meltwater streams.

3.2 Hydrology

This section summarizes the hydrologic characteristics of the Lower Issaquah Valley. More detailed studies of the surface-water hydrology of the area have been carried out by King County SWM and METRO (SWM, 1991; SWM, 1992, METRO, 1981). The intent of this section is to provide a brief overview of the conditions in the LIV.

The Issaquah basin covers a 61 square-mile area including Issaquah Creek and Tibbets Creek. There are seven precipitation gages in the Issaquah basin, six of which are in or near to the LIV. Annual precipitation within the LIV ranges from 50 to 60 inches per year, based on 1988 data collected as part of the Issaquah GWMA. Mean precipitation at the nearest long-term gage at Landsberg is 57 inches. In general, precipitation increases with elevation.

There are ten operating stream gages within the Issaquah Basin, four of which are within the LIV study area (Figure 10). Figure 10 shows the mean annual flow at these gages. These flows were developed by SWM during HSPF simulation modeling of the Issaquah Basin. The detailed analysis by SWM of long-term hydrologic data incorporates important variations in precipitation and run-off and is considered the most representative description of average current hydrologic conditions in the basin. Unit area discharges range from 0.06 to 0.12 cfs/acre (SWM, 1990). These are relatively large due to high precipitation, steep topography and impermeable bedrock and till exposures.

A summary of 1990 monthly average flows for these four gages (46A, 14A, 67A, and 25C) is presented in Appendix E. Average 1990 monthly flows on the North Fork (gage 46A) range from 1.26 cfs in August to 38.67 cfs in January, with an annual average flow of 9.34 cfs. Average 1990 monthly flows on the East Fork (gage 14A) range from 3.89 cfs in September to 72.25 cfs in February, with an annual average flow of 26.9 cfs. Average 1990 monthly flows on the Main Fork near the Issaquah Gap (gage 25C) ranged from 1.6 cfs in September to 36.4 cfs in January, with an annual average flow of 14.26 cfs. Average 1990 monthly flows on the Main Fork near the mouth at Lake Sammamish (USGS gage) ranged from 28.4 cfs in September to 334 cfs in January, with an annual average flow of 133 cfs. This gage is located nearly one mile south of the mouth of Lake Sammamish, above the wetland area. There is no gaging data on the Main Fork of Issaquah Creek near its confluence with the East Fork.

The availability of streamflow data and hydrologic modeling in the basin allows an estimation of groundwater recharge based on hydrologic data for the individual sub-basins. Evaluation of individual sub-basins indicates that there is significant recharge to groundwater on an annual basis, which can be calculated as a residual hydrologic component based on precipitation, run-off and average streamflow using the following equation:

$$Q_r = P*F - \frac{Q_S}{A} - ET$$

Where

Q_r = Recharge to groundwater (ft)
P = Long-term Annual Precipitation at SeaTac (ft)
F = Precipitation Adjustment for elevation of sub-basin
A = Area of sub-basin (ft^2)
ET = Evaporation based on pan measurement at Puyallup (ft)
Q_s = Annual streamflow volume at outlet of sub-basin (ft^3)

Using the data developed by SWM, recharge rates for each sub-basin were calculated (See Appendix E). These infiltration estimates, based on streamflow and climatic data, are as follows:

- North Fork Sub-Basin (area = 2,855 acres): 1.3 cfs
- East Fork Sub-Basin (area = 5,606 acres): 4.6 cfs
- Lower Fork Sub-Basin (area = 35,080 acres): 16.2 cfs
- Tibbets Creek Basin (area = 3,460 acres): 0.3 cfs

Total annual groundwater recharge is therefore estimated at 22 cfs based on hydrologic analysis. This value is similar to other estimates (CH2M Hill, 1993; Carr Associates, 1993). Increased streamflows caused by increased run-off within a sub-basin will reduce groundwater recharge. The SWM analysis evaluated the effect of future land-use on peak flows and flooding in the basin and concluded that peak flows could increase 14 to 78 percent. An analysis of the possible increase in mean annual flow was not carried out, but similar increases are possible, resulting in similar decreases in groundwater recharge.

3.3 Hydrogeology

This section summarizes the hydrogeologic characteristics of the LIV based on available data.

3.3.1 Hydrogeologic Units

The sediments occurring within the LIV consist of stratified silt, sand, and gravel deposits of fluvial, glacial, and lacustrine origin. In an attempt to understand the hydrogeology of the area, the geologic materials were organized into hydrostratigraphic units which have similar hydraulic characteristics, as summarized on Table 5. The hydrostratigraphy has been grouped similarly to the geologic stratigraphy into 7 separate units: Alluvium, Recessional Outwash, Delta, Till, Lacustrine, Undifferentiated Glacial Drift and Bedrock. This hydrostratigraphy differs from the geologic stratigraphy in that the recessional deposits are sub-divided into deltaic and non-deltaic sediments. The general characteristics of each unit are shown on Table 5. A discussion of the hydrogeologic characteristics of each unit follows.

Alluvium occurs near ground surface to depths of 20 feet or more. It is associated with recent fluvial (stream) activity and also occurs throughout the lowland areas. Saturated alluvium may constitute a shallow perched aquifer, or may be continuous with a more extensive unconfined aquifer within underlying recessional and deltaic deposits.

Recessional Outwash occurs in the elevated terrain on each side of the LIV, particularly throughout the eastern area (Grand Ridge and Lake Tradition Plateau). It occurs at or near ground surface and may reach depths of more than 100 feet in places. Water-levels and aquifer properties of the Recessional Outwash are not well known since only a few wells are completed in this material. Saturated recessional outwash may form locally perched aquifers on the upland areas depending on the underlying materials. It may also constitute part of a more extensive unconfined aquifer.

Delta Deposits are geologically and chronologically consistent with recessional outwash and are not subdivided in geologic studies. However, the delta deposits constitute a distinct hydrogeologic unit because of their distribution, extent and hydraulic properties. Deltaic sediments occur along the eastern edge of the valley, and plunge beneath the valley floor to the west. They are the result of fluvial deposition from the North Fork and East Fork glacial drainages. Delta deposits form the high-permeability aquifer tapped by the City's and District's wells. Saturated deltaic deposits may constitute locally confined to semi-confined aquifers, due to interfingered fine-grained lacustrine and alluvial deposits. However, continuous confining layers are unlikely within the delta deposits, and therefore on a regional scale the delta deposits constitute an unconfined aquifer.

Till occurs in the eastern and western elevated terrain, either near ground surface or below Recessional Outwash. Till is not present in the central portion of the Valley or at its margins because it was eroded and re-worked by glacial processes in the Sammamish trough. The till may act as a low-permeability perching layer on the upland areas which creates small perched aquifers within the Recessional Outwash. On the Tradition Lake Plateau, Lake Tradition is likely perched, in part, by an underlying till layer. Till is not generally considered an aquifer, but it is capable of transmitting groundwater. The Lake Tradition and Grand Ridge uplands, though "perched" above the till, transmit recharge to the LIV through the till or through erosional windows within it. Similarly, the more permeable sandy ablation till on Grand Ridge may transmit more groundwater than silty/tills located elsewhere.

Lacustrine sediments interfinger with the Delta deposits, and may form regionally extensive clay/silt layers in the lower portion of the valley near Lake Sammamish. Lacustrine interbeds within the deltaic deposits are typically discontinuous and difficult to correlate between borings. There is little supporting geologic or geophysical evidence for extensive clay/silt layers could constitute regional aquitards.

Undifferentiated Glacial Drift is inferred to exist in places beneath Vashon Glacial till in the eastern elevated terrain, and, for simplicity, is assumed to include Vashon Advance Outwash materials. Little is known of the hydraulic characteristics, or the thickness or extent of these deposits. This pre-Vashon drift may overlie bedrock in the eastern highland area.

Bedrock occurring within the study area is believed to have much lower permeability than most of the unconsolidated deposits. In comparison to the unconsolidated materials, very little groundwater is expected to move through the bedrock.

3.3.2 Hydrogeologic Boundaries

Hydrogeologic boundaries can restrict groundwater flow (e.g. bedrock boundaries) or can enhance groundwater flow (e.g. stream boundaries). They also constitute the ultimate source areas and discharge areas of the aquifer system. The boundaries recognized in the LIV aquifer system are as follows:

- The LIV aquifer is bounded below by low-permeability bedrock, and by bedrock outcrops occurring in the higher elevations along the margins of the groundwater basin. The assumed low permeability of the bedrock constitutes a no-flow boundary to the base of the aquifer;

- The LIV aquifer is bounded on the north by Lake Sammamish, which is a regional discharge area for the aquifer. All groundwater flowing through the LIV aquifer ultimately discharges to Lake Sammamish, the wetland area directly south of the Lake, or to Issaquah Creek which drains into Lake Sammamish;

- The LIV aquifer is bounded on the south by shallow bedrock at the Issaquah Gap;

- The uppermost boundary to the LIV aquifer is the most complex, consisting of wetlands, streams, lakes, open-space (recharge areas), and urbanized areas. The water entering the groundwater flow system originates from precipitation within the confines of the groundwater basin. Streams may "lose" water to the aquifer, "gain" water from the aquifer, or have no interaction with the aquifer. Lake Tradition likely contributes water to the aquifer through vertical infiltration from the Tradition Lake Plateau to the LIV aquifer. Urbanized areas tend to reduce the natural infiltration to the aquifer through stormwater collection. Undeveloped open areas and rural residential areas represent potential recharge areas to the aquifer.

3.3.3 Groundwater Elevations

Groundwater elevations, or water-table elevations, determine, in part, the rate and direction of groundwater flow. Elevations are referenced to mean sea-level (msl). Groundwater flows from high elevations to lower elevations, at a rate proportional to the slope of the water-table and the hydraulic characteristics of the aquifer. Groundwater elevations fluctuate in a somewhat predictable fashion because of annual fluctuations in precipitation and groundwater recharge. The annual high and low groundwater elevations are typically used to evaluate the general behavior of the aquifer. The high and low water-table configuration based on observed water-levels is shown on Figure 11. Water-level elevations are extrapolated to the western portion of the Valley based on assumed conditions. There are very little data regarding groundwater conditions in the western LIV.

Seasonal high groundwater elevations in the LIV occur in February, based on 1992 data, and range from 150 to 200 feet in the South Issaquah/Hobart area to approximately 50 feet about two miles south of Lake Sammamish. Groundwater elevations in the immediate vicinity of Lake Sammamish are uncertain, because no wells exist in this area. However, groundwater elevations are expected to approach 25 feet near the lake, which is the average elevation of Lake Sammamish. Seasonal high groundwater elevations in the central valley area, where most of the wells are located, vary from approximately 60 to 70 feet. Groundwater elevations increase to the east to as much as 80 feet or higher.

Seasonal low groundwater elevations occur in August and September, based on the 1992 data, and range from 150 to 160 feet in the South Issaquah/Hobart area to approximately 47 feet approximately two miles south of Lake Sammamish. Seasonal low groundwater elevations in the central valley area, where most of the wells are located, vary from approximately 55 to 60 feet.

Little data are available on Grand Ridge and Tradition Lake Plateau. Recently installed shallow wells at the proposed Grand Ridge development indicate that groundwater elevations vary from about 400 feet to over 800 feet, and are likely representative of shallow perched aquifers over low-permeability bedrock or till. Groundwater-levels in a private well (Dean Well) located west of the proposed development are relatively constant at approximately 338 feet. This well is completed below till.

3.3.4 Groundwater-Level Fluctuations

Fluctuations in groundwater-levels are often indicative of the overall behavior of the aquifer, the location of recharge/discharge areas, and the response to recharge/infiltration.

In general, the LIV aquifer responds very quickly to precipitation events. These water-level responses are seen in both shallow and deep wells. This response suggests continuity with the ground surface and/or stream network. Additionally, the wells in the LIV respond to pumping of the various production wells in the area. Short-term fluctuations are clearly observed in response to the Lakeside Gravel Pit, which operates wells on an eight-hour work-day schedule. Figure 12 shows a hydrograph of one shallow monitoring well at the ARCO site. The hydrograph shows the short-term fluctuations in water-level caused by pumping at Lakeside, short-term and longer term declining and rising water level trends due to climate, and the effect of pumping at SPWSD well 9. The various responses result in "noise" in long-term water-level observation caused by these short-term effects.

Within the valley area, the annual change in groundwater elevations was between 7 and 10 feet in 1992. Greater annual fluctuations of up to 15 feet occurred in the vicinity of SPWSD-7/8. The annual change in water elevations appears to decrease to 7 feet or less north towards Lake Sammamish, while higher annual water-level fluctuations of 10 feet or more occur south and east of the central valley area.

Although, the annual groundwater-level fluctuations observed in 1992 appeared to be greater in the south and less in the north, there are no apparent differences in the magnitude of fluctuation associated with the depth of the wells and piezometers. For example, the same annual water-level fluctuation was observed in each piezometer installed in SPVT-7. Furthermore, each monitored zone appears to respond at the same time to recharge and discharge, with the exception of some of the wells located towards the south (COI1/2). This suggests that the permeable zones encountered at various depths all respond in a similar fashion to recharge and discharge, and thus, on the large-scale, essentially behave as a single aquifer unit.

3.3.5 Directions of Groundwater Flow

Groundwater generally flows northwestward through the LIV area and discharges to Lake Sammamish, or the wetland area immediately south of the Lake. Groundwater flow converges on the central valley area from the North Fork, East Fork and Lower Fork Sub-Basins of Issaquah Creek. Flow directions in the Wester LIV (near Newport Way) are not well known. The deltaic sediments of the North and East Forks readily transmit groundwater downwards into the LIV from the upland areas, causing steep hydraulic gradients at the margins of the valley then flatter within the delta itself.

Groundwater flow directions in the Grand Ridge and Tradition Lake areas are less certain, because of a lack of wells and water-level measurements. It is presumed that flow mimics topography and is primarily westward toward the Issaquah Valley, with components of flow directed towards the North Fork (particularly the wetland areas) and the East Fork valleys. Near the western margins of these areas, vertical infiltration through the deltaic sediments probably dominates. Quasi-horizontal flow may occur along distinct delta strata, but the continuity of individual strata within deeper zones in the LIV aquifer cannot be substantiated.

Groundwater elevations vary throughout the year in response to winter and spring recharge. The direction of groundwater flow within the valley appears to shift from a primarily northern direction during the summer and fall, to a northwestern direction during the winter and spring (see Figure 11). This is noted in the WHPP wells as well as the monitoring wells at the ARCO site (Geraghty and Miller, 1991). This westward shift in flow direction indicates a large influx of groundwater from the east during the winter and spring. This has important implications with regard to the source of recharge to the aquifers within the valley, and well capture zones.

3.3.6 Hydraulic Gradients

Hydraulic gradients are indicative of the rate of groundwater movement and are important in determining the time of travel (TOT) typically used in delineating wellhead protection areas. Gradients are unitless parameters, equivalent to a slope.

The average horizontal hydraulic gradient within the central valley area, based on 14 wells, is relatively flat at between 0.001 and 0.002. Hydraulic gradients are less well known on Grand Ridge and Tradition Lake area. Within the proposed Grand Ridge development, the horizontal gradient is about 0.067, one order of magnitude higher than in the Lower Valley.

Vertical gradients are also important since they indicate the upward or downward component of groundwater flow. In general, downward gradients are expected in recharge areas and upward gradients are expected in discharge areas.

The vertical hydraulic gradients vary considerably (orders of magnitude) throughout the Lower Valley area from a magnitude of 8.9×10^{-6} to 1.7×10^{-1}. In general, the vertical gradient is, as expected, directed upward in the northern area near Lake Sammamish. Primarily downward vertical gradients occur in the central valley area, probably as a result of the high-volume pumping within this area. Locally, both upward and downward gradients may be created because of the completion interval of the production wells, which may induce downward leakage from above and upward leakage from below. At SPWSD 7/8, the vertical hydraulic gradient appears to be downward from the surface to the 117-foot completion interval and upward from the deeper 177-foot completion to the 117-foot completion interval.

Vertical gradients on Grand Ridge and Tradition Plateau are unknown. However, the vertical gradient is directed upward along the flanks of the Tradition-Lake area (near WH-1, and COI1/2). The upward gradients in this area may be the result of infiltration originating from higher elevations at a high head and discharging to the lower valley area.

In general, the vertical hydraulic gradients observed within the LIV in 1992 appeared to remain relatively constant throughout the year, with the exception of wells COI1/2 and SPVT6. At these sites, the vertical gradient decreased between the winter/spring recharge period and summer/fall period, when the vertical gradients are at a minimum. This trend suggests that recharge to the deeper sediments during the winter/spring may increase the upward vertical gradient in places and then decay during the ensuing dry period.

3.3.7 LIV Aquifer Characteristics

Geologic logs within the LIV are insufficient to fully delineate the thickness and extent of the LIV aquifer system. The present understanding of the system indicates that total sediment thickness ranges from over 600 feet the central LIV near COI 4/5; to 300 feet at the Grand Ridge margin of the LIV (SPWSD 9); to 150 feet at the Lake Tradition margin of the LIV (WH-1); to 63 feet at the Hobart Gap (RP-1). Actual aquifer thicknesses are assumed to be similar to sediment thicknesses, since there is little regional geologic continuity between strata.

Production wells within the LIV tap highly permeable aquifers. Testing of these wells has provided data on the hydraulic characteristics of the aquifer. These aquifer characteristics are summarized on Table 3.

Carr/Associates conducted a 3-day pumping test of Wells 7 and 8 between September 12 and 15, 1990. The wells were pumped at a combined rate of 5,600 gpm. During the test, water-levels were monitored in 17 wells and at 6 surface water stations. The 17 monitoring wells included 11 piezometers and 6 production wells. During the test water-levels in the observation wells were drawdown between 1 and 3 feet, and the cone of depression extended a distance of approximately 7,000 feet from the pumping wells. Analysis of the pumping test was complicated to some degree by interference resulting from the pumping of other production wells, and by the complex hydrogeologic environment of the valley. Based on the test, a transmissivity of approximately 67,000 ft^2/d was calculated (Carr/Associates, 1991). Assuming an aquifer thickness of between 200 and 300 feet, a bulk hydraulic conductivity of between 220 and 330 ft/day for the aquifer is estimated. The calculated storativity varied from 0.2 to 1×10^{-4}. During the test, there was no direct evidence of impact to shallow surface water bodies.

A long-term pumping test of Well 9 was conducted at a rate of 2,340 gpm for about 9.5 days by Carr/Associates in July, 1992. During the test, water-levels were monitored in 55 observation wells. In addition, 15 surface water monitoring stations were established and monitored. The test was designed to minimize interference from surrounding, pumping wells and attempt to achieve steady state conditions in the aquifer through an extended test length. Analysis of the well 9 test (Carr Associates, 1993) suggests the following:

- Well 9 is completed in a thin (50-foot) isolated aquifer zone (termed Zone C); with a high transmissivity, separated from the overlying sediments by a leaky aquitard;
- Pumping of Well 9 caused drawdowns of between 1.4 and 0.2 feet in shallower zones of the aquifer;
- Chemical analyses and streamflow monitoring suggest that test pumping of the well had no measurable influence on surface-water; and
- Flow paths towards Well 9 do not intersect the known contamination at the ARCO site.

Analysis of the test performed for this WHPP suggests that:

- Steady-state conditions were not achieved;

- Transmissivity of the aquifer as a whole is similar to that observed at wells 7/8 at 70,000 ft^2/day based on a late-time drawdown analysis of all wells monitored; and

- Strong, downward vertical gradients are established from the water-table towards the deeper portions of the aquifer.

In July 1992, Golder Associates conducted a series of slug tests in the monitoring wells. The tests were analyzed using the Bouwer/Rice (1967) method and the method of Van der Kamp (1976). Results of the slug tests are summarized in Table 3. The hydraulic conductivity calculated from the tests ranged from 100 to 470 ft/day, which is consistent with the pumping test results.

3.3.8 Stream/Aquifer Interaction

Stream-aquifer interaction is important in an aquifer system and can be a source of recharge to the aquifer. It is often difficult to measure the "hydraulic continuity" between a stream and aquifer and, in most cases, indirect assessments of stream-aquifer interaction are necessary. The parameters controlling stream-aquifer interaction are:

- The elevation difference between the stream and the groundwater; and

- The hydraulic characteristics of the streambed.

In the LIV, there are three major streams traversing the area. The North Fork and East Fork Issaquah Creek descend from elevated upland areas into the LIV, losing more than 200 feet of elevation over a relatively short distance. The Lower Fork of Issaquah Creek gradually descends through the LIV from the Hobart Gap to Lake Sammamish, losing about 100 feet of elevation. From a hydraulics standpoint, it is expected that the steep sections of the North and East Forks of Issaquah Creek would provide coarser bedload (sands and gravels), and have a higher hydraulic conductance. When the stream enters the LIV, it's gradient decreases and finer sediments (sands and silts) are deposited, potentially reducing the hydraulic connection between the streambed and the underlying aquifer.

Stream gaging was performed in March 1992 on the North Fork and East Fork of Issaquah Creek. On the North Fork, three stations were gaged between the Mc Donald Well and 60th Street (approximately 1,000 feet apart). On the East Fork, two stations were gaged (approximately 1,000 feet apart) near the Sunset Overpass of I-90. The objective of the stream gaging was to determine whether significant stream/aquifer interaction was occurring at the edge of the upland areas surrounding the LIV. The accuracy of the survey is estimated at +/- 1 cfs, due to the shallow stream depth and low velocity of water flowing through the stream. On the North Fork, measured streamflow decreased from 3.3 cfs upstream of the McDonald well to 2.8 cfs downstream of the Mc Donald well, and then increased to 4.1 cfs below the 60th Street bridge farther downstream. These results do not indicate large streamflow losses or gains and are within the accuracy of the survey.

Therefore, at that streamflow, stream/aquifer interaction of less than 1 cfs per 1,000 feet of streambed is estimated along the North Fork at its confluence with the valley floor. Along the East Fork, a similar conclusion is reached. Streamflows measured upstream and downstream of the Sunset overpass were 9.8 and 9.3 cfs respectively. These values are within the accuracy of the survey and are consistent with streamflows used by King County SWM. Thus, stream/aquifer interaction along the East Fork between the Sunset overpass and confluence with the Lower Fork Issaquah Creek is estimated at less than 1 cfs per 1,000 feet of streambed. Because of the limited extent of steam gaging, these streamflow relationships may not be representative for all seasons or flow regimes. Additional stream gaging data are needed to fully characterize stream/aquifer interaction along the edge of the LIV.

Mini-piezometers were installed at six locations in the LIV (four on the Lower Fork and two on the North Fork) in June, 1991 (Appendix E). These piezometers were placed in or directly adjacent to the streambed to a depth of 5 to 8 feet. They measure the relative water-levels in the stream and underlying shallow groundwater. The results at four of the six locations indicated that stream water levels were "perched" 1 to 3 feet above the groundwater level, indicating little interaction between the stream and aquifer. At two of the stations, groundwater levels were equal to or higher than the stream water-level, suggesting continuity between the systems.

Monitoring of streamflow and shallow groundwater levels during the pumping test at SPWSD well 9 also indicated limited hydraulic continuity with the streams. The cone of depression created by the 9-day pumping test extended over nearly two square miles, and the drawdowns observed at the water-table (based on a hand-contoured drawdown map) can account for over 80% of the water pumped from the aquifer during the test assuming a bulk porosity of 20%. Appendix C contains a drawdown map and volume calculations for the well 9 test. If stream infiltration provided a significant contribution to the water pumped from the well, drawdowns in distant observation wells would be much less. Thus, infiltration from the stream to the aquifer is interpreted to be a minor component of the water drawn to the well when it is pumped. There is still a long-term impact to surface waters during pumping, but this impact occurs at the discharge areas (i.e. the wetlands directly adjacent to Lake Sammamish) of the groundwater system because there is less groundwater moving through the aquifer as a result of pumping.

For the purpose of wellhead protection delineation, it is concluded that within the central portion of the LIV, where the majority of urban development is occurring, streams are a minor source of water to the wells. In the wetland areas downstream of the production wells, pumping may influence surface waters, but this aspect of the hydrogeology is not a concern of the WHPP.

3.3.9 Water Balance

A water balance provides an overall assessment of the quantities of water entering and leaving the LIV aquifer. Water balances can be computed in a number of ways, using surface water information, water use information, and groundwater data. Water balance estimates of the LIV aquifer have been made by CH_2M HILL (1993), Parametrix (1993), and Golder Associates as part of this project. Table 6 summarizes the results of the various analyses.

Groundwater Recharge:

The aquifers within the LIV are recharged from precipitation occurring within the Lower Issaquah groundwater basin and from down-valley groundwater flow through the Hobart Gap in the Upper Issaquah valley. A significant finding of the GWMA report was that the down-valley flow through the Hobart Gap is a minor component of the overall groundwater flow to Lake Sammamish. The maximum likely groundwater flow through the gap is less than 2 cfs based on the aquifer thickness, and transmissivity at the Hobart Gap (Parametrix, 1993).

Additional groundwater recharge may occur from losing stream sections along the valley margins (e.g. East Fork and North Fork). However available limited stream gaging and mini-piezometer data do not indicate losing reaches of the Issaquah Creek system below the East Fork. The bedrock areas along the southern LIV contribute indirectly to recharge to the LIV aquifer. Shallow soil infiltration probably flows laterally along the bedrock surface until reaching the valley floor, where higher permeability sediments are present, and recharge occurs. As discussed in Section 3.2, an estimated 16 cfs of recharge may occur in the lower fork sub-basin of Issaquah Creek based on streamflow and climatic data.

Based on the current understanding of the groundwater system, the Plateau areas (Grand Ridge and Tradition Lake Plateau) are important recharge areas, because of the exposure of coarse-grained near-surface sediments which may be continuous with the valley aquifer via the deltaic landform. Infiltration of precipitation into the subsurface from these area is likely, but additional deep and shallow wells are needed to further characterize the Plateau areas. The glacial tills in the area may create locally perched zones and serve to buffer infiltration from the plateau to the LIV aquifer. This buffer may attenuate infiltration, but the overlying ground surface still represents a recharge area. In areas where the till is absent, such as the western portion of Grand Ridge, direct infiltration to the LIV aquifer is likely. In areas where the till is present, indirect infiltration may reach the LIV aquifer via more complex pathways. As discussed in Section 3.2, an estimated 6 cfs of recharge may occur from the eastern upland areas (North Fork and East Fork Sub-basins) based on streamflow and climatic data.

Groundwater Discharge:

Water balance calculations performed for the East King County Regional Aquifer assessment (CH_2M HILL, 1993) indicate an average groundwater discharge to Lake Sammamish at between 15 and 27 cfs, based on an analysis of the entire Issaquah Basin, including losses and transfers out of the basin.

Water balance calculations for the Issaquah GWMA (Parametrix, 1993) indicate a similar estimate of 25 cfs. The GWMA study further estimated that infiltration from the Lower Issaquah Valley is about 11 cfs, based on the relative size of the basin above and below the Issaquah Gap. The remaining 14 cfs would have to flow through the Issaquah gap area from the upper Issaquah Basin in order to discharge to Lake Sammamish. However, this amount of flow through the gap is not supported by drilling information. The maximum likely groundwater flow through the gap is less than 2 cfs based on the limited aquifer thickness, extent and transmissivity. Thus, an estimated 13 cfs recharge is contributed in the LIV study area. It is possible that the unaccounted 12 cfs from the upper Issaquah Basin may surface as baseflow to Issaquah Creek.

Based on hydrologic analysis of the North Fork, East Fork and Main Fork sub-basins of Issaquah Creek, recharge to the LIV aquifer, prior to groundwater withdrawals, is on the order of 22 cfs. Groundwater withdrawals are approximately 5 cfs, leaving a net discharge to Lake Sammamish of approximately 17 cfs.

Based on the similar results of the three estimates of discharge to Lake Sammamish, a groundwater discharge to Lake Sammamish of between 13 and 20 cfs is assumed.

Water Balance

Figure 13 is a conceptual sketch of water-balance components of the LIV. A water balance implies that groundwater recharge is balanced by groundwater discharge and withdrawals. Actual measurement of groundwater recharge is difficult, so it is commonly assumed that groundwater discharge equals groundwater recharge less groundwater withdrawals. Using this logic, groundwater recharge to the LIV is on the order of 20 to 25 cfs, with 5 cfs leaving via groundwater withdrawal and 15 to 20 cfs discharging to Lake Sammamish and the wetland area. Using the sub-basin streamflow analysis, up to 10 cfs may enter the LIV via the eastern Plateau areas, with the remaining 10 to 15 cfs entering along the western valley margin, through the Hobart Gap, or via stream infiltration along Issaquah Creek below the Issaquah Gap.

3.3.10 Hydrogeologic Conceptual Model

This section summarizes the hydrogeologic understanding of the LIV aquifer system, as discussed in previous sections:

- The stratigraphy within the LIV is highly complex, consisting of shallow Alluvium, Recessional Outwash, Delta, Till, Lacustrine, and Undifferentiated Glacial deposits. The Delta deposits are highly permeable and are the most important source of groundwater within the LIV. Recessional Outwash is also highly permeable, and occurs in the eastern higher elevations providing an important media for groundwater recharge. The shallow alluvial deposits vary in permeability, and may or may not be fully saturated. The other hydrogeologic units are less permeable, and may provide local aquitards within the LIV;

- The LIV hydrogeologic system is bounded at depth and along the border of the groundwater basin by low-permeability bedrock; on the south by Hobart gap, which allows only a limited quantity of groundwater to pass from the Upper Issaquah Valley; on the north by Lake Sammamish where the groundwater within the LIV discharges; and at the surface by streams, lakes, and permeable and impermeable areas;

- Groundwater elevations within the LIV vary from about 25 feet msl near Lake Sammamish to about 200 feet msl in the Issaquah Gap. In the central valley area groundwater elevations are generally between 50 and 70 feet. In the Grand Ridge area groundwater elevations vary from 400 to over 800 feet;

- Groundwater-levels fluctuate annually between 7 and 15 feet within the LIV. The timing and magnitude of the fluctuations is the same for shallow zones and deeper zones. Groundwater-levels respond rapidly to precipitation events;

- The direction of groundwater flow within the LIV is generally northwestward toward Lake Sammamish, but varies annually within the central valley area from a northwestern direction during periods of high groundwater-levels to a more northern direction during periods of low groundwater-levels;

- Within the central valley area the horizontal hydraulic gradient is relatively flat at between 0.001 and 0.002 ft/ft. Vertical hydraulic gradients are generally directed upwards except in the vicinity of the City's and District's production wells (COI 4/5, and Well 7/8). On Grand Ridge the horizontal hydraulic gradient is 0.067 ft/ft. A steep vertical hydraulic gradient exists between the Grand Ridge terrain and the valley floor;

- The LIV aquifer system is a series of discontinuous permeable zones and less permeable zones which, as a whole, behave as a single unconfined aquifer. Locally semi-confined lenses of aquifer exist, but are not representative of the aquifer as a whole. Pump tests show that water-levels are affected in shallow zones as well as deeper zones, demonstrating hydraulic communication throughout the aquifer system. Transmissivity is estimated at 67,000 to 70,000 ft^2/d, based on two long-term pumping tests. Average hydraulic conductivity is estimated at between 200 and 300 ft/day.

- Streams are a minor source of water to the wells in the central portion of the LIV; and

- Average annual recharge to the LIV aquifer is between 20 and 25 cfs. The eastern plateau areas (Grand Ridge and Lake Tradition) may provide up to

30% of the direct recharge to the LIV, with the remainder occurring within the main valley. Average annual discharge to Lake Sammamish and the adjacent wetland area is between 10 and 20 cfs.

4. LOWER ISSAQUAH VALLEY WELLHEAD PROTECTION AREA DELINEATION

This section presents the derivation of the proposed wellhead protection areas for the City's and District's wells.

4.1 WHPA Delineation Definitions

A wellhead protection area (WHPA) can be broadly defined as that area in the vicinity of a well or wellfield in which certain restrictions and/or plans have been enacted to protect the well or wellfield from groundwater contamination. The delineation of the WHPA is most commonly based on the time of travel (TOT) from a potential contaminant source to a well. An area around the well can be defined, termed a capture zone, which represents an area having a specified TOT to the well. For example, a 1-year capture zone represents an area around a well or wellfield in which contaminants could reach the well within one year. The common practice has been to define WHPA's based on 1-year, 5-year, and 10-year TOT's. The capture zone area for each of these TOT's is progressively larger for increasing TOT, since the groundwater would move farther over a longer time period. Management strategies are typically tailored to these TOT's, with more restrictive approaches within the shorter capture zone.

There are several assumptions in the TOT or capture zone approach that should be recognized. First, the time required for a contaminant to reach the well is based on the groundwater flow rate within the aquifer. In other words, the contaminant is assumed to be transported through the aquifer at the same rate as the groundwater. This is not always the case, and different contaminants move through the groundwater at different rates, dependent on their chemical behavior. However, from a planning standpoint, the TOT approach is conservative and appropriate for developing management strategies. Potential contaminant sources, specific in location and type of contaminant, should be evaluated on a case-by-case basis, using more sophisticated fate and transport models used in groundwater contamination studies. Section 6 discusses the behavior of various contaminants in more detail.

Secondly, the time required for a contaminant introduced at the ground surface to reach the underlying aquifer is not incorporated into the capture zone or TOT. It is assumed that a contaminant released in a WHPA capture zone would reach the water table instantaneously. Again, this is not always the case. Contaminants released at the ground surface can adhere to soil particles and become dispersed and diluted as they move to the water table through infiltration. There are possible direct pathways, such as a well with a poor surface seal, or an improperly abandoned well. The importance of the vertical, unsaturated transport component depends on the depth to the water table and the type of contaminant. Again, the conservative assumption for planning purposes requires a simplified approach that does not incorporate these processes. The shallow depths to groundwater in the Issaquah area support the conservative assumption of "instantaneous" transport to the water table. However, potential contaminant sources, specific in location and type of contaminant, should be evaluated on a case-by-case basis, using more sophisticated fate and transport models used in groundwater contamination studies. Section 6 discusses the behavior of various contaminants in more detail.

4.2 WHPA Delineation Methods

A number of methods of differing sophistication are used in the derivation of WHPAs. A summary of the methods and results is provided below. Appendix H contains the mathematical formulation and results of each of these analyses.

- **Calculated Fixed Radius method (CFR),** is the simplest approach and is based on a simple water balance formula. This method does not require knowledge of the aquifer characteristics, except for porosity. The well capture zone derived from this method simply consists of a circular area surrounding the wellhead. No consideration is given to the regional hydraulic gradient, or aquifer boundaries. This method is inappropriate for the LIV system.

- **Analytical Calculations,** take into account the basic aquifer characteristics, such as transmissivity, aquifer thickness, and hydraulic gradient. The calculations assume steady state conditions and calculate capture zones to the boundary of the hydrogeologic system. This method is inappropriate for the LIV system.

- **Hydrogeologic Mapping** involves mapping the aquifer boundaries, particularly recharge areas, in relation to the wells of interest. A qualitative assessment of groundwater elevations and more quantitative flow net analyses can provide general information on the source of water to wells and it direction of flow. Hydrogeologic mapping is carried out to some extent for any WHPA analysis, and can generally determine the ultimate recharge areas of the aquifer. However, it cannot by itself be used to determine time-based (TOT) well capture zones, as these require consideration of groundwater flow rates and aquifer properties.

  Hydrogeologic mapping is based on the geology of the area and evaluation of recharge areas, as discussed in Section 3. Based on the analyses presented in Section 3, recharge areas are located along the margins of the Issaquah Valley and on the upland plateau areas of Grand Ridge and Lake Tradition. The extent of recharge areas in the Valley floor is less certain because recent alluvial deposits have covered the permeable glacial sediments.

  On Figure 5, showing the surface geology of the area, the areas representing coarse outwash and ice-contact deposits are interpreted as major recharge areas. These areas encompass approximately 2,850 acres. Specific TOT designations are not associated with the hydrogeologic mapping approach, and additional computations are needed to refine WHPA delineation.

- **Numerical groundwater flow models** are the most sophisticated methods of WHPA delineation and are required for complex systems composed of non-linear aquifer boundaries and multiple wells. A numerical model incorporates the hydraulic characteristics and boundary conditions of the aquifer and used a "particle tracker" to numerically simulate the rate and direction of "particles" of groundwater moving through the system. The accuracy of a WHPA derived from a numerical model is a function of the how well the numerical model can simulate observed conditions of the groundwater flow system. This, in turn, is a function of how much data are available to develop the model, and on the complexity of the groundwater flow system.

The proposed WHPA's for the LIV aquifer are based on a composite of well capture zones determined from the various methods outlined above. Because of the complexity of the aquifer, the proposed WHPA's are weighted toward the numerical modeling and hydrogeologic mapping results, rather than the simpler analytical results. The description and results of the groundwater model are presented in the following section.

4.3 Numerical Groundwater Modeling

Groundwater models are a useful tool to represent and understand groundwater flow and contaminant transport. It is important to understand that models are used in hydrogeology as tools. It is rare that a groundwater model can accurately simulate or predict groundwater conditions in all portions of the aquifer. This is particularly true of the LIV aquifer because of its complexity. However, groundwater models are more accurate than other available methods and represent the best available technology for describing aquifer responses. The primary objective of the numerical model is to accurately simulate the response of the aquifer and use the model as a predictive tool in land-use planning. Groundwater modeling technology has improved dramatically in recent years and is no longer restricted by complex data files or intensive computer requirements. Models now exist that have graphical interfaces and run easily on personal computers. Recognizing that new WHPA strategies, changes in the location and amount of groundwater withdrawal, and additional hydrogeologic data might require modification or re-evaluation of capture zone delineations in the future, a secondary objective of the modeling for the WHPP was to try and develop the model using a flexible, "user friendly" software that could be used in on-going wellhead protection planning activities.

The general methodology of groundwater modeling is to numerically discretize the aquifer into blocks and assign aquifer properties to each block. At the edges of the model, boundary conditions are specified such as constant head, constant flux, and no-flow. The aquifer properties and boundary fluxes are then adjusted, based on supplemental direct hydrogeologic information, such as pumping tests and hydrogeologic mapping, in order to calibrate the model to existing conditions. The model is calibrated to measured water-levels throughout the aquifer. This is one reason that an entire year of detailed water-level monitoring was performed for the Wellhead Protection Program. When the model adequately re-creates the observed water-levels in the aquifer, using reasonable parameters consistent with direct hydrogeologic data, it is used as a predictive tool. In this case, it is used to predict the 1-year, 5-year, and 10-year capture zones for each of the LIV production wells. Capture zone delineations were performed for the City wells COI 1/2, COI 4/5, and SPWSD wells 7/8. The grouping of the wells into well-pairs was based on the proximity of the wells to each other.

The distribution of water-level measurements in the LIV is not uniform, so the focus of the calibration was to represent groundwater-levels in the central valley area near the COI and SPWSD wells as closely as possible. Modeled groundwater-levels in the northern and western valley area were more difficult to calibrate because there are very limited groundwater-level data in these areas. The dimensional characteristics of the valley, (aquifer thickness, and hydraulic conductivity) were represented within the model based on hydraulic testing and drill logs discussed in Sections 2 and 3. The total groundwater discharge to Lake Sammamish, based on the water balance calculations, was an important calibration parameter.

The groundwater flow system within the study area is complex and does not lend itself easily to numerical modeling. The main difficulties with modeling the system are:

- The overall thickness, extent and detailed stratigraphy of the deltaic/outwash aquifer in the LIV is not well known;
- Aquifer thickness, extent and groundwater-levels are not well known in the eastern plateau areas; and
- The transition from the recharge areas in the eastern plateau areas to the relatively horizontal two-dimensional groundwater flow system within the valley floor is difficult to simulate because of the large vertical head difference between these areas.

Consequently, an approach involving a three-dimensional "black-box" model and a simplified two-dimensional model was developed. The purpose of the more complex three dimensional model was to test assumptions and boundary conditions used in the two-dimensional model and evaluate the validity of the 2-D model. The three-dimensional model was developed using MODFLOW/MODPATH, as discussed in the following section.

4.3.1 MODFLOW/MODPATH Modeling

To evaluate the potentially-complex stratigraphy and uncertainty about conditions on the eastern plateau area, a three-dimensional simple box model was developed using MODFLOW. The aquifer was represented as a rectangular system consisting of ten layers with a stream traversing the uppermost layer of the aquifer (Appendix G). A simple rectangular-shaped model domain was chosen for this purpose, rather than attempting to represent the actual valley floor configuration. The modeled domain was 16,000 feet long by 8,000 feet wide, which represents the approximate length and width of the Lower Issaquah Valley. The domain of the model consisted of 10 permeable layers which were chosen to be 20-feet thick, separated by 5-foot thick aquitards, for an overall thickness of 275 feet. The 10-layer MODFLOW model of the Lower Issaquah Valley was developed to study the effects of anisotropy on well capture zones. Anisotropy is a measure of the preference for horizontal rather than vertical groundwater flow and is usually the result of stratigraphy. An anisotropy of 100:1 means that horizontal hydraulic conductivity is 100 times greater than vertical hydraulic conductivity. The hydraulic conductivity of the permeable layers was 100 to 300 feet/day, similar to observed conditions. The hydraulic conductivity of the aquitards was varied as part of the analysis of anisotropy. Constant head boundaries were assigned to the northern and southern boundaries to simulate the observed gradient of 0.001. The lateral boundaries were assumed to be impermeable. A single well pumping at a constant rate of 1,700 gpm was located 3,200 feet from the eastern border and 8,000 feet from the southern border.

The intent of the MODFLOW modeling exercise was to evaluate the effect of varying parameters on the minimum travel time to a pumping well screened in the lower portion of the aquifer and on the number of particles reaching the well from a hypothetical source located 2,000 feet from the well. This sensitivity analysis resulted in the following conclusions:

- The critical anisotropy of the aquifer as a whole was on the order of 1000:1. If, on the whole, horizontal hydraulic conductivity exceeds vertical hydraulic conductivity by less than 1000:1, then incorporating multiple layers and anisotropic conditions in the model did not significantly alter the number of particles captured from a source located 2,000 feet from the well;

- The continuity of a low-permeability confining layer (0.01 to 0.35 ft/day) was important to a lateral extent of about 1,000 feet for a 100/ft/day aquifer and to a lateral extent of 320 feet for a 350 ft/day aquifer. If such a low permeability layer could not be demonstrated, it's presence in the model did not significantly alter the number of particles captured from a source located 2,000 feet from the well;

- Stream infiltration within the central valley area of less than 1 cfs per mile of stream has a maximum of a 60-day effect on the minimum travel time from the location of the stream to the well. Thus, including a stream in the model would not dramatically change the results of the capture zone; and

- Recharge from the eastern plateau areas in excess of 20% of the down-valley flow will impact the shape and extent of the capture zones.

Based on the conclusions of the "black box" model, and supporting hydrogeologic evidence, a multi-layer groundwater model is not presently necessary to simulate the LIV aquifer system specifically:

- Geologic logs do not indicate that low-permeability layers are laterally extensive;

- Pumping test responses and long-term water-level responses do not suggest high anisotropy values or low-permeability leakage within the aquifer as a whole; and

- Stream gaging does not indicate more than 1 cfs per mile stream losses in the central valley area.

The sensitivity of the model to recharge from the eastern plateaus could easily be incorporated into a 1-layer, 2-dimensional model. Thus, a 1-layer, 2-dimensional modeling approach was taken for find delineation of capture zones.

4.3.2 FLOWPATH Model

The one-layer steady state model of the Lower Issaquah Valley area was developed using FLOWPATH, which is based on a block-centered finite difference formulation. The modeled area of approximately 6.7 square miles lies primarily within the valley floor area. Because of the difficulty in simulating the transition between the eastern plateau and the lower valley, the model does not directly include the eastern plateau area. Rather, the groundwater contribution of the eastern plateau area was incorporated into the valley floor model as a constant-flux boundary condition. The model configuration is shown on Figure 14. The following assumptions apply to the two-dimensional plan view model:

- The aquifer system behaves as a single confined isotropic aquifer with specified heterogeneities;

- The aquifer system is 200 feet thick, except extending from south of Issaquah to the Hobart Gap, where it thins from 200 to 50 feet;

- Lake Sammamish is represented as a constant head condition at 25 feet msl. The model was calibrated so that between 10 and 20 cfs discharges to the Lake boundary, based on water balance calculations.;

- The Issaquah Gap boundary has a constant head of 150 feet during the winter and spring, when water-levels are the highest; and 140 feet msl during the summer and fall, when water-levels are the lowest;

- Constant flux boundaries along the eastern perimeter of the Lower Valley are similar, with a total influx of between 5 and 10 cfs based on water budget calculations. The flux from the eastern boundary was adjusted within these ranges during the model calibration process;

- Constant flux boundary conditions of the southern and western perimeter of the Lower Valley were adjusted as part of model calibration;

- No-flow boundary conditions were assigned to portions of the valley margins where bedrock outcrops exist;

- The bedrock underlying the valley bottom is impermeable;

- The City's and District's wells are assumed to pump constantly at a combined rate of 4.2 cfs, based on usage data from 1990-1991. A future scenario was developed assuming appropriation of all SPWSD water rights applications and a possible re-distribution of groundwater withdrawals by the City of Issaquah as shown on Table 7.

The major model assumption is that of a single confined aquifer with no recharge or stream infiltration from the central valley area. The aquifer system within the Lower Issaquah Valley area, as a whole, appears to behave generally as unconfined to semi-confined. Small-scale heterogeneity in hydraulic conductivity, thickness and extent of water-bearing zones are present. After considering a number of different ways to represent the aquifer system numerically, the decision was made to assume it is fully confined. The assumption of fully confined conditions is conservative (and over-estimates capture zone extent), because all groundwater is assumed to enter the system from the boundaries. Additionally:

1) The contribution to the aquifer system from precipitation occurring within the valley floor area is much less than that entering along the margins of the valley. The likely maximum potential contribution assuming the basin average recharge of 4 inches per year over an area of 2,100 acres would be about 1 cfs. However, the vertical hydraulic gradient throughout much of the valley floor area is directed upwards, and as such, only the shallow unconfined sediments could receive recharge. Furthermore, the areal recharge distribution within the valley area is patchy due to urbanization and it would be difficult to assign recharge rates accurately;

2) The contribution of water from streams and creeks to the aquifer system in the valley floor area is not a sensitive parameter, based on the results of the 3-D MODFLOW simulations. Furthermore, the vertical hydraulic gradient is directed upward throughout much of the valley floor area, and, as such, leakage from the creeks could not enter the aquifer system. Leakage from streams to the aquifer at the margins of the LIV is incorporated via the constant flux boundary condition; and

3) Predicted capture zones will be the same from a confined and unconfined 1-layer model if both models have the same hydraulic head distribution and hydraulic properties.

As the understanding of the hydrogeologic system improves with the collection of additional data, complexities may be incorporated into the model, if deemed appropriate. For present planning purposes, we have opted to take a somewhat conservative approach to modeling the valley groundwater system. Potential contaminant sources within the

WHPA's, specific in location and type of contaminant, should be evaluated on a case-by-case basis, using more sophisticated fate and transport models used in groundwater contamination studies. This however, is beyond the scope of the Wellhead Program and is more the responsibility of those potentially responsible for groundwater contamination. Section 5 discusses the behavior of various contaminants in more detail.

4.3.3 FLOWPATH Calibration and Results

Calibration of the model to observed conditions proceeded as follows:

- Horizontal hydraulic gradients were approximately reproduced by varying the hydraulic conductivity of the aquifer;
- Flux entering the valley from the south and west and the flux entering the valley from the east was varied to match the groundwater-levels and directions of flow occurring in the central valley area. This was done for both the seasonal high and low groundwater-level conditions; and
- The change in direction of flow between the seasonal high and low groundwater-level periods was matched to observed conditions by changing the ratio between the flux entering from the south and west, and the flux entering from the east.

All modeling results are presented in Appendix H and summarized in Table 8. Two different cases are presented:

- Case 1 assumes a constant hydraulic conductivity (200 ft/day) within the model domain;
- Case 2 assumes that the aquifer along the eastern valley margin (deltaic materials) is more permeable (300 ft/day) than the sediments farther to the west and north; and
- Case 3 assumes the hydraulic properties of Case 2, but evaluates boundary fluxes in the model.

Each case included simulations under conditions of the "average" annual high groundwater-levels (case 1a and 2a) and the "average" annual low groundwater-levels (Case 1b and 2b). The results are as follows:

<u>Case 1-Constant Hydraulic Conductivity</u>

Table 8 summarizes the calibration results for Case 1. A uniform hydraulic conductivity is assumed for Case 1. Case 1a represents the annual high groundwater-level conditions, while Case 1b represents the annual low groundwater-level conditions. To calibrate the model, the annual high groundwater-levels measured in February 1992 were used for

Case 1a, while September 1992 water-levels were used for annual low groundwater levels (Case 1b).

The results indicate that a single constant hydraulic conductivity of the valley floor aquifer system can be used to accurately match the observed groundwater-levels and flow directions. Discrepancies between modeled and observed water-levels are less than 2 feet at all wells except in the area around SPWSD wells 7/8. The discrepancy observed in this area is caused by the surrounding pumping wells. The total groundwater flow to Lake Sammamish for this case is 16.7 cfs, which is within estimated ranges. Groundwater flow from the eastern boundary for Case 1a is 7.1 cfs, or approximately 34 percent of the total groundwater flow entering the valley floor area. This also is consistent with water balance estimates.

The annual low water-levels and flow directions occurring in September of 1992 in the central valley area can be a matched by reducing the groundwater flow entering from the valley margins, and reducing the Issaquah Gap boundary to 140 feet (2.5 cfs flux). Flux from the eastern boundary is reduced to 4.1 cfs, or about 23 percent of the total groundwater flow entering the valley floor. Groundwater flow from the south and west was not decreased. The total groundwater flow to Lake Sammamish in this case is 13.8 cfs, which is still within estimated annual ranges.

These results simulate the observed recharge, showing a variable distribution of recharge to the LIV during the course of a year. On the whole, of course, recharge is higher in the winter/spring and lower in the summer/fall. The relative contributions from the east and south/west boundaries of the aquifer change appreciably. Flux from the eastern model boundary must be reduced significantly to reproduce observed summer/fall groundwater levels. Recharge from the eastern plateau areas appears to occur as a transient "pulse" during winter/spring and illustrates the importance of the eastern Plateau area (both Grand Ridge and Lake Tradition Plateau) for restoring groundwater-levels after summer. The model supports the hypothesis that the eastern plateau area supplies between 20 and 35 percent of the total groundwater flow entering the LIV aquifer system.

Case 2-Variable Hydraulic Conductivity

Table 8 summarizes the calibration results for Case 2. For Case 2, the hydraulic conductivity in the vicinity of the wellfields is assumed to have a hydraulic conductivity 1.5 times higher (300 ft/day) than the materials located farther west and north. This scenario is more consistent with the conceptual model of the high-permeability delta deposits concentrated along the eastern valley area. For the high water-level case (Case 2a), the groundwater contribution from the east to 9.7 cfs (47 percent of the total inflow to the model). The higher inflows from the Plateau areas are necessary because, if the hydraulic conductivity is higher in the eastern and central valley area, the total groundwater flow through the area must be greater to match the observed hydraulic gradient. The total groundwater flow to Lake Sammamish for this case is 16.5 cfs.

For the annual low groundwater-level case (Case 2b), the Plateau recharge was reduced to 6.1 cfs (36 percent of the total) to match observed groundwater-levels and flow directions. The groundwater contribution along the southern and western borders was not decreased. The Hobart gap area boundary head was reduced from 150 to 140 feet, consistent with Case 1c. The total groundwater contribution to Lake Sammamish for this case is 12.9 cfs.

Similar to Case 1, Case 2 indicates a proportionally higher contribution of recharge from the eastern plateau during winter/spring recharge compared with the south and west. Further, Case 2 suggests that the total groundwater contribution from Grand Ridge and Lake Tradition may be as much as 45 percent of the total recharge to the aquifer.

Case 3 - Boundary Fluxes

Table 8 summarizes the calibration results for Case 3. Identical hydraulic properties to Case 2 were used. The purpose of the simulation was to determine the minimum flux necessary from the south and western margins of the LIV that would reproduce observed groundwater levels and flow directions. The surface geology of the western LIV is not indicative of high recharge, and lower fluxes are possible. The results indicate that at least 2.7 cfs cumulative inflow from the west and southwest boundaries is necessary to calibrate the model. This necessitates a proportional increased flux from the east of between 8.6 and 13.9 cfs. Total groundwater flow to Lake Sammamish is between 11.5 and 15.6 cfs consistent with water balance estimates. The modeled inflow of between 8.6 and 13.7 cfs from Grand Ridge and Lake Tradition Plateau is higher than the estimates based on hydrologic data. For Case 3, between 75% and 89% of the recharge to the LIV originates from the eastern plateau areas.

4.4 Well Capture Zones/WHPA Delineation - Current Conditions

Well capture zones for 1-, 5- and 10-year capture zones were developed from the model groundwater-levels for Cases 1, 2 and 3. The modeled capture zones for each case are presented in Appendix H, and summarized on Table 9.

1-year Capture Zones

The composite 1-year capture zones for all cases are shown on Figure 15. Appendix H contains the individual capture zone delineations. Because groundwater-levels and flow directions fluctuate annually, the actual capture zones will encompass a portion of both the annual high water-level capture zone and the annual low water-level capture zone. In order to provide a reasonable estimate of the overall 1-year capture zone, superposition of all cases should be considered to represent the 1-year capture zone and WHPA.

5-year Capture Zones

The composite 5-year capture zones for all cases are shown on Figure 16. Appendix H contains the individual capture zone delineations. Because groundwater-levels and flow directions fluctuate annually, the actual capture zones will encompass a portion of both the annual high water-level capture zone and the annual low water-level capture zone. In order to provide a reasonable estimate of the overall 5-year capture zone, superposition of all cases should be considered to represent the 5-year capture zone. Capture zones for SPWSD 7/8 and COI 1/2 extend to the constant flux boundary of the model.

The 5-year capture zone extends to the eastern content flux boundary of the model. The model cannot be used to predict the extent of capture zones east of the model boundary. Capture zones within the domain of the model are still accurate. The approach to travel time analysis outside of the model domain is described below.

10-year Capture Zones

The composite 10-year capture zones for all cases are shown on Figure 17. Appendix H contains the individual capture zone delineations. Because groundwater-levels and flow directions fluctuate annually, the actual capture zones will encompass a portion of both the annual high water-level capture zone and the annual low water-level capture zone. In order to provide a reasonable estimate of the overall 10-year capture zone, superposition of all cases should be considered to represent the 10-year capture zone.

The 10-year capture zones extend to the eastern constant flux boundary of model for all wells except COI 4/5. The model cannot be used to predict the extent of capture zones east of the model boundary. Capture zones within the domain of the model are still accurate. The approach to travel time analysis outside of the model domain is described below.

Capture Zones Outside Model Domain

As discussed previously, difficulties in modeling the transition from the eastern plateau areas to the valley floor necessitated a simplification of the model that prevents predicting the extent of capture zones on the eastern plateau areas. It would be extremely difficult, without substantial additional data on groundwater conditions at all depths on the Plateau to propose discrete, spatially variable capture zones on Grand Ridge and Lake Tradition Plateau. However, it is possible to calculate equivalent vertical travel times from the plateau areas to the valley floor. The calculation of the vertical hydraulic conductivity can be made based on Darcy's equation using the boundary fluxes from the model and the head differences between the Plateau area and the valley floor. Darcy's equation is expressed as:

$$Kv = \frac{q}{iA}$$

where

Kv = vertical hydraulic conductivity (ft/day)
q = flux from eastern model boundary (ft^3/day)
i = vertical gradient based on head differences
A = recharge area outside model domain (ft^2)

Appendix H, Table H-2 summarizes these calculations. Vertical hydraulic conductivities of between 0.8 and 2.7 feet/day are calculated. Using these conductivities and an effective porosity of 25%, a vertical groundwater velocity of between 0.2 and 0.6 feet/day is calculated. Translating this velocity into a travel time from the Plateau (elevation 460 feet) to the Valley floor (elevation 50 feet), a travel time of between 2 and 6 years is estimated from the upland areas to the LIV aquifer and model boundary. The capture zones for LIV wells COI 1/2 and SPWSD 7/8 reach the model boundary of about 4 years. Thus travel time from Grand Ridge and Lake Tradition Plateau is estimated to be between 6 and 10 years.

Figure 18 shows a composite overlay of all capture zones and recharge areas for the LIV aquifer.

4.5 Well Capture\Zone WHPA Delineation - Future Conditions

A final case was considered using projected water-rights as pumping rates for the area production wells, including SPWSD Well 9. Table 7 summarizes the projected withdrawals based on water rights applications. Withdrawal from SPWSD wells 7/8 is increased three-fold, and SPWSD 9 is assumed to be on-line at a rate of 3,225 acre-feet/year. Issaquah wells COI 1/2 are increased through a possible transfer of water rights from the City's Gun Club wells (Lynne, 1993). The purpose of this simulation was not to evaluate water-rights or groundwater availability, but to evaluate the possible increase in capture zone area resulting from increased groundwater usage in the LIV. The actual increases in groundwater usage, if any, cannot be determined at this time but the simulation is based on all known applications and existing rights.

The results of the simulation indicate that the capture zones of the wells increase substantially, essentially encompassing the entire LIV at the 10-year TOT, and a substantial portion of the LIV at the 5-year TOT. Figure 19 shows the 5-year capture zone using projected withdrawals. Appendix H, Figures H-16 to H-20, show the modeled water-table configuration and capture zones. Of particular interest is the skew of the capture zones to the west. Whereas under present conditions the capture zones extend roughly southeast from the wells, under projected conditions the capture zones extend much farther west, towards Tibbets Creek. One reason for this is the inclusion of SPWSD well 9. The position of the well is such that it intercepts a large proportion of the flux from the eastern upland areas, forcing wells SPWSD 7/8 and COI 4/5 to draw water from further to the west.

Although this projected simulation is a hypothetical scenario, it is clear that increased groundwater usage in the LIV will enlarge the capture zones and WHPA's in the Valley, on the eastern recharge areas, and possibly out to the western portion of Issaquah. This may influence WHPA strategies, particularly with respect to re-location or permitting of hazardous materials facilities west of the present capture zones for the wells.

5. SUMMARY AND CONCLUSIONS: HYDROGEOLOGY

The significant findings and conclusions from the hydrogeologic analysis and capture zone delineations are summarized as follows:

Geology

- The pre-glacial bedrock structure of the LIV forms a deep bowl up to 600 feet deep between the East Fork Issaquah Creek and Lake Sammamish. Between the East Fork and Hobart Gap, bedrock depths are shallower and more uniform;

- Complex depositional environments during the last glacial retreat formed large deltas that extend from near ground-surface on the eastern Plateau areas (Grand Ridge and Lake Tradition), to well below sea-level in the valley floor. These deltas may extend as much as 3,000 feet into the LIV;

- The sediments within the delta are typically heterogeneous and there is no evidence of stratigraphic continuity of individual sediment types (e.g. clays). The deltaic materials contain discontinuous layers and lenses of sand, gravel, and silt;

- On the western edge of Grand Ridge, the deltaic deposits are exposed at ground surface. East of this exposure of deltaic deposits is a coarse sandy till. This till may represent an ablation till, rather than a basal till;

- There are no data regarding the sediments deeper than 100 feet in the Grand Ridge and Lake Tradition area. Older glacial deposits, possibly containing coarse sands and gravels may underlie the more recent glacial deposits. Bedrock is greater than 250 feet deep in places on Grand Ridge based on a geophysical survey.

- Fluvio-lacustrine depositional processes dominated the later stages of glacial retreat. These sediments overlie the deltaic deposits and interfinger with the delta at its margin. The lacustrine sediments are finer than the deltaic deposits, consisting of sands, silts and clays; and

- Recent alluvial process have deposited a variety of sands, gravels and silts over the LIV.

Hydrology

- Hydrologic analysis of precipitation run-off and streamflow in sub-basins of the LIV indicates total groundwater recharge to the LIV of 22 cfs, which is consistent with previous estimates;

- Hydrologic data indicate that about 27% of the recharge to the LIV aquifer occurs within the East Fork and North Fork sub-basins; and

- Increased run-off due to urbanization will reduce groundwater infiltration in direct proportions.

Hydrogeology

- The deltaic deposits underlying the eastern portion of the LIV are highly permeable and the most important source of groundwater in the area;

- Aquifer transmissivity is estimated at approximately 67,000 ft^2/day, with a storativity of between 10^{-4} and 0.2 depending on the method of analysis. Hydraulic conductivity is estimated at between 100 and 300 feet per day. Aquifer porosity is estimated at 0.25. Average hydraulic gradient is between 0.001 and 0.002. Groundwater velocity is between 0.4 and 2.4 feet per day;

- Groundwater levels fluctuate 7 and 15 feet annually at all depths monitored;

- Groundwater flow directions vary seasonally from a northwesterly direction in the winter/spring to a northerly direction in the summer/fall;

- Groundwater recharge occurs primarily on the Eastern Plateau areas (Grand Ridge and Lake Tradition) and along both margins of the Issaquah Valley between the East Fork and Issaquah Gap;

- Groundwater discharge is concentrated between Lake Sammamish and the adjacent wetland area. Average annual groundwater discharge is estimated at 15 cfs.

- There appears to be little stream/aquifer interaction in the central LIV area.. Stream gaging, mini-piezometer installations and pumping test results suggest limited hydraulic continuity between surface and groundwater within the central valley area. Additional stream gaging data are needed to further assess hydraulic continuity with the central LIV;

- Analysis of pumping tests and long-term water-level fluctuations indicates that groundwater withdrawals in the LIV affect shallow groundwater levels and cause downward vertical gradients from the water-table toward the completion zones of the wells; and

- The LIV aquifer system behaves as an unconfined to locally semi-confined aquifer. Analyses of pumping tests, water-levels, and hydraulic gradients do not suggest that significant regional confining layers are present within the aquifer system. As such, the aquifer is highly vulnerable to contamination from surface sources.

Wellhead Protection Delineations

- The typical WHPA delineation approach, using time of travel (TOT) as a basis, incorporates simplifying assumptions which conservatively over-estimate the potential impact of a contaminant release at the ground surface;
- Hydrogeologic mapping of recharge areas and numerical modeling are the most appropriate methods for WHPA delineations in the LIV aquifer system;
- Hydrogeologic mapping indicates that approximately 2,850 acres along the Eastern plateau area may provide recharge to the LIV aquifer.
- The modeling approach for the LIV aquifer system accurately reproduces observed hydrogeologic conditions and the model can be used as a predictive tool. The approach also satisfied a secondary objective, which was to develop the model using readily accessible software that could be easily modified to incorporate possible revisions in the future;
- The 3-dimensional modeling indicated that a low permeability confining layer had to be continuous over at least 1,000 feet to have a significant impact on the capture zone of a well. Geologic logs do not indicate that low-permeability layers are laterally extensive;
- The 3-dimensional modeling indicated that horizontal hydraulic conductivity had to exceed vertical hydraulic conductivity by at least 1000:1 in order to have a significant impact on the capture zone of a well. Water-level and pumping test responses do not indicate high anisotropy or low vertical leakage;
- The 3-dimensional modeling indicates that steam infiltration of 1 cfs per mile of stream had a minimal effect on the capture zone of the well. Stream gaging and mini-piezometer installations do not indicate stream losses in excess of 1 cfs per mile;
- The 2-dimensional model accurately reproduces observed water-levels for both high-flow and low-flow conditions to within 2 feet in most wells. Predictive simulations of capture zones for both high-flow and low-flow conditions incorporate the change in seasonal groundwater flow direction;
- The 2-dimensional model accurately reproduces observed water-levels for both a uniform hydraulic conductivity and for a variable hydraulic conductivity aquifer, where more permeable sediments are concentrated along the eastern margin of the LIV (similar to the distribution of deltaic sediments);

- The 2-dimensional model indicates that increased influx of groundwater from the eastern plateau area during the winter and spring is the primary reason for the change in groundwater flow direction.

- The 2-dimensional model indicates that flux from the eastern plateau areas may account for between 22% and 47% of recharge to the aquifer. An adequate calibration to observed water-levels can also be obtained with up to 89% of total recharge to the aquifer originating from the eastern plateau areas;

- Composite WHPA capture zones, based on superposition of model results for different cases incorporate the variable groundwater flow direction and range of hydraulic conductivity within the LIV aquifer;

- Composite 1-year WHPA capture zones encompasses approximately 85 acres, distributed as three non-coalescing circular areas around each well pair;

- Composite 5-year WHPA capture zones encompasses approximately 450 acres. Capture zones for COI 1/2 and SPWSD 7/8 coalesce and reach the boundary of the model. The capture zone for COI 4/5 remain distinct;

- Composite 10-year WHPA capture zones encompass an area of at least 800 acres. Capture zones for COI 1/2 and SPWSD 7/8 coalesce and reach the boundary of the model. The capture zone for COI 4/5 coalesces with the other capture zones but does not reach the model boundary;

- It is not possible to delineate spatially distributed capture zones on the eastern plateau areas. The additional travel time from the Plateau area to the boundary of the model is between 2 and 6 years. The capture zones for COI 1/2 and SPWSD 7/8 reach the model boundary in 4 years. Thus, the Plateau areas lie in a 6- to 10-year capture zone; and

- Future groundwater withdrawals in the LIV will enlarge the capture zones of wells in the LIV, possibly including a large portion of the southern LIV to the Issaquah Gap, and western portion of the LIV to Tibbets Creek.

6. WATER QUALITY EVALUATION

This section presents a general discussion of groundwater contamination issues and processes, followed by an evaluation of current groundwater and surface water quality of the Lower Issaquah Valley (LIV).

6.1 Overview of Contaminant Hydrogeology

Groundwater contamination can be defined as artificially induced degradation of natural groundwater quality, which may impair the use of the water, and create a human health hazard. Contaminant types can be broadly classified into inorganic chemicals, organic chemicals, microbiological contaminants, and radionuclides. Inorganic chemicals include metals and nitrate. Organic chemicals include petroleum products, pesticides and herbicides, chlorinated solvents, and other miscellaneous organic compounds. Microbiological contaminants include bacteria, particularly coliform bacteria, viruses, and giardia. Table 10 presents a general breakdown of contaminant categories and characteristics of typical contaminants.

There are a large number of potential sources of groundwater contamination, which are broadly grouped into point sources and non-point sources based on the areal extent of the contaminant source. Point sources include underground storage tanks (UST's), landfills, construction activities, mining activities, and agricultural activities (animal feed lots, dairy). Non-point sources include agricultural use of fertilizers, pesticides and herbicides, septic systems, and urban runoff. The division between point and non-point sources is gradational. For example, depending on the number and areal extent of septic drainfields, septic systems could be classified as either a point or a non-point source.

The transport of a contaminant from the ground surface to an aquifer is a highly complex subject, dependent on a number of hydrogeologic and chemical parameters. It is beyond the scope of the WHPP to evaluate specific transport pathways for all contaminants of concern. Rather, the objective of the WHPP is to provide a general technical framework for planning purposes and for more detailed future analyses as required. The following summary of general contaminant behavior is included to briefly discuss significant transport parameters associated with the various contaminant categories.

In general, there are two important properties to recognize in contaminant transport from the ground surface to groundwater:

- Sorption reactions with soil particles (particularly organic matter) are important in controlling the migration rate and concentration of contaminants in both the unsaturated and saturated portions of the sub-surface. In some cases, these processes significantly retard the rate of contaminant migration, and may significantly attenuate the concentration. As such, the plume for a retarded contaminant may expand more slowly and the concentration may be less than for a non-reactive contaminant; and

- The solubility of the contaminant is important in the concentration of the contaminant since it determines how easily the contaminant dissolves in water. A given volume of contaminant with a high solubility is more likely to attain a high concentration in groundwater than a similar quantity of a low-solubility compound.

Table 11 contains a list of several contaminants and their respective travel times across a 1,000-foot pathline in a granular aquifer similar to the LIV aquifer. Appendix I contains additional contaminants and the assumptions used in developing the travel times. Table 11 shows that travel times range over orders of magnitude depending on the type of contaminant.

The concentration of a contaminant is usually referenced to a Maximum Contaminant Level (MCL) established by state or federal agencies based on toxicity and risk to human health. These MCL's are the standards by which the severity of contamination are assessed, and are in many, but not all, cases the established criteria for clean-up actions at contaminated sites. For groundwater protection studies, protection of the aquifer is often based on a level lower than the MCL as a target water quality which the community strives to maintain. Table 12 summarizes current primary drinking water standards (MCL's) for inorganic and organic contaminants.

Major Cations/Anions

In general, the major cations and anions do not pose a threat to human health and are not generally considered contaminants. At high concentrations, some compounds, such as chloride, sulfate and sodium, may cause a health risk. A secondary MCL for chloride (250 mg/L), and sulfate (250 mg/L) exists, and a MCL for sodium is expected in the future.

Metals

Elevated metals may cause a variety of health problems associated with accumulation of metals in body tissue. The transport and fate of trace metals is complex, due to their tendency to form complexes with inorganic and organic anions, which changes their potential solubility and transport characteristics accordingly, and due to their sensitivity to the specific conditions of the subsurface (pH, pE, and redox environment). Adsorption processes may also strongly influence the mobility of trace metals. For example, in some groundwater, many of the trace metals are strongly adsorbed, which reduces the dissolved concentrations significantly.

Nitrate

Nitrate contamination has been attributed to agricultural practices, septic systems, nitrogen fertilizers and urban run-off. Elevated nitrate concentrations pose a health risk, particularly to infants and small children, from a condition known as methemoglobinemia. A primary MCL of 10 mg/L exists of nitrate. In some cases nitrate in groundwater originates as nitrate-containing wastes or fertilizers applied to the ground surface. Nitrate may also originate from organic nitrogen which occurs naturally or is incorporated into the soil by human activities. A process called denitrification often occurs in the soil zone (and groundwater system) when organic matter is abundant and reducing conditions exist. Denitrification in the soil zone can remove large amounts of nitrate under certain conditions. Once nitrate reaches the water table, however, it is highly mobile (does not react or absorb to soil particles) and does not transform or break down readily unless denitrification occurs in the absence of dissolved oxygen.

Organic Chemicals

Organic chemicals are becoming an increasingly problematic contaminant in groundwater. They include petroleum products (gasoline, diesel oil), solvents, pesticides and herbicides. The health risk of organic contaminants range considerably. Many are toxic to the nervous system or vital organs and others are carcinogens. One of the common behaviors of most organic chemicals is their occurrence in multiple phases. During migration from a surface source to the water table, organic chemicals can partition into three distinct phases, occurring in:

- Soil pores and soil solids as a residual;
- Soil gas as a vapor; and
- Pore water and groundwater as a dissolved phase.

Thus, a given quantity of contaminant released to the subsurface has a very complex pathway from its source to groundwater. Many organic contaminants are volatile and a portion of a spill on the ground surface will volatilize into the atmosphere or soil pore space. A spill may migrate downwards in a liquid phase and mix with groundwater at the water table. However, water infiltrating through the soil may "pick up" contaminants present in soil vapors and residuals. A fluctuating water table may also pick up contaminants in this manner.

Organic contaminants can be broadly classified according to their non-aqueous behavior into Light Non-Aqueous Phase Liquids (LNAPL) and Dense Non-Aqueous Phase Liquids (DNAPL). These distinctions are important to the fate and transport of organic contaminants in groundwater.

As the name implies, LNAPL is lighter than water, and, when present in groundwater, often floats at the water table. LNAPL contaminants include gasoline, oils, and greases. The most prevalent potential LNAPL contaminant in the LIV is gasoline. Gasoline is a complex mixture of over 200 different hydrocarbon compounds. Of these compounds, soluble aromatics typically comprise more than 95 percent of the dissolved constituents. As a result, the dissolved components typically associated with gasoline contamination are normally dominated by the aromatics benzene, toluene, ethylbenzene, and xylene (BTEX).

As the name implies, DNAPL is denser than water, and, when present in groundwater, often sinks below the water-table. Below the water table, DNAPL in large quantities may migrate to the bottom of the aquifer or perch on stratigraphic heterogeneities within the aquifer. If present as a free-product liquid phase below the water table, DNAPL can be a continuing source of dissolved groundwater contamination lasting many decades. DNAPL contaminants include solvents used for cleaning and degreasing of metal parts. Common components of solvents include trichloroethylene and trichloroethane. Tetrachloroethylene (PCE) is commonly used in dry cleaning processes.

6.2 Groundwater Quality in the LIV

As part of this study, three rounds of water quality samples were taken from wells located throughout the LIV between May 1992 and April 1993, as summarized on Table 4. The samples were analyzed for various constituents, including the major anions and cations, priority pollutant metals, iron and manganese, nitrate, turbidity, volatile organics, pesticides, herbicides, and PCB's. Appendix E contains the groundwater quality database prepared for this study. Additionally, water quality sampling was performed between 1990 and 1992 (Geraghty and Miller, 1992) in 18 monitoring wells around the ARCO Station at the corner of Gilman Blvd. and Front Street after a leak in one of the underground storage tanks was detected. These data were provided to the WHPP and are summarized in this section. The WDOE also performed sampling at six sites in Issaquah and analyzed for lead and organic compounds, (WDOE, 1992). The groundwater quality is summarized by category below.

6.2.1 Major Cations and Anions

The major cations and anions were analyzed to determine the general character of the groundwater occurring within the LIV. These constituents are generally of only minor concern with regard to human health. Secondary contaminant levels, however, have been assigned to chloride and sulfate. Also, high sodium concentrations pose a possible health risk for people with heart disease, and a MCL of 40 mg/L is expected to be established for sodium in the future.

The groundwater occurring within the LIV is a calcium bicarbonate type of water. The groundwater contains relatively low concentrations of dissolved solids, indicating that the groundwater is relatively young. Most of the groundwater sampled throughout the LIV is "soft", with a hardness of less than 75 mg/L as calcium carbonate ($CaCO_3$), calculated from calcium and magnesium concentrations. Only one production well (Bell) falls into the moderately hard category of between 75 and 150 mg/L as $CaCO_3$.

The chloride and sulfate concentrations in groundwater are well below the secondary MCL's. In addition, sodium concentrations are well below the expected MCL of 40 mg/L.

6.2.2 Priority Pollutant Metals

All priority pollutant metal concentrations from wells sampled as part of the WHPP were below detection limits within the LIV.

A number of shallow monitoring wells not sampled as part of the WHPP have reported elevated levels of lead. The drinking water standard for lead is 50 parts per billion (ppb), or 5 ug/L. Elevated lead levels in groundwater are often associated with gasoline contamination, stormwater run-off, and possibly aerosol lead from vehicle emissions. Samples submitted to WDOE between January 1990 and July 1991 showed lead concentrations varying from 6 to 70 ppb. The highest lead concentrations were reported near the Texaco Station at the corner of Sunset and Front Street in Issaquah. Wells at the proposed Virginia Mason facility on Gilman Blvd also showed elevated lead concentrations (19 to 5 ppb).

Lead concentrations in monitoring wells at and around the ARCO station ranged from below detection to 124 ppb. The highest concentrations were observed in wells MW-8, MW-10, and MW-12 during August of 1991. These wells are all completed at the water-table at depths of less than 20 feet below ground. Deeper completions near these wells showed concentrations of less than 3 ppb. The most recent sampling analysis for lead at the ARCO site was in February 1992. At that time, the highest lead concentration was 22 ppb in MW-8, and less than 5 ppb in all other wells sampled.

Elevated lead concentrations have not been observed in deep production wells in the LIV.

6.2.3 Iron and Manganese

Secondary contaminant standards exist for iron and manganese, due to aesthetic and taste considerations.

Within the LIV, the iron and manganese concentrations are generally low, with the exception of 5 wells with iron concentrations above the current SMCL of 0.3 mg/L (SPVT1-1, WH3-1, SPVT3, WH2-1, and SPVT2-2), and 3 wells with manganese concentrations above the SMCL of 0.05 mg/L (SPVT3, WH2-2, and SPVT2-2). For each of these samples which exceeded the SMCL, turbidity was greater than 4 NTU's, and in one case, (the SPVT2-2 sample) had an extremely high turbidity of 160 NTU. The high turbidity of these samples was likely responsible for the reported high iron and manganese concentrations, because iron and manganese attached to the suspended particles may have been dissolved into the groundwater sample during sample preparation (acidification). Therefore, these samples are not believed to represent the true groundwater quality, and the iron and manganese concentrations throughout the LIV are believed to be below their respective SMCL's.

6.2.4 Nitrate

Nitrate concentrations in all wells sampled as part of the WHPP were less than 1.5 mg/L. Nitrate concentrations of greater than 1 mg/L were detected in 9 wells (Lakeside-new, SP7-2, DAROUT, SPVT1-1, SPVT5-1, Caldwell, WH2-1, SPVT3, and WH3-2). These nitrate concentrations imply slight groundwater quality degradation, possibly due to lawn fertilizers, septic systems, or pastured farm animals. Present nitrate concentrations within the LIV are typical of urbanized areas. Continued monitoring of nitrate concentrations is advisable to establish trends in nitrate concentrations. At present there are no trends in the nitrate data with respect to time or well completion depth.

6.2.5 Turbidity

Elevated turbidity may result in aesthetic and industrial-use problems. In addition, high turbidity is often associated with coliform bacteria.

Within the LIV, turbidity of greater than 1 NTU was detected in 15 wells. All but one of these were monitoring wells, in which the high turbidity can be attributed to insufficient development, a common occurrence for monitoring wells. The Bell Telephone well was the only production well with elevated turbidity.

6.2.6 Volatile Organic Compounds (VOCs)

Volatile organics include many of the contaminants associated with petroleum products and industrial solvents. Volatile organics were detected in two monitoring wells (SPVT5-1, and SPVT8-4) sampled as part of the WHPP:

- In SPVT5-1, 1,1,1-Trichloroethane was detected in all sampling rounds at concentrations of up to 1.3 µg/L. The present MCL for 1,1,1-Trichloroethane is 200 µg/L. This constituent is a solvent used in metal cleaning products. The contaminant was first detected in May 1992 at a concentration of 0.7 µg/L, and was sampled again November 1992 with a detected concentration of 1.2 ug/L, and then recently sampled again (April, 1993) with a detected concentration of 1.3 µg/L. This may suggest a trend of increasing concentration.

- Five volatile organic compounds were detected in monitoring well SPVT8-4 during the October, 1992 sampling round. However, organic volatile compounds were not detected when the well was re-sampled, suggesting that the reported results were likely due to contamination of the sample at the laboratory or during transport to the laboratory.

Volatile organic compounds have been detected in shallow monitoring wells installed as a result of releases of hydrocarbon from gasoline stations in the LIV. Common VOC's associated with gasoline include benzene (MCL=5 µg/L), ethylbenzene (MCL=70 µg/L), toluene (MCL=100 µg/L), and total xylenes (MCL= 1000 µg/L). At the ARCO site, water quality can be summarized as follows:

- Benzene concentrations exceeded 3,000 µg/L in onsite wells MW-1, MW-2, and MW-14 in 1991, but were below 2 µg/L or undetected in downgradient monitoring wells. The last reported sampling in August 1992 showed benzene concentrations of 1,000 µg/L in on-site well MW-1 and 32 µg/L in on-site well MW-14. Concentrations in downgradient off-site monitoring wells were less than 2 µg/L or below detection.

- Ethylbenzene concentrations exceeded 700 µg/L in onsite wells MW-1, MW-2, and MW-14 in 1991. Concentrations in downgradient monitoring wells were below 2 µg/L or undetected. The last reported sampling in August 1992 showed ethylbenzene concentrations of 385 µg/L in on-site well MW-1, 7 µg/L in MW-2, and 34 µg/L in on-site well MW-14. Concentrations in downgradient off-site monitoring wells were less than 2 µg/L or below detection.

- Toluene concentrations exceeded 1,400 µg/L in onsite wells MW-1, MW-2 and MW-14 in 1991, but were below 2 µg/L in downgradient monitoring wells. The last reported sampling in August 1992 showed ethylbenzene concentrations of 385 µg/L in on-site well MW-1, 7 µg/L in MW-2, and 34 µg/L in on-site well MW-14. Concentrations in downgradient off-site monitoring wells were less than 2 µg/L, or below detection.

- Total xylene concentrations exceeded 2,000 µg/L in onsite wells MW-1 and MW-2 in 1991. Concentrations in downgradient off-site wells MW-6, MW-7 MW-9 and MW-11 ranged from 3 to 10 µg/L. These wells are completed above 40 feet below ground. The last reported sampling in August 1992 showed total xylene concentrations of 300 µg/L in on-site well MW-1, 2 µg/L in MW-2, and 81 µg/L in on-site well MW-14. Concentrations in downgradient off-site monitoring wells were less than 2 µg/L, or below detection.

6.2.7 Pesticides and Herbicides

Pesticide chemicals have a wide range of health effects, and many are carcinogenic. Wells in the LIV were analyzed for pesticides and herbicides using EPA method 8080 and 8150, respectively (see Appendix E). Concentrations of all pesticides and herbicides analyzed in wells sampled for the WHPP were below detection limits.

6.2.8 Summary

The groundwater within the LIV generally contains few dissolved solids, and is classified as a calcium bicarbonate type of water. In general, the groundwater quality from production wells within the LIV is excellent, with only slightly elevated iron and manganese concentrations. Herbicides, pesticides or PCB's were not detected within the LIV, and priority pollutant metals are below regulated limits. Shallow groundwater contamination from volatile organic compounds associated with underground gasoline storage tanks has been documented above drinking water standards in shallow monitoring wells the LIV. One organic compound (1,1,1-Trichloroethane,) has been detected and confirmed in monitoring well SPVT5-1 at concentrations of up to 1.3 ug/L. Other organic compounds (benzene, toluene, ethylbenzene, and xylene) have been detected in other monitoring wells not monitored as part of the WHPP.

6.3 Surface Water Quality in the LIV

Surface water quality is important with regard to groundwater quality since it is often indicative of the quality of stormwater run-off, which may reach groundwater through direct infiltration. Stream water quality is summarized briefly below, with an emphasis on drinking water constituents rather than toxicity to fish or riparian habitat.

METRO monitors several sites within the watershed on a monthly basis during baseflow conditions, as part of its annual quality of local lakes and streams program, including three sites on Issaquah Creek and one site on Tibbetts Creek. In addition, Metro has collected grab samples during high flows and storms since 1987 from one site on Issaquah Creek. Metro further collected five samples from five sites within the Issaquah basin during 1989 and 1990 as part of a storm water quality sampling program.

Between 1989 and 1990 dry season fecal coliform geometric means of four of the five stream locations exceeded state water-quality standards. The East Fork Issaquah Creek location did not exceed the standard. Yearly geometric means exceeded state standards in three of the five sites, while the wet-season state standard was exceeded in only Tibbetts Creek. An evaluation of baseflow metal concentrations, indicated that copper, chromium, iron, nickel, and zinc concentrations were below their respective aquatic standards, and cadmium, mercury, and lead concentrations were below detection limits.

Two fish kills occurred on the North Fork Issaquah Creek in March and April, 1990. Water and tissue samples indicated the fish kill was due to a combination of elevated metal, ammonia, sulfides, 1,2 Benzenedicarboxylic Acid, and Diisonyl Ester along with low hardness.

6.4 Urban Run-off/Stormwater Quality

Water quality evaluations of stormwater/urban runoff for various land uses are available from several water quality studies, including Golder Associates, 1992; the National Urban Run-off Program (US EPA, 1983), and a study for the City of Portland (Woodward-Clyde, 1992). These studies appear to be the most relevant stormwater quality assessments with regard to potential groundwater contaminants and land uses. Stormwater contaminant concentration data has also been collected within the Issaquah valley by METRO to evaluate potential groundwater quality impacts.

Table 13 summarizes representative median concentrations in stormwater run-off. In general, concentrations are similar for all land-uses, with slightly higher nitrate concentrations in residential areas, and higher zinc concentrations in commercial areas. Lead concentrations are similar for all land-uses at the NURP sites, while lead is higher in commercial/industrial areas in the Portland study. Total petroleum hydrocarbons (TPH) is similar for all land-uses, based on the Portland study.

7. LAND USE AND CONTAMINANT INVENTORY

This section present the results of a land-use and contaminant inventory of the LIV area.

The land-use and contaminant source inventory for the LIV developed from the following data:

- Land-use maps provided by the City of Issaquah;
- Land-use maps for King County (King County SWM, 1990; King County SWM, 1992);
- WDOE Underground Storage Tank Investigation List, March 1992;
- City of Issaquah listing of business licenses issued, 1991;
- Telephone survey/interview of 65 potentially hazardous materials businesses, March, 1993;
- City of Issaquah Fire Department inventory of hazardous chemicals;
- State of Washington RCRA filers, Issaquah area;
- SPWSD and City of Issaquah sewer service map; and
- Aerial photograph review of Issaquah area for 1936, 1968, 1974, and 1990.

Land-use and contaminant source information were input to a Geographic Information System (GIS) database, which also contained geologic and capture zone information from the WHPA delineation portion of this study. This allowed graphical overlays of land-use with WHPA's for analysis.

7.1 Past Land-use

Aerial photographs of the Issaquah area from 1936 and 1968 show that land-use prior to construction of Interstate-90 was predominantly rural and that little noticeable change in land-use occurred during that time. The two major developments in the LIV prior to 1974 were the construction of Interstate-90 and the Lakeside sand and gravel pit. Equipment fueling, solvents and excavations during construction may have caused contaminant releases, but quantities are not known. The former Issaquah Airport located west of the LIV production wells operated until about 1987, handling light aircraft traffic. Fueling docks and solvents may have been used at the airport, but quantities are unknown.

There is no evidence from the aerial photos to indicate severe contamination that has since been built-over or excavated. There are no large ground stains or facilities present on any of the aerial photos that would suggest the use or discharge of hazardous materials.

7.2 Current Land-use

The City of Issaquah has twelve land-use designations. For the purposes of wellhead protection, these land-uses were combined into five separate groups as summarized on Table 14. A separate land-use designation was established for transportation corridors in Issaquah, which includes I-90, and major arterials within the City. King County zoning codes, with the exception of the western portion of Grand Ridge and Lake Sammamish area, are rural 5-acre (RA-5) for all county areas of interest outside the jurisdiction of the City. Figure 20 shows the present land-use in the LIV.

Land-use within the delineated wellhead protection areas is summarized on Table 14:

- Land-use in the 1-year TOT's is predominantly vacant/undeveloped or residential for all wells. The future activities in these vacant/undeveloped areas are therefore important to groundwater quality in the LIV. A significant proportion of land-use in the 1-year WHPA's is transportation. Vehicular accidents, street run-off, and construction activities are therefore potential contaminant sources of concern for groundwater.

- Land-use in the 5-year TOT's is predominantly vacant/undeveloped (40%), followed by residential (26%) and commercial (16%) land-uses. Future activities in vacant/undeveloped areas are therefore important to groundwater quality in the LIV. Specific activities permitted in residential and commercial land-uses are also important to groundwater quality in the LIV. Permitting of on-site use or storage of hazardous materials in commercial zoned areas may represent a threat to groundwater quality. About 12% (53 acres) of the 5-year WHPA is a transportation. Vehicular accidents, street run-off, and construction activities are therefore potential contaminant sources of concern for groundwater.

- Land-use in the 10-year TOT's is predominantly vacant/undeveloped (45%), a slightly higher percentage of the TOT compared to the 5-year TOT. Future activities in vacant/undeveloped areas are therefore important to groundwater supplies in the LIV. Residential land-use occupies about 26% of the TOT, similar to the 5-year TOT. The land-use acreage shown on Table 14 do not include acreage outside of the City of Issaquah. Commercial land-use occupies about 12% of the 10-year TOT (proportionally less than the 5-year TOT). Permitting of on-site use or storage of hazardous materials in commercial zoned areas may represent a long-term threat to groundwater quality. Only about 8% (61 acres) of the 10-year WHPA is a transportation arterial, not including the proposed Sunset By-pass. Vehicular accidents, street run-off, and construction activities are still potential contaminant sources in the 10-year TOT.

7.3 Contaminant Source Inventory for the LIV

This section summarizes the present potential contaminant sources in the LIV and specifically within the 1-, 5-, and 10-yr WHPA's delineated in Section 4.

As part of this study, a database of the past and present UST's and chemical handlers has been developed. The database is presented in Appendix J, and graphical output from the GIS is presented on Figures 21 through 27. Potential groundwater contaminant sources within the LIV include UST's, spills at chemical handling facilities, stormwater/urban runoff, and transportation spill hazards. In addition, future zoning/density changes could impact groundwater quality, by increasing urban runoff, increasing the number of septic systems, and possibly increasing the number of UST's or chemical handlers.

Underground Storage Tanks

Based on WDOE UST data from 1992, there are 39 UST site facilities in the LIV which are currently operational, being investigated, or were recently operational. These facilities have one or more tanks, with total facility capacities ranging from 1,100 gallons to over 160,000 gallons. The storage tanks contain primarily gasoline, diesel, fuel oil, and propane. Priority pollutant metals such as lead or chromium are sometimes associated with UST facilities. Some of these facilities have been taken out of service and the tanks removed. Some tanks have also been removed and replaced with new and safer tanks. Appendix J summarizes the UST database, including the known history of each facility and the present and past potential release quantities. Currently there are about 32 operating facilities remaining within the Issaquah area. Figure 21 shows the location of the 39 UST facilities on file with WDOE. Figure 22 shows the locations of UST facilities where leaks have been reported, suspected, or under assessment. Fourteen facilities in the LIV have reported UST releases of contaminants.

Within the WHPA's, there are 16 UST facilities. Table 15 summarizes the number of tanks and the total volume of product within each WHPA. For the purposes of WHPA planning, no distinction is made between facilities with double-walled tanks or release detection systems. It is highly unlikely that the total volume contained in the UST's within each WHPA would be released to the aquifer instantaneously. Figures 23 and 24 show the locations of UST's relative to modeled capture zones.

Chemical Handlers

Based on review of the RCRA filers listing and telephone interviews with area businesses, there are 16 businesses within the LIV area that handle chemicals that could potentially contaminate groundwater. Figure 25 shows the location of chemical handlers in the LIV. Most of these businesses handle only small quantities of chemicals. However, some of these chemicals, particularly the solvents (DNAPL), are of concern with respect to groundwater contamination. Seven dry cleaning facilities exist within the Issaquah area which reportedly use the solvent tetrachloroethylene (PCE). The quantities of PCE used for dry cleaning are generally small, less than 55 gallons on-site at a given time. Three businesses (Grange Supply, Lakeside Gravel Pit, and Gilman Autobody) use solvents for cleaning and degreasing purposes. The contaminants present in solvents vary, but may include a variety of regulated VOC drinking water contaminants. All businesses reportedly have no more than 55 gallons of solvent on site at any given time. Six businesses reportedly have other petroleum oil products, including waste oil, on site. Quantities range from less than 100 to 2,500 gallons (Lakeside Industries). One business (Circuit Partner) handles about 80 different chemicals in both dry and liquid form. Most of the chemicals are acids and metal complexes. Solvents or regulated VOC compounds are not reportedly on-site. The hazard to groundwater posed by each chemical was not evaluated, since this business is presently outside of the WHPA's. The chemical handler database is presented in Appendix J.

Within the WHPA's, there are six chemical handlers. Table 15 summarizes the facilities within each WHPA. For the purposes of WHPA planning, it is assumed that the maximum reported amount is on-site as a potential spill release. It is highly unlikely that the total volume contained within each WHPA would be released to the aquifer instantaneously. Figures 26 and 27 show the locations of chemical handlers relative to modeled capture zones.

Urban Runoff

Urban runoff can potentially contaminate groundwater, and is a relatively constant source. Run-off can be evaluated in terms of a contaminant load to groundwater. A contaminant load is a mass of contaminant entering the system over a period of time. This mass can be determined from the concentration (mass per unit volume) and the infiltration rate (volume per unit time). If storm sewers are present, only a small portion of stormwater is likely to infiltrate to groundwater. In developing possible contaminant loads (see Section 8) it is conservatively assumed that present contaminant loads are a function of the median stormwater run-off concentrations shown on Table 13 and an infiltration rate, expressed as a percentage of mean annual precipitation.

The City of Issaquah has a stormwater collection system, but discharges storm water run-off into surface waters primarily in the downstream reaches of Issaquah Creek near Lake Sammamish. The stormwater collection system reduces the amount of direct infiltration of stormwater from urban areas. However, some areas, such as East Sunset Way, do not have stormwater collection. Interstate-90 is potentially a significant source of direct infiltration of untreated stormwater run-off. The present design of the Interstate does not include a stormwater collection system, and all road run-off is allowed to discharge directly to the ground via outfalls. There are approximately 50 outfalls along the 4.5 mile stretch of I-90 along the East Fork of Issaquah Creek. Available monitoring data are insufficient to determine the magnitude of water quality impacts from I-90. However, it is estimated that up to 215 acre/feet per year, or 70 million gallons per year, of stormwater run-off are generated by Interstate 90 adjacent to the East Fork of Issaquah Creek (SWM, 1992).

Transportation Spills

A significant percentage of land-use within the 1, 5, and 10-year TOTs to LIV production wells are associated with transportation. As such, contamination from spills of hazardous chemicals caused by vehicular accidents are a significant concern. Various chemicals may be transported via the interstate on tanker trucks or other transport vehicles or personal vehicles. There are no data regarding type or quantities of hazardous materials transported on interstate or local highways in the Issaquah area. A tanker truck can carry as much as 10,000 gallons, while other tankers may transport tens of 55 gallon drums. Accident statistics for Interstate 90 between SR-900 and the Sunset interchange are summarized on Table 16. The table shows that, in general, there has been an increase in total number of accidents and the accident rate (per million vehicle miles) along this portion Interstate-90. There have been four documented fuel spillages, but no reported hazardous spills along this section of I-90 since 1980. Since 1988, the accident rate is approximately one accident per 167,500 vehicles, with an estimated average daily traffic volume of 33,050 vehicles over that period. Using these figures, there are approximately 73 accidents per year along I-90. The probability that one of these accidents will involve a loaded tanker truck, or other vehicle transporting hazardous materials is difficult to determine. However, given that the interstate presently has no stormwater or spill containment structures, it is likely that a major spill along the interstate would result in discharge of hazardous materials to the ground surface.

There are no data concerning accident rates or spillage along City arterials. Accidents along City arterials are likely to be contained by the City's stormwater collection system, but some areas, such as East Sunset Way, do not have stormwater collection.

Future Land-Use

Presently, groundwater quality in LIV production wells is excellent, and existing land-uses have not resulted in groundwater contamination above drinking water standards. Therefore, control and prediction of the impact of future land-uses is a significant objective for wellhead protection. The recent growth of the LIV area has resulted in some ambiguity regarding future land-use developments. As such, it is not possible to document or inventory projected land-use changes and predict the impact on groundwater quality in the LIV. Possible land-use changes that may affect groundwater quality in the LIV include:

- *Grand Ridge MPD.* The largest potential land-use change in the LIV is the proposed Grand Ridge MPD. A rural zoning designation for the eastern portion of Grand Ridge has recently been approved by the King County council, and it is unlikely that high-density development will occur in this area. This portion of Grand Ridge was not incorporated into the WHPA modeling and capture zone delineation because it appears to be at the boundary of the aquifer system. However, further investigations are needed to determine hydrogeologic conditions at depth.

- *Lakeside/West Grand Ridge Urban Zone.* The western portion of Grand Ridge is presently zoned urban. This portion of Grand Ridge is important to wellhead protection planning because it provides direct recharge to the LIV aquifer. This has two implications. First, land-use protection on Grand ridge must strive to minimize potential surface contamination from point sources and stormwater. Secondly, as discussed in Section 3, urban development in this area which results in increased annual run-off to surface water will proportionally decrease the recharge to the aquifer from the Grand Ridge area. Changes in the recharge patterns may also alter the shape of capture zones for the LIV production wells. Attempts to maintain recharge through re-infiltration of stormwater must pay strict attention to water quality and contaminant loads. The urban zoned portion of Grand Ridge, particularly adjacent to I-90, is located within a 7 to 10 year WHPA under present groundwater withdrawals. Under future increased groundwater withdrawals, a proportionally larger area of the presently urban-zoned portion of Grand Ridge will lie in a 7 to 10-year WHPA. Future land-use decisions for this area should consider impacts to groundwater quantity and quality.

- *The proposed Sunset By-pass.* This transportation project would result in a multi-lane highway from the Sunset I-90 interchange to the Issaquah-Hobart Road south of the central business district. The proposed route has not been finalized, but it would traverse both the 5-year and 10-year WHPA's. Minimizing groundwater quality impacts, both during construction and afterwards, will be necessary for this project;

- *Expansion of commercial and light industrial land-uses.* This may be recommended as growth in Issaquah continues. The central business district of Issaquah lies in a 5-year and 10-year WHPA, and possible groundwater quality impacts must be evaluated prior to re-zoning or permitting of potentially hazardous activities.

- *Increased development on the Lake Tradition Plateau.* Similar to Grand Ridge, the Lake Tradition area is an important recharge area and lies in a 7 to 10 year capture zone under present conditions. Increased development may increase run-off and reduce groundwater recharge to the Lower Fork sub-basin, which provides up to 16 cfs to the LIV aquifer. Changes in the recharge patterns to the LIV aquifer may alter the shape and extent of capture zones for LIV production wells.

- *State of Washington anti-degradation policy (WAC 173-200-030).* This legislation may affect all projected changes in land-use within the LIV. The policy states that existing water quality shall be protected, and contaminants that will reduce the existing quality thereof shall not be allowed to enter such waters, except in those instances where it can be demonstrated to the department's [WDOE] satisfaction that:

(i) An overriding consideration of the public interest will be served; and

(ii) All contaminants proposed for entry into said ground waters shall be provided with all known, available, and reasonable methods of prevention, control, and treatment prior to entry.

Appendix I contains the WAC-173-200 concerning groundwater quality.

8. CURRENT AND FUTURE GROUNDWATER CONTAMINATION POTENTIAL

A quantitative assessment of contamination potential is desirable to develop a ranking of contaminant types and contaminant sources. The concentration of a contaminant is usually referenced to a Maximum Contaminant Level (MCL) established by state or federal agencies based on toxicity and risk to human health. These MCL's are the standards by which the severity of contamination are assessed, and are in many, but not all cases, the established criteria for clean-up actions at contaminated sites. For groundwater protection studies, protection of the aquifer is often based on a level lower than the MCL as a target water quality which the community strives to maintain. Quantifying contamination potential or risk to public health is difficult from both a technical standpoint and from a public communication/ acceptance standpoint. Two approaches were used in developing a ranking of groundwater contamination potential in the LIV:

- One approach was to compute, for various contaminant types, a critical load of a given contaminant and compare this "critical" load to the estimated or observed actual loads of contaminants within the LIV capture zones. This approach worked well for non-point sources of inorganic contamination, but was less useful for point sources of organic contaminants;

- The second approach was to utilize a ranking strategy worksheet developed by the US EPA. While a thorough evaluation of assumptions and methodology could not be carried out on the EPA method, the results showed similar trends and conclusions to the more specific approach used in the loading calculations. The EPA ranking provided a more broadly defined means of ranking contaminant sources.

Groundwater contaminant sources are commonly divided into two categories: point and non-point sources. The approach to predicting possible contaminant concentrations from these sources differs for each source category. Non-point sources are those sources which are aerially extensive and relatively continuous over time. Urban run-off, fertilizer applications, and multiple septic systems can all be treated as non-point sources. Point sources are those sources which have a specific location and extent, and which occur over a distinct period of time. Underground storage tanks, chemical handling facilities, landfills, and individual septic tanks can be treated as point sources.

The results of the contaminant ranking approaches are summarized in the following sections.

8.1 Contaminant Loading Approach

The contaminant loading approach begins with the question; "how much contaminant is theoretically necessary to cause an undesirable concentration in a production well?". The undesirable concentration has been conservatively assumed to be one-half the MCL for a given contaminant. This level is termed an "action level". The concentration of a contaminant in a well is dependent on the amount of mixing with "clean" groundwater flowing through the aquifer. One gallon of one contaminant mixed with 5,000 gallons of clean water may not result in a concentration that exceeds drinking water standards, while one gallon of a different contaminant may result in serious groundwater contamination. It is beyond the scope of the WHPP to quantitatively assess all possible contaminants with respect to their travel time to production wells and potential concentration. For the purposes of wellhead protection planning, four "indicator" contaminants have been selected which are commonly associated with specific land-uses or activities, and which have established primary drinking water MCL's. For non-point sources, the indicator contaminants are:

- Lead: Commonly associated with urban run-off.
  MCL = 0.05 mg/L. Action Level: 0.025 mg/L.

- Nitrate: Commonly associated with urban run-off, septic tanks, and fertilizers. MCL = 10 mg/l. Action Level: 5 mg/L.

For point sources, the indicator contaminants are:

- Benzene: Commonly associated with USTs.
  MCL = 0.005 mg/L. Action Level: 0.0025 mg/L.

- Tetrachloroethylene: Commonly associated with on-site dry cleaning.
  MCL = 0.005 mg/L. Action Level: 0.005 mg/L.

Contaminant loads are expressed as a mass (e.g. kilograms per year). The critical loads are calculated based on the action-level concentration of the contaminant (mg/L) and the quantity of water pumped from a single well or multiple wells in a wellfield.

Critical loads are calculated by as follows:

$$Lcrit_i = (Ccrit_{i,j} * Q)$$

Where

$Lcrit_i$ = Critical load of contaminant i (milligrams/year)
$Ccrit_{i,j}$ = Action-Level concentration of contaminant i (milligrams/Liter)
Q = Total pumping rate from production wells (Liters/year)

Calculation of present loads is similar to calculation of the critical load, being:

$$L_i = (C_{i,j} * I)$$

Where,

L_i = Load of contaminant i (milligrams/year)

$C_{i,j}$ = Concentration of contaminant i for land-use/source j (milligrams/Liter)
I = Infiltration rate to the aquifer (Liters/year)

The calculation of actual contaminant loads are dependent on a number of parameters, many of which are not well known. For example, the amount of benzene which would be necessary to exceed the critical load is dependent on the distance of the source to a well, the quantity of the spill, the area over which the spill occurs, and various contaminant transport parameters such as sorption coefficient, retardation factor and biodegradation. It is beyond the scope of the WHPP to provide detailed data or analyses regarding specific processes or parameters controlling contaminant transport and behavior in the LIV. However, in order to accommodate the uncertainty and range of potential parameter values, a risk-based approach has been developed using simple calculations and transport models using the spreadsheet @RISK. This approach enables a range of values (minimum, maximum, and expected) to be utilized in calculations. In the @RISK worksheet, these calculations are repeated many times (typically 1,000 or more), randomly selecting parameter values from the specified ranges. Thus, a calculated result for a contaminant load is expressed as a distribution of values, showing minimum, maximum and expected values. The expected value occurs most frequently, while the less frequent results are out on "the tails" of the distribution. The results of the non-point and point source analyses are presented in the following sections.

8.1.1 Non-Point Sources

Non-point sources of contamination have been grouped into three categories: urban/storm runoff, fertilizer application, and septic systems. Nitrate loads associated with these activities have been estimated based on data from urban run-off studies (US EPA, 1983, Golder 1991, METRO, 1982), and from USGS studies (Frimpter, 1992). Lead loads associated with various land-uses have also been estimated from urban run-off studies (NURP, 1983, Woodward-Clyde, 1992). Six land-use categories were used, as outlined in Section 7. Application rates, contaminant concentrations, or groundwater infiltration rates under each category were estimated based on these data.

The results of the nitrate analyses are detailed in Appendix K, containing the worksheet calculations based on parameter ranges. The following discussion is based on expected values only. Table 17 summarizes the predicted nitrate loads (expected values only) to the LIV aquifer under present conditions, and two possible future development scenarios. For all cases, the contribution from urban run-off is low. Under present conditions, the majority of nitrate load is likely due to fertilizer applications. The predicted load of 2,650 kg/yr nitrate is based on an assumed fertilized area of 33 acres within the 10-yr WHPA, or 290 lawns of 5,000 ft^2 area (100 ft x 50 ft). The predicted groundwater concentration is similar to observed conditions at 0.8 mg/L. The two future load analyses include possible development of 1,180 acres on Grand Ridge and Lake Tradition Plateau. Development at 1-acre density and 5-acre density was evaluated. Fertilizer applications could be as high 10,300 kg/yr for the 1-acre development scenario (1,095 new lawns contributing 3 lbs of nitrate per 1,000 ft^2). A nitrate load of 6,500 kg/yr is estimated for the 5-acre development scenario (273 new 10,000 ft^2 lawns with similar application rates). For both scenarios, septic application rates were based on 2.5 persons per unit, with 1,180 new units for the 1-acre scenario and 273 new units for the 5-acre scenario.

The results of the nitrate analysis show that:

- Under present conditions, nitrate loads appear acceptable and the predicted concentration of less than 1 mg/L is within observed ranges of nitrate levels in the LIV aquifer;
- Fertilizer applications in future residential areas on the recharge areas of Grand Ridge and Lake Tradition Plateau could cause some degradation in water quality, particularly at 1-acre density;
- Future development utilizing septic systems at 5-acre density may increase nitrate loads with some degradation of groundwater quality, though below critical loads; and
- Future development utilizing septic systems at 1-acre density may increase nitrate loads to unacceptable levels, approaching state drinking water standards.

The results of the lead analyses are detailed in Appendix K, containing worksheet calculations based on parameter ranges. The following discussion is based on expected values only. Table 18 summarizes the predicted lead loads to the LIV aquifer under present conditions, and one possible future development scenarios. Under present conditions, the majority of lead load is from residential land-use, because it has a proportionally higher total area than other land-uses. The predicted load of 42 kg/yr is based on assumed infiltration rates for various land-uses. The predicted groundwater concentration is on the order of 10 ppb, which is similar to observations in several shallow wells in the LIV. Future development of 1,180 acres on Grand Ridge and Lake Tradition Plateau, the addition of the Sunset by-pass, and added commercial development increases the predicted load to 75 kg/yr. The predicted groundwater concentration is on the order of 20 ppb, which is also similar to observations in several shallow wells in the LIV.

The results of the lead analysis are somewhat inconclusive, given the complex transport behavior of lead. However:

- Under present conditions, lead loads in urban run-off may have some impact on water quality and the predicted concentration of about 0.01 mg/L is within observed ranges of lead levels in the LIV aquifer; and
- Future development may increase lead loads due to increased residential land-use and associated transportation. Lead loads could approach an action level of 0.025 mg/L without water quality protection measures.

8.1.2 Point Sources

Point sources containing organic compounds are more difficult to evaluate because of the complex behavior of organic compounds in groundwater. Specifically, retardation and biodegradation processes are very significant transport parameters and influence the calculated contaminant concentration as a function of both time and distance from a contaminant source. In general, the effect of degradation and retardation processes is that, to achieve a specified concentration (e.g. an action level of one-half the MCL) at a well, larger contaminant loads are required at greater distances from the well. In other words it may take 10 gallons of gasoline at a distance of 400 feet to exceed the action level, while it could require 1,000 gallons at a distance of 1,000 feet to achieve the same concentration.

A simplified assessment of organic contaminant transport was carried out to evaluate the possible range of loads necessary to cause degradation in groundwater quality above the action level of one-half the MCL for benzene. Utilizing a probabilistic approach similar to that for non-point sources, a range of aquifer and transport parameters were used to calculate critical contaminant loads at various travel times from well SPWSD 7/8. Appendix K contains details of the parameters used. The results are summarized as follows:

- For benzene, the critical load of gasoline is on the order of 200 gallons per day released to the aquifer at the 1-year time of travel assuming an action-level of 2.5 µg/L. This equivalent to 73,000 gallons of gasoline released in a one-year time frame. The critical load of gasoline is on the order of 500-times higher at the 5-year time of travel due to the buffering effects of biodegradation and retardation of benzene.

- Critical loads for DNAPL contaminants such as PCE are much lower than for benzene. Simple loading calculations suggest that as little as one-gallon of PCE released in the 1-year WHPA could cause contamination above the action level.

These load calculations do not imply that the calculated contaminant loads are acceptable levels for groundwater management. The complexity of transport of organic contaminants requires a site-specific analysis. However, the calculations do illustrate the "order-of-magnitude" volumes theoretically necessary to cause severe groundwater contamination. A spill of organic contaminant (e.g., gasoline), unless it is directly adjacent to a well, may not cause a health risk, and management of these types of sources should reflect an understanding of the behavior of these compounds. The critical load approach for point-source organic contaminants was not implemented in a detailed LIV-specific risk assessment because of difficulties in determining:

- The likelihood of contamination;

- Appropriate ranges of initial concentrations and spill volumes;

- The effect of multiple source-types and locations (transportation, USTs, chemical handlers); and

- Exposure and toxicity parameters necessary to "normalize" the risk associated with point sources (benzene, PCE) versus non-point sources (e.g. nitrate), as well as the risk between specific point sources (e.g. UST site 1 versus UST site 3).

It is beyond the scope of the WHPP to develop a comprehensive, site-specific assessment of contaminant risks in the LIV. However, existing methodology developed by EPA was used to rank point sources as a screening process. The results of the ranking are discussed in the following section.

8.2 EPA Ranking Methodology

The EPA ranking methodology for contamination risks is based on the likelihood and severity of well contamination. The likelihood of well contamination is a function of the likelihood of release at the source and the likelihood of reaching the well. The severity of well contamination is a function of release quantity, contaminant attenuation, and toxicity. This approach is a simplified form of risk assessment that uses limited data to develop the relative risk of various potential contaminants. This method requires some knowledge of the hydrogeology, but can be implemented by competent non-hydrogeologists for planning purposes. The basic methodology assumptions, and limitations of the method are presented in Appendix L, which is taken directly from the US EPA document.

The ranking methodology was used independently of the contaminant load analysis to provide a preliminary ranking of point source hazards associated with UST's, chemical handlers, and transportation hazards (spills of hazardous substances). Through the use of the EPA risk approach, the overall contamination potential of sources are ranked in order to provide a framework for establishing priorities with regard to wellhead protection efforts.

The following general hydrogeologic properties were used in the EPA methodology:

Parameter	Range in EPA Screening
Depth to Aquifer	12-50 feet
Hydraulic conductivity	10^{-3} to 10^{-1} cm/sec
Groundwater Velocity	33 to 330 ft/yr

The hydraulic properties used in the screening are fixed ranges in the risk assessment and are considered accurate and not subject to change.

Each potential point source determined from the contaminant source inventory was evaluated using the EPA methodology, including all USTs and chemical handlers identified within the 5-year and 10-year capture zones. An important parameter in the EPA methodology is the distance of a source from the well. In several cases, a number of point sources were lumped into the same ranking assessment based on their similar distance from a well. Similarly, for transportation spills, all of the production wells in the LIV are less than 1,000 feet from a major arterial or Interstate and, in terms of a screening level risk assessment, the distance to a transportation hazard is similar for all wells.

The second important parameter is the type of contaminant, which affects the toxicity, persistence, and degradation scores used in the risk assessment. For UST sources, benzene is the contaminant used for scoring; for chemical handling facilities, tetrachloroethylene (PCE) was used. For transportation spills, five contaminants were evaluated: sulfuric acid, benzene, carbon tetrachloride, chromium, and a mix of volatile organic compounds (VOC Mix).

The resultant score of a given contaminant source for a given well is ranked numerically from negative 200 to positive 10. Scores greater than zero are high risk sources. Scores between zero and -4 are considered moderate risk sources, and scores less than -4 are considered low risk sources. The relative ranking of sources is valid regardless of its actual score, which provides a means of ranking among low or moderate risk sources.

The results of the screening are summarized on Table 19. There are no high risk (score greater than 0) sources in the LIV. There are two moderate risk sources (score between 0 and -4) in the LIV. All other sources are considered low risk according to the EPA method. The highest ranking risk (score of -2.6) in the LIV is a transportation spill of sulfuric acid, which applies to all wells in the LIV. The second highest ranking risk are the UST's and chemicals handled at the Grange Supply (score of -3.9), applying only to COI wells 1 and 2. The higher scoring "low risk" sources (scores between -20 and -4) include primarily chemical handlers and all other transportation spill hazards (chromium, benzene, carbon tetrachloride, and VOC mix). All of the gasoline stations in the LIV have very low scores (less than -100).

8.3 Discussion

The results of the contaminant load analyses and the EPA screening process are similar in many ways. Both approaches suggest a relatively low overall risk of groundwater contamination to LIV production wells under present conditions. This is supported by the observed water quality in the LIV aquifer. Both approaches indicate relatively low risks from present point sources of benzene (e.g. gas station USTs). The contaminant load analysis suggests that a relatively small release of PCE could exceed action levels. However, using the EPA approach, the risk is actually quite low, due possibly to the toxicity and persistence factors incorporated in the risk-screening methodology.

Based on the results of the two contaminant evaluations, a relative ranking of groundwater contamination hazards to the LIV aquifer has been developed as shown on Table 20. This ranking includes relative hazards under present land-use conditions, and under possible future land-use conditions. Under present land-use, the highest hazard is posed by a chemical spill along any of the major thoroughfares in the LIV, followed by chemical handling facilities. Non-point sources of urban/residential contamination have the lowest ranking under present land-uses.

Future changes in land-use will affect the relative ranking of contaminant sources. However, land-use changes must be evaluated on a site-by-site basis, particularly for point sources, such as service stations or chemical handling facilities. Table 20 shows a continued low ranking for these categories, but assumes that no additional facilities are sited within the WHPA's for present production wells. Transportation spills will likely remain a high-ranking hazard under any development scenario. However, increased spill response and spill containment readiness could reduce the risk from transportation. Future urban/residential development, particularly on the recharge areas of the LIV, is potentially a high ranking ground water quality hazard. As shown in the nitrate analysis, 1-acre lot development using septic on the recharge areas of Grand Ridge and Lake Tradition Plateau would pose a high risk to groundwater quality (possibly approaching the MCL for nitrate). Development at 5-acre density using septic tanks reduces the risk, but will still result in groundwater quality degradation. Development with urban services (sanitary sewer) and open space to maintain recharge would likely further reduce risks from nitrate.

9. GROUNDWATER QUALITY MANAGEMENT

9.1 Summary of Key Technical Issues

To summarize the key technical issues identified in previous sections:

Hydrogeology

- The LIV aquifer is a heavily used, complex stratified system that is difficult to simulate using simple models;
- Significant seasonal fluctuations in groundwater levels, groundwater flow directions and hydraulic gradients are present. Superposition of multiple well capture zones is the only way to delineate WHPA capture zones using a time-of-travel approach;
- Present groundwater withdrawals intercept down-valley flow and influence water-levels in virtually all surrounding wells within a 2 mile radius. Strong downward gradients are produced from the pumping wells which draws water from the shallow water-table towards the deeper portions of the aquifer. Thus, the aquifer is very vulnerable to contamination at the water table;
- Recharge from Grand Ridge and Lake Tradition Plateau areas is significant, especially during the winter/spring. The estimated travel time from Grand Ridge/Tradition Plateau to the LIV production wells is between 6 and 10 years;
- One-year capture zones for wells SPWSD 7/8, COI 1/2 and COI 4/5 underlie 82 acres, primarily within the City of Issaquah;
- Five-year capture zones for wells SPWSD 7/8, COI 1/2 and COI 4/5 underlie 450 acres, primarily within the City of Issaquah, but including some County land near Lakeside, Grand Ridge, and the Sunset Interchange area;
- Ten-year capture zones for wells SPWSD 7/8, COI 1/2 and COI 4/5 underlie at least 710 acres within the City of Issaquah, and unincorporated King County along Grand Ridge and Lake Tradition Plateau; and
- Future increases in groundwater usage by SPWSD and the City of Issaquah may increase the 5- and 10-year capture zones to production wells and encompass nearly all of the LIV area.

Groundwater Quality and Contamination

- Present groundwater quality is excellent for all parameters in all potable water-supply wells in the LIV. A number of shallow monitoring wells have shown elevated levels of regulated contaminants including benzene, trichloroethane, xylenes, and lead;

- Seven documented hydrocarbon releases within the LIV since 1988 have not been detected in deeper production wells in the LIV. These releases have occurred within the modeled 5-year capture zones of production wells;

- Bio-degradation of light hydrocarbons (LNAPLs) associated with gasoline products may provide some measure of natural protection from sub-surface gasoline contamination;

- Contamination of the aquifer from dense hydrocarbons (DNAPL's) would be very serious and difficult to characterize;

- Contamination of the aquifer from stormwater and residential applications is not apparent at present levels of development. Increased development, resulting in greater run-off and less recharge to the aquifer increase the potential for groundwater contamination from stormwater and residential contaminants, such as nitrate;

- The overall risk of groundwater contamination from current point sources is relatively low using the EPA methodology for ranking contamination potential. Groundwater contamination risks from present non-point sources, based on estimated contaminant loads from specified land-uses, is also low.

- Accident statistics along the Interstate-90 are insufficient to determine the probability of a serious tanker spill. However, transportation ranks highly in comparison with other sources in the EPA screening. The consequences of a spill along transportation corridors (e.g. I-90) are serious and should be addressed;

- The risk of groundwater contamination from future point sources could be high, depending on the location and type of contaminant, using the EPA methodology for ranking contamination potential. The risk of future groundwater contamination from future non-point sources, based on estimated contaminant loads and specified land-uses, could also be high.

9.2 Recommended Wellhead Protection Strategies

A number of strategies for groundwater quality protection have been developed in recent years as awareness of groundwater contamination has increased. There are several important considerations in evaluating appropriate wellhead protection strategies:

- Other environmental programs, ordinances, and policies provide, in many cases, substantial overlap with possible local responses for groundwater protection. The intent of the WHPP is to provide a technical framework for implementing workable strategies, not to re-develop management structures or responses that may already exist at other level of government;

- The nature of present land-use and contaminant sources in the LIV is such that future conditions pose an equal or greater risk to groundwater supplies as compared to present activities. Thus, water quality protection strategies should emphasize management of future land-use;

- Public education and involvement is key to any implementation effort. An informed and participatory public will greatly enhance the ability of the local jurisdiction to implement strategies and funding for programs; and

- Implementation of strategies will require varying levels of short-term and long-term expenditures by the governing jurisdictions. The trade-off between expenditure and the level of protection must be considered. The present dependence on the LIV aquifer as a sole source of drinking water suggests that protection at any cost is needed because additional new groundwater supplies have not yet been identified in the LIV; allocation of new water rights is presently curtailed by hydraulic continuity issues; and a tie-in to a regional water source is many years away.

With these considerations in mind, a number of wellhead protection strategies can be addressed. Wellhead Protection Programs across the country have typically relied on strategies focusing on administrative approaches such as zoning changes and permitting procedures. Alternative strategies such as engineering solutions and contingency sources are also considered in conjunction with regulatory approaches. Typical WHPA strategies are summarized on Table 21. The planning objective, legal considerations, and general administrative requirements for each strategy is shown. Many of these strategies are applicable to the Lower Issaquah Valley including:

- Aquifer Management Zones;

- Land Use Zoning and Control;

- Special Permitting;

- Hazardous Materials Handling Regulations;

- Public Education;
- Engineering;
- Spill Response Planning;
- Water Supply Contingency Planning; and
- Monitoring and further technical studies

Each of these strategies are discussed in the following sections. These sections summarize possible components of each strategy, but do not make specific recommendations regarding policy or structuring of an ordinance.

9.2.1 Aquifer Management Areas

Rationale

Establishing Aquifer Management Areas is the first step towards groundwater quality management. It provides a focus for all subsequent management strategies and is a declaration of commitment on the part of jurisdictional bodies to groundwater protection. The term aquifer management area (AMA) is consistent with existing terminology used by the City of Renton, and is recommended to provide consistency in WHPA terminology in the State.

This is a high priority element of Wellhead Protection, and must be established prior to implementing other recommended strategies.

Specific Requirements/Recommendations

- A wellhead protection committee (WHPC) should be established to address wellhead protection issues. The WHPC should be able to develop policy and resolve issues affecting local wellhead protection areas. Issues involving regional groundwater management should continue to be addressed by the Groundwater Advisory Committee (GWAC) established for the Issaquah Basin Groundwater Management Area.
- Three specific AMA's should be designated in the LIV corresponding to the capture zones delineated from the hydrogeologic analysis. AMA-1 should correspond to a TOT less than 1-year, AMA-2 to between 1 and 5 years, and AMA-3 to all TOT's greater than 5 years. The Grand Ridge/Lake Tradition upland areas should receive an intermediate (AMA-2) designation, which is more appropriate to its importance as an aquifer recharge area, and the likelihood of being within a 5-year TOT under increased groundwater usage. It is presently estimated that these areas lie in a 6- to 10-year capture zone.

- General policy statements regarding management directives should be adopted for each AMA. The language used in these policy statements should be developed by the jurisdictional entities, and reflect high (AMA-1), moderate (AMA-2), and baseline (AMA-3) levels of management policy. For example, AMA-1 policy may emphasize zoning and land-use control, while policy for AMA-2 may emphasize permitting requirements or design standards. AMA-1 designations may result in restrictive controls on land-use. AMA-2 designations are more actively "managed" and may require protective policies and goals, in conjunction with flexible management and permitting.

Special Considerations

A legal description of the AMA's will be required for developing any ordinances within these areas. The parabolic shape of the modeled capture zones is not amenable to legal descriptions consistent with survey markers or roads. Therefore, modified AMA designations, specific to jurisdictional boundaries should be developed. These modifications should be made by the governing jurisdiction, since the approach to the modification will be subjective in nature.

Development of management policy for each AMA designation should focus on long-term strategies. Given that dependence on locally withdrawn groundwater supplies is likely to continue for at least 10-years, and possibly more, even an AMA-3 designation should receive sufficient protection policy to minimize groundwater quality degradation. Similarly, an AMA-2 designation based on possible future withdrawals rather than current withdrawals may be more appropriate and suitably conservative.

Designation of AMA's will overlap with the following programs:

- King County Sensitive Areas designation - Critical Aquifer Recharge Areas (CARA's);
- Issaquah Groundwater Management Program; and
- City of Issaquah interim Critical Areas Ordinance.

Administrative Support

Management of the AMA's will require administrative oversight. The City of Issaquah, King County, and SPWSD should cooperatively fund a position for management of the AMA's. Responsibilities may include:

- Coordinate and implement Spill Response and Water Supply Contingency Plan;
- Coordinate public education activities;

- Coordinate with planning and public works personnel regarding development plans, environmental reviews, construction projects, and water-supply planning;

- Oversee monitoring programs and further technical studies; and

- Integrate surface water, and non-point pollution programs into Wellhead Protection activities, possibly in conjunction with the proposed Basin Steward position recommended in the draft Basin and Non-Point Action Plan (King County SWM, 1993).

Estimated Cost

The cost of administering the WHPA program should include annual salary for the administrator and a budget for staffing and program support. A senior-level administrator is recommended. Annual budgets could range from $10,000 to $300,000 depending on the program objectives for a given year.

9.2.3 Land Use Zoning and Control

Rationale

Prohibiting certain land uses or activities is an accepted purvey of government and in many cases is the most cost-effective means of managing water quality since administrative costs associated with permit reviews or site inspections are not necessary. There are difficulties in restricting or prohibiting land-uses or re-zoning. It may be easier to control future land-uses through permitting and design review than to re-zone or prohibit existing and future land-uses. Based on the present groundwater quality conditions and presently low risk to groundwater quality, strategies other than zoning and land-use prohibition may be appropriate.

Possible Specific Requirements

The following land-use zoning and control options may be appropriate for the LIV:

- Re-zoning of the western portion of Grand Ridge. Re-zoning of this area may be necessary to maintain adequate high quality groundwater recharge to the LIV aquifer. Any land-use changes to the Western portion of Grand Ridge must address groundwater recharge and groundwater quality. An emphasis must be placed on land-use that maintains open-space and limits or prohibits potential contaminant sources.

- Set minimum open-space requirements for Grand Ridge and Lake Tradition Plateau that will maintain current levels of groundwater recharge from these areas. A similar recommendation was proposed by King County SWM (Recommendation BW 3 from the Draft Basin and Non-Point Action Plan) and is consistent with the goals of Wellhead Protection. The King County recommendation could be proposed without modification as a wellhead protection strategy;

- Prohibit businesses handling DNAPL contaminants within WHPA's. Commercial activities generating DNAPL contaminants, such as trichloroethylene, or tetrachloroethylene could be prohibited or relocated. Six dry cleaners, two automotive business and the Lakeside Gravel facility are within the 5-year WHPA would be impacted by this strategy. These businesses may not be entirely dependent on the on-site hazardous materials and a possible compromise would be to re-locate only the hazardous materials;

- Prohibit businesses handling any organic contaminants within WHPA's. Gasoline service stations or other commercial activities generating organic compounds, such as benzene and toluene could be prohibited or relocated. This strategy was used in Renton to eliminate UST's within AMA's in the City. The City offered incentive payments to business to re-locate within a specified period of time. There may be legal challenges to this strategy since there has been no documented contamination of LIV production wells, and the results of this study actually suggest a relatively low risk from the present distribution of service stations.

Special Considerations

Zoning issues in the LIV are complex, as the recent Grand Ridge issue demonstrated. It is beyond the scope of the WHPP to propose more detailed zoning or land-use restriction strategies since there are so many other factors influencing these issues. From a groundwater quality protection standpoint, maintaining present zoning and permitting processes, may not offer the level of protection that meets the standards of the community, particularly as the area continues to develop. Enforcement of the state anti-degradation policy offers some additional protection, but action on the local level is important. However, a "zero-risk" approach, which eliminates all present and future possible sources of groundwater contamination through land-use control, may not be in the best economic/development interests of the community either. The trade-off between initial expenditure, long-term cost and the level of protection must be considered. From a groundwater quality standpoint, the present zoning configuration and likely development scenario is not in the best interests of long-term water quality protection. Urban zoning should be located away from recharge areas, and, at a minimum, should set minimum open space requirements and require compliance with the state anti-degradation policy (WAC 173-200). Development on recharge areas should meet the above requirements and require re-infiltration of treated stormwater runoff.

Administrative Requirements

Initial preparation, review and adoption of zoning changes or land-use restrictions will require some administrative support. Little oversight will be required after the changes have been adopted, but inspections and enforcement may be necessary to insure compliance.

Estimated Cost

Adoption of zoning or land-use prohibition is a low-cost option to develop. The ultimate cost of such a strategy may be higher if legal challenges result; if the City's tax base is eroded.

9.2.4 Special Permitting

Rationale

Special permitting is an effective means of dealing with proposed land-uses on a case-by-case basis. It provides the City or County with a method for obtaining more detailed analysis and/or design specifications prior to permitting certain land uses. As discussed in Section 6, many groundwater contamination problems must be dealt with on a case-by-case basis since the transport and behavior of contaminants varies. Special permitting may be a better alternative to land-use control since it provides a site-by-site assessment of land-uses rather than a comprehensive ban on land-uses which could result in legal action by businesses wanting to locate facilities in WHPA's. A permitting process can provide added flexibility by using existing design standards and guidelines as a baseline (e.g. King County or WDOE documents) for planning review with additional "line-item" requirements by the local jurisdiction as necessary for groundwater protection. The responsibility for plan review and acceptance would fall to the Wellhead Protection Administrator, in conjunction with SEPA review, public works, and planning departments. The "trigger" for considering special permit requirements should be any location within an AMA.

Specific Requirements/Recommendations

There are a number of possible land-uses or activities that could require special permitting for groundwater quality protection. These include:

- Drainage plans for construction projects and new facility siting within WHPA's, including plans for conveyance, ditching, wet ponds, and biofiltration.

  Suggested reference guideline documents:

  King County Surface Water Design Manual

Biofiltration Swale Performance, Recommendations, and Design Considerations. *WDOE Publication 657, October, 1992.*

- Drainage plans in compliance with the Puget Sound Highway Run-off Program (WAC 173-270) for existing and new highway projects;

  Suggested reference guideline documents:

  King County Surface Water Design Manual

  Stormwater Program Guidance Manual for Puget Sound Basin. WDOE publication 92-32 and 92-33, July 1992;

- Stormwater detention and/or re-infiltration plans for new developments;

  Suggested reference guideline documents:

  Stormwater Program Guidance Manual for Puget Sound Basin. WDOE publication 92-32 and 92-33, July 1992;

  Biofiltration Swale Performance, Recommendations, and Design Considerations WDOE. Publication 657, October, 1992.

  WDOE publication 83-8, Guidelines to Prevent, Control and Contain Spills from the Bulk Storage of Petroleum Products, August 1983.

  WDOE publication 82-1, Design Criteria for Gravity Oil/Water Separators, January, 1982

- Design plans for facilities handling hazardous materials.

  Suggested reference guideline documents:

  WDOE publication 83-8, Guidelines to Prevent, Control and Contain Spills from the Bulk Storage of Petroleum Products, August 1983.

  WDOE publication 82-1, Design Criteria for Gravity Oil/Water Separators, January, 1982

Special Considerations

Permitting procedures must be specifically outlined including:

- An ordinance specifying types of facilities requiring design permits;
- Accessible guidance documentation for permittees; and

- A comprehensive list of regulated chemicals.

In addition, coordination with on-going WDOE programs and databases pertaining to hazardous materials permitting is necessary.

Administrative Requirements

Oversight and review of special permits necessary for water-quality protection should be the responsibility of the Wellhead Protection administrator, in conjunction with SEPA, public works and building/design code reviews.

Estimated Cost

The cost of permit reviews would be incorporated in the annual salary and budget of the Wellhead Protection Program administrator.

9.2.5 Hazardous Materials Handling Regulations

Rationale

There are a number of existing state and federal regulations controlling the use, storage and transport of hazardous materials. The requirements, penalties, and justification of these regulations are well established and there is no basis for proposing substantial regulatory oversight and control at the local level, once a facility is sited. Permitting provides the local jurisdiction sufficient input into the location and type of facility. However, it is important to maintain an accurate inventory and history of hazardous materials used in the jurisdiction, both within WHPA's and elsewhere. Any regulatory efforts at the local level should focus on inventory and site history. This will provide documentation that could be used if additional wells are sited in other areas of the LIV, or if a contaminant release occurs.

Specific Requirements/Recommendations

The goal of a regulation/ordinance requiring inventory and history at hazardous materials facilities is to provide the local jurisdiction (e.g. the City of Issaquah) with in-house capabilities to monitor the use of hazardous chemicals. Specific components include:

- An ordinance requiring chemical handling facilities to comply with documentation requirements;
- An effective and accessible computer database to store and retrieve information pertaining to type, quantity, and transport of hazardous chemicals;
- A comprehensive list of regulated chemicals;

- A schedule of compliance specifying reporting frequency and format; and
- Coordination with on-going WDOE programs and databases pertaining to hazardous materials handling.

Special Considerations

An inventory program needs to be simple and flexible in order to allow easy input from the affected businesses and to provide useful output for planning and oversight by the WHPA program. Businesses should not feel they are subject to another level of regulation, but rather are contributing information to a working database. Increasing public awareness of Wellhead Protection and continuing public outreach will enhance the effectiveness of this type of program.

There may be overlap with existing state and county programs aimed at waste reduction and monitoring. Inventory data from these programs may also be useful at the local level for monitoring potential groundwater contamination in the area.

Administrative Requirements

Oversight and review of an inventory program would be a primary responsibility of a Wellhead Protection administrator.

Estimated Cost

The cost of developing a hazardous material inventory would be incorporated in the annual salary and budget of the Wellhead Protection Program administrator. Computer software and hardware would be necessary to properly develop and maintain the inventory data. The GIS system utilized in the WHPP study would be an excellent platform for the continued storage, retrieval and presentation of a contaminant source inventory.

9.2.6 Public Education

Rationale

Successful implementation of a WHPP requires public awareness of the issues, the proposed measures and the opportunities for productive involvement. A mix of technical information, mapping of jurisdictional commitment and motivational cues is necessary to allow the public to support relevant governmental, financial and regulatory initiatives; to acquire new attitudes and skills; and to modify personal behaviors with the aim of protecting and enhancing groundwater quality in the LIV aquifer system.

The recommended program would encompass present and future educational needs, from the perspectives of general awareness of the WHP and water supply/water quality issues, as well as the specific information requirements of commercial/industrial interests, homeowners, UST owners, citizen and environmental activists/volunteers/voters. Extensive educational materials have already been created and distributed by related agencies and jurisdictions. These materials are referenced in Appendix M.

Without this level of effort and input, the possibility of achieving the desired end result of protecting the LIV aquifer is haphazard at best.

Specific Recommendations

Education for increased general awareness of the WHP and water quality/water supply issues should begin now and include the following main messages:

- The LIV Aquifer System is a limited resource and a treasure which must be preserved, enhanced and used intelligently.
- Actions of individuals, corporate and governmental members of the public can either destroy, sustain or improve the quality of the groundwater/drinking water supply.
- Pollution prevention is less expensive than replacing wells and treating contamination.
- Wellhead protection requires specific pro-active measures which are identified in the WHP plan. It does not happen by itself. Wellhead protection requires citizen support of new ordinances, permit procedures, funding and personnel requirements. It also requires the support of commercial and industrial interests, and the staff and elected officials of overlapping jurisdictions.

The recommended tools or activities for relating these messages include:

- Publication of a small "WHP Educational Magazine" which summarizes and illustrates the key recommendations of the WHP and where people fit in. For distribution in schools, public meetings, Chamber, and to Public Information officers of related agencies.
- Public meeting to announce release of the plan, provide a basic briefing and outline a proposed schedule of implementation.
- Press and media articles (including City newsletter) announcing the release of the plan and its key components as well as the main messages listed above. Also announcing the availability of the "WHP educational magazine", and offering to speak at meetings of special interest groups. Ongoing and regular media coverage of the Main Messages above and the implementation process lays the groundwork for approval of financial and institutional measures supporting aquifer protection; helps to influence the knowledge and attitudes of the community; and affects the coverage of specific

potentially "sensational" events such as hazardous material spills. Thus, the press is more likely to support specific behavioral and institutional changes rather than reacting and portraying local government negatively.

- Piggyback at any related existing activities such as Hazardous Waste Collection to distribute the "WHP educational magazine" and announce any upcoming actions.

- Workshop for local government staff and elected officials who will be involved in implementation of WHP via permit review, land use decisions, inspection and monitoring. Collaboration is critical to create a regulatory framework which is logically consistent, fair and enforceable. Increasing competition for funding requires efficiency and dovetailing rather than duplication. Public education efforts should help to educate the constituent interests and create support for less tangible projects such as maintenance, risk-prevention and monitoring.

Specific information requirements of existing and potentially contaminating sources as identified in Section 7.3 should also be addressed. These include UST owners, dry cleaners, gas stations and other chemical handlers. Activities include:

- Direct mail the "WHP educational magazine" to these identified businesses.

- Direct mail a packet identifying current regulations, request for inventory, and specialized education about handling and spill response. These materials have been compiled by other communities (see Appendix) and can be reissued by the WHP Administrator.

- Direct mail notice of specialized trainings areawide (by King County, DOE, DOH, Cities of Bellevue, Olympia, etc.) to relevant businesses.

Public education measures should be implemented in support of the Recommended Wellhead Protection Strategies as detailed in Section 9.2. Specifically:

- Aquifer Management Areas - Encourage public support by local press article describing why AMA's are needed and how they will be managed. Outline pros and cons and ramifications to the homeowner, the local business owner, the children of the future. Include calendar or diagram of process of designation of AMA's with opportunities for public input clearly noted.

- Land Use Zoning and Control - Specific measures dependent on nature of options employed, whether new ordinances, rezoning, conditional use restrictions or new project review. Any of these options should involve public notification via the press, and direct mail to any specifically involved businesses or landowners. The "WHP educational magazine" should be made available to the Chamber and other business groups so that the baseline information about WHP is already assimilated, including the location of the WHP/AMA Areas. Permit applicants should also be given a packet containing the WHP summary, mapping and planning considerations.

- Special Permitting - Support new regulations by increasing public awareness of WHP and the need for more detailed analysis and design specifications prior to permitting certain land uses. The health of the area's economic climate and preservation of jobs and profits must be linked with the need to protect the aquifer. The use of local press is key. When in the implementation phase, provide a library of resource materials and guidance documentation for permittees and citizens.

- Hazardous Materials Handling Regulations - Use local press for the initial support to establish new regulations. Create and distribute specialized materials for hazardous materials handlers detailing regulated chemicals, compliance schedules for reporting, agency and regulatory overlapping, and the underlying rationale for compliance. Provide ongoing notification of all chemical handlers about relevant trainings in surrounding jurisdictions. Encourage compliance via publicity and awards, such as the City of Bellevue program. (See Appendix M for details.)

- Spill Response Planning - Use local press for support of the need for Spill Response Planning and appropriate funding to establish and implement a program. Provide ongoing interaction with related agencies and jurisdictions. Provide press coverage of examples of agency cooperation, case histories. Provide recognition of emergency response personnel and records.

- Monitoring - This is one of the areas where the use of citizen volunteers can increase the amount and frequency of monitoring for water level and water quality in local surface water. The use of volunteers can reduce monitoring funding requirements while providing hands-on education about the realities of WHP and also generating newsworthy coverage of water quality issues. The Puget Sound Water Quality Authority has funded multiple demonstration projects in this area.

Special Considerations

The public is the key to approval or disapproval of the political, regulatory and financial measures required to actually implement the Wellhead Protection recommendations. Access to the community through the audience of its school children should not be underestimated. Where children are concerned, people are more open to consideration of the need to pay now to protect the future. Educating children to educate their parents about specific behavioral practices has been demonstrated to be highly effective, especially in areas such as recycling, and hazardous waste disposal. This has been shown in many of the model PIE programs of the Puget Sound Water Quality Authority. In the City of Issaquah, the Boy Scouts have carried on a successful program of storm-drain stencilling.

Kitsap County in cooperation with multiple state and local agencies, created an Environmental Education Resource Guide for educators which is applicable to the LIV.

Other special interest groups provide a unique opportunity for networking support for WHP throughout the community. Because of the extensive planning work associated with the GMA, and the East Sammamish Community Plan, there is already a select body of citizens with technical background. They are a naturally receptive audience trained to be able to understand the immediate need for wellhead protection measures. They have already pre-selected themselves as citizen activists and demonstrated their commitment to the community. Direct mailing of the "WHP educational magazine" and periodic updates of the process of implementation would help to maintain this strong constituency. A commitment by the WHP Administrator to speak at local service groups like Chamber and League of Women Voters is worthwhile in terms of educating about WHP and the need for political support and endorsement of various regulatory measures. Other natural community allies are the environmental groups such as the Audubon Society and Garden Clubs. Their members would be naturally compatible with the goals of the WHP and would be open to learning of specific protection measures and volunteer activities.

Overlap with Existing Programs

There is considerable overlap with existing plans and regulations. Of primary note are the East Sammamish Community Plan, the Draft Basin & Nonpoint Action Plan for the Issaquah Creek Basin and the Issaquah Groundwater Management Area Plan. The WHP Administrator should work to support appropriate basinwide recommendations, and to become familiar with related agency programs in King County and Washington, as well as programs in neighboring cities of Olympia, Renton, Bellevue and Bremerton. See Appendix M for further information on these programs. Many of the existing materials could be customized and adopted for use in the LIV.

Estimated Cost

Coordination and oversight of the program would be the responsibility of the WHP Administrator. The cost of creating the "WHP Education Magazine" would be approximately $10,000. For the first year, it is recommended that a consultant collaborate with the WHP Administrator in the creation of strategies for public education. The cost of this contract would be approximately $ 25,000, assuming that implementation were performed by the WHP Administrator and local government staff.

9.2.7 Engineering and Design Standards

Rationale

Engineering solutions to contaminant source control are often overlooked in favor of regulatory or administrative approaches to controlling the use of potential groundwater contaminants. Engineering issues are "built-in" to the permitting process in that design guidance and specifications are often available for permittees to base their designs upon. It is difficult, and possibly inadvisable, to force compliance to specific engineering design standards. Substantial costs would be incurred by the City and/or county in developing standards that are specific enough for engineering design. The subsequent costs of reviewing, approving, or offering variances are also high. New or existing businesses should bear the responsibility for design and maintenance of systems. However, rather than designate specific standards, flexibility and cooperation in the permitting process may provide better results. The additional cost of providing guidance documents and working individually with permittees may be substantially less than protracted negotiations and/or conflicts over set design standards. New and innovative approaches to water quality protection may also be overlooked by permittees in favor of "the county or city requirements".

Specific Requirements/Recommendations

Engineered solutions to groundwater quality protection should be encouraged for the following:

- Stormwater (detention, treatment and re-infiltration);
- UST Leak Detection Systems; and
- Engineered barriers or containment structures for spill containment.

Special Considerations

Ordinances requiring compliance to strict new standards may not result in more or better engineered solutions to water quality protection, particularly if there is inadequate enforcement. A commitment by the City and/or county to apply and enforce existing guidelines and to explore alternatives presented by permittees may be the most effective approach to engineering solutions.

Administrative Requirements

Oversight and review would be a joint responsibility of the Wellhead Protection administrator and Public Works Departments.

Estimated Cost

The ultimate cost of engineering approaches would be paid by the permittees, including the City for its public works projects. The additional costs incurred by the City for plan reviews could be incorporated in the annual salary and budget of the WHPA administrator. Partial funding by the City, County or State for innovative designs could be explored by the WHPA administrator and proposed on a case-by-case basis. The costs of permitting review may require additional review by public works or building departments for engineering design.

9.2.8 Spill Response Planning

Rationale

A comprehensive but informal response procedure is presently applied to incidents on Interstate-90. The Washington State Patrol, Washington Department of Transportation, Washington Department of Ecology and Issaquah Fire Department have established roles in dealing with accidents and spills of hazardous materials. The IFD and State Patrol are normally first responders to accidents, followed by Department of Transportation. If a hazardous spill is present, Ecology is notified who then direct a local clean-up contractor to mobilize equipment to the site for clean-up. The main deficiency in the present system is the time required for a spill containment contractor to arrive on-site. There is no established response procedure for dealing with spills on City or County roads.

Guidelines for developing a response plan are available from WDOE. However, a specific Spill Response Plan for the LIV has not been developed for the WHPP. Instead, general objectives and recommendations regarding spill response have been outlined. The reason for not providing a detailed spill response plan at this time is because many of the response plan elements suggested in the WDOE guidelines are beyond the scope of the Wellhead Protection Plan, and would be more effectively addressed after some measure of Wellhead Protection Planning and response has been initiated. In addition, a comprehensive spill response plan will also address impacts to surface waters and should include input from the Basin Planning activities in the LIV. Preliminary steps towards wellhead protection should be taken prior to developing the Spill Response Plan, including:

- Adoption of WHPA's;
- Establishment of a WHPA administrator; and
- Preliminary spill response plan activities, as discussed below.

Once these measures are taken, a more effective and comprehensive Plan can be developed which serves the needs of Wellhead Protection, provides additional regulatory impetus for formal adoption of a spill response plan, provides administrative support from conception to implementation through the WHPA administrator, and provides baseline commitment and training of local personnel on spill response.

Specific Requirements/Recommendations

The ultimate content of a spill response plan is detailed in the WDOE guidance, but includes:

- Promulgation of the plan by the Local Emergency Planning Committee;
- Endorsements by participating facilities or departments in all jurisdictions;

- Hazard analysis, including hydrologic and geographic analysis, and incident occurrence scenarios;

- Limitations of mitigation, response and recovery actions;

- Coordination with State Comprehensive Emergency Management Plan;

- Detailed operations plans designating responsibilities, levels of incident severity, notification processes, emergency response centers and coordinators, interactive hazards; and

- Detailed notification procedures during and after spill occurrences.

Development of the spill response plan will be most useful and consistent with other WHPA strategies if it is developed after some preliminary actions have taken place including designation of AMA's, appointment of a WHPA administrator, and development of a hazardous materials list. Additionally, a commitment to Spill Response would be established by:

- Training City of Issaquah Fire Department personnel in Spill Response. The minimum level of training for off-site emergency responders is defined in WAC 296.62.300-3112. Training can be arranged through Sgt. Glass at (206) 753-0347.

- Purchasing spill containment materials (absorbent, lights, polyethylene, etc.) by IFD or Public Works; and

- Establishing a contract with a clean-up contractor for spills within City limits.

Administrative Requirements

Development of the spill response plan would be a joint responsibility of the Wellhead Protection administrator, Issaquah Fire Department, and Public Works Departments.

Estimated Cost

The cost of training for Spill Response is minimal for Fire Department personnel. An in-house training program can be developed using state matching funds for continued in-house training and refreshers. Purchase of spill response equipment will probably be between $5,000 and $15,000 initially. The cost of developing the Plan could be incorporated in the annual salary and budget of the WHPA administrator.

9.2.9 Groundwater Supply Contingency Planning;

Rationale

Contingency planning for SPWSD was carried out in 1990 in response to pending water rights and possible aquifer contamination. No formal contingency planning has been carried out for the City of Issaquah.

A major obstacle to contingency planning in the LIV is the present inability to obtain water rights in the Issaquah Basin due to hydraulic continuity issues. Although not a specific objective of the WHPP, the data and modeling carried out for the WHPP suggests that the focus of long-term steady-state hydraulic continuity issues in the LIV should be the impact of groundwater withdrawals on the wetland area near Lake Sammamish and reduced groundwater discharge to Lake Sammamish, not on the impact to specific upstream reaches of the Issaquah Creek system.

Contingency planning and management of the LIV aquifer can be greatly enhanced by joint management the aquifer and operation of the major production wells by the City of Issaquah and SPWSD. The SPWSD and City of Issaquah have constructed an inter-tie between the two water systems, which enables water from all wells in the LIV to be distributed to either the City of Issaquah or the Sammamish Plateau. Both hydraulically and geographically, the wells in the LIV can and should be operated as a single wellfield. This, in itself, is an effective contingency since it provides multiple redundancy in groundwater sources for the area.

Specific Requirements/Recommendations

The following options have been recommended to SPWSD in a water supply contingency plan (Kennedy Jenks Chilton, 1991):

- *Purchase or Transfer of METRO's water rights from Lake Sammamish.* Obtaining surface water rights may provide a means for proposing mitigation strategies to impacts at the Sammamish Wetland and Lake Sammamish from increased groundwater withdrawals;

- *Maximize Development of the Sammamish Plateau Aquifer.* Additional development of the Plateau Aquifer would provide further source redundancy for SPWSD and could potentially allow for proportionally more use of the LIV aquifer by the City of Issaquah on an interim or emergency basis;

- *Develop groundwater from Evans Creek area.* Additional development of the Evans Creek area would provide further source redundancy for SPWSD and could potentially allow for proportionally more use of the LIV aquifer by the City of Issaquah on an interim or emergency basis.

- *Purchase or transfer of Darigold Creamery Water Rights.* If the Darigold well were used as a potable source, the WHPA for the well would not be any more or less susceptible to contamination than existing wells in the LIV. However, the Central Business district of Issaquah, between Sunset and Dogwood Streets would become part of a 1-year WHPA, which may restrict future land-use by potential hazardous materials handlers.

Additional recommendations, based on the assessment of the hydrogeology of the LIV includes:

- *Exploration of Grand Ridge, Lake Tradition Plateau for groundwater sources.* Additional development of the Grand Ridge and Lake Tradition Areas would provide further source redundancy for SPWSD or City of Issaquah. The hydrogeologic analysis from the WHPP suggests that an appreciable thickness of sediments may underlie western Grand Ridge and Lake Tradition. The location of these areas would minimize aquifer contamination concerns since they are within rural or undeveloped areas of the LIV. A deep test well is necessary to assess the groundwater potential in these areas, as well as a feasibility study of conveyance to respective distribution systems.

- *Exploration of Tibbetts Creek, Lake Sammamish Lowlands for groundwater sources.* Additional development of the LIV Aquifer would provide further source redundancy for SPWSD or City of Issaquah. The hydrogeologic analysis from the WHPP is inconclusive regarding groundwater development potential in these areas. The location of these areas may be inappropriate if commercial/industrial development associated with hazardous materials is shifted from the Central Issaquah area towards the Newport/SR-900 area. Additional Wellhead Protection Delineations beyond the scope of this WHPP would also be required. A test well is necessary to assess the groundwater potential in these areas, as well as a feasibility study of conveyance to respective distribution systems.

- *Continued participation in EKCRWA exploration of regional eastside groundwater sources.* Development of a regional water source for eastside communities may provide a long-term contingency for COI and SPWSD by decreasing the dependency on local production wells.

- *Evaluation of optimization strategies for combined COI and SPWSD use of production wells in the LIV.* The present intertie between SPWSD and COI allows for coordinated operation of the wellfield. Development of coordinated wellfield operation strategies for all wells could minimize vulnerability to contamination by optimizing the present redundancy of sources between COI 1/2, COI 4/5, SPWSD 7, 8, and 9.

- *Evaluation of the feasibility artificial aquifer recharge and recovery.* Artificial recharge and recovery of the LIV aquifer could be an effective contingency response for several reasons. From a supply standpoint, use of the aquifer as a storage reservoir may provide added capacity during critical usage periods, and reduce surface water impacts (possibly permitting additional withdrawals from the aquifer). From a water quality standpoint, artificial recharge may provide sufficient control of the hydraulic gradient to essentially direct the flow of groundwater and establish flowpaths that avoid potential contaminant sources.

- *Continue to work with WDOE regarding water rights and hydraulic continuity issues in LIV.* Further analysis of hydraulic continuity and mitigation strategies is needed in the LIV to evaluate the impact of additional groundwater withdrawals and increased urbanization on surface water and groundwater availability. Complex hydraulic continuity issues must be resolved and innovative mitigation, allocation, and water-rights strategies might be considered. There is presently no flexibility in contingency planning based on additional groundwater sources in the LIV until water rights issues are resolved.

Special Considerations

All contingency alternatives may be best approached as a conjunctive endeavor between the City of Issaquah and SPWSD. Water rights and hydraulic continuity issues need continued support if an agreement on water rights with WDOE is to be reached. A joint effort by the City of Issaquah and SPWSD demonstrating commitment to effective management of the resource and with specific recommendations for exploration, mitigation wellfield optimization, and water-rights may provide public and regulatory support for developing groundwater in the LIV.

Estimated Cost

The most effective approach to funding contingency planning projects would be to establish a joint budget between SPWSD and City of Issaquah and work together to develop scopes of work for specific items. Exploration elements will obviously be the most expensive elements, and could be phased over several budgeting periods. Water rights and hydraulic continuity issues need continued funding and support if an agreement from the WDOE is to be reached.

9.2.10 Monitoring

Rationale

Continued monitoring of groundwater quality and water-levels is essential to establish trends and detect problems before they reach the wellhead. In conjunction with continued inventory of contaminant sources, monitoring of water-levels and water quality in the LIV should continue.

In conjunction with monitoring, individual focused hydrogeologic studies are recommended to further develop the understanding of the aquifer, facilitate implementation of contingency planning alternatives, and increase the monitoring efficiency of the present monitoring network.

Specific Requirements/Recommendations

The following wells should continue to be monitored for water-levels on a monthly basis: WH-1, WH-2, WH-3, VT-1, Foothills Baptist, Egghead.

The following monitoring wells should continue to be monitored for water quality, including benzene, toluene, xylene, ethylbenzene, trichloroethylene, trichloroethane, and tetrachloroethylene on a yearly basis: WH-2, WH-3, VT-1.1, VT-5.1, VT-1.1.

Additional shallow monitoring wells are recommended at the following locations:

- Adjacent to I-90 on the north side of the Front Street interchange. A special permit from WDOT may be required which could take up to 6 months to grant. This well will provide added water quality monitoring directly upgradient of SPWSD 7/8;

- Along Newport Way in the Issaquah Creek sub-basin. This will provide water-level data along the western margin of the LIV; and

- On the western edge of the Grand Ridge upland. This will provide water-level and water quality monitoring along the eastern margin of the LIV aquifer.

A study of the dissolved oxygen characteristics of the aquifer would be useful to evaluate the ability of the aquifer to degrade and transform organic compounds. A similar study was initially considered at the ARCO facility, but was not initiated. Two phases could be considered. The first phase would involve field sampling of area wells. A second phase might be to simulate the transformation of a hypothetical spill of contaminant using a model. An integrated study utilizing all of the LIV wells would be most useful. Funding for the study could be provided from multiple sources including the City, County, State and local businesses handling organic compounds.

Estimated Cost

The cost of the monitoring programs are estimated as follows:

- Water-level monitoring: Incorporated into personnel budget of WHPA Program.

- Water quality monitoring: Sample analyses at $250 per sample. Sample collection included in personnel budget of WHPA program.

- Monitoring Wells: $12,000-$15,000 per well.
- Organic Contamination: $10,000 to $15,000 for sampling and analysis. $20,000 to $50,000 for modeling depending on complexity.

Coordination and oversight of the programs would be the responsibility of the WHPA administrator.

10. SUMMARY AND CONCLUSIONS - GROUNDWATER QUALITY PROTECTION

- Threats to groundwater quality are highly varied and dependent on the type of contaminant and hydrogeology. Generalizations and assumptions must be incorporated into any broad discussion of groundwater quality and contamination potential. Specific contaminants and locations must be addressed on a site-by-site basis;

- Groundwater from deep production wells is presently excellent, while some contamination from organic compounds and lead has been observed in the upper portions of the aquifer;

- Present land-use is predominantly residential or undeveloped, with lower proportions of commercial or transportation-related uses. Land-use in the 1-, 5- and 10-year capture zones reflects this general trend;

- The present inventory of potential contaminants within the LIV includes 39 UST facilities, sixteen chemical handling facilities, urban/residential run-off and potential transportation spills;

- Future land-uses that may impact groundwater quality include development of the West Grand Ridge Urban zone, the Sunset By-pass project, expansion of commercial/light industrial land-use, and development on the Lake Tradition Plateau;

- Based on estimated loads of nitrate under present conditions and possible future development scenarios, development of the Grand Ridge/Lake Tradition Plateau area may increase nitrate levels to the aquifer because of septic fields fertilizer applications and stormwater infiltration. Development at 1-acre density using septic fields may cause unacceptable nitrate levels in the LIV aquifer;

- Based on estimated loads of lead under present conditions and possible future development scenarios, further urban/residential development may increase lead levels in the shallow portions of the aquifer;

- Based on an EPA method of screening point sources, there are no "high risk" contaminant sources in the LIV. All potential contamination sources fell in a low to moderate risk according to the EPA methodology;

- Based on an EPA method of screening point sources and more detailed point source loading analyses, the risk of groundwater contamination in existing production wells from present distribution of service stations is actually quite low. This is due to the chemical behavior of gasoline and its ability to degrade naturally in the sub-surface;

- Based on an EPA method of screening point sources, the highest risk of groundwater contamination is posed by transportation spills along the I-90 corridor. Although ranked as a moderate risk to groundwater, a spill of sulfuric acid ranked highest in the EPA method;

- Wellhead protection strategies should build on existing programs, ordinances and policies and avoid overlap with other levels of government;

- The focus of wellhead protection should be on management of future land-use rather than control or re-direction of existing land-use. The exception to this is the urban-zoned western portion of Grand Ridge. Land-use and development in this sensitive recharge area should receive particular attention to wellhead protection issues.

- All wellhead protection strategies must begin with a commitment to address the issues. This is best accomplished by designating aquifer management zones, creating an administrative position for WHPA issues, and establishing public awareness of WHPA issues. Once these tasks are accomplished, more detailed WHPA strategies such as zoning policy, special permitting and review, and hazardous materials ordinances, can proceed;

- Spill response planning, establishment of special permitting procedures, and contingency planning are considered the most effective and high priority elements of wellhead protection in the LIV aquifer. Once initial WHPA policies are adopted, these issues should receive first attention.

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Appendix O. Cross Connection Control Program

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CITY OF ISSAQUAH
CROSS CONNECTION CONTROL PROGRAM






INDEX

Cross-Connection Control Program

1. Purpose

The purpose of this program is to protect the health of water consumers of the public water system. This cross-connection control program establishes minimum operating policies and backflow prevention assembly installation and testing practices. This program is structured such that it may be supplemented with published documents and materials developed by the City for its specific use. The authority to enforce these practices and policies is established in City of Issaquah Municipal Code Chapter 13.13 or its future revisions.

2. Definitions

Approved: depending upon the context, City of Issaquah-approved or Washington State Department of Health-approved.

Air Gap (AG): an air gap is a physical separation between the free flowing end of a potable water supply pipeline and the overflow rim of an open or non-pressurized receiving vessel.

Backflow: the undesirable reversal of flow of water or other substances through a cross-connection into the public water system or consumer's potable water system.

Backflow Prevention Assembly: an assembly to prevent backflow; an assembly that, when installed, controls cross connections.

BAT: a Washington State certified Backflow Assembly Tester holding a valid, State of Washington-issued, certificate in accordance with chapter WAC 246-290.

CCC: Cross Connection Control; a program to control or eliminate cross connections; the act of controlling or eliminating cross connections.

CCS: Cross Connection Control Specialist; one who is certified by the State of Washington to execute the City's Cross Connection Control Program.

City: the City of Issaquah, City personnel or designee, having the authority to perform the associated duties described herein.

Cross Connection: any actual or potential physical connection between a public water system or the consumer's water system and any source of nonpotable liquid, solid, or gas that could contaminate the potable water supply by backflow.

DCDA: Double Check Detector Assembly; a type of backflow prevention assembly used to protect against low-health hazard. Generally installed on fire systems that require metering.

DCVA: Double Check Valve Assembly; a type of backflow prevention assembly used to protect against low-health hazard.

DOH: the Washington State Department of Health, Division of Drinking Water, the authoritative body for public drinking water systems.

IMC: Issaquah Municipal Code; the body of law for the City of Issaquah.

In-Premises Isolation: an approved air gap or approved backflow prevention assembly that is located within the property owner's property lines, to isolate a specific piece of equipment.

Potable: water suitable for drinking by the public.

Premises Isolation: an approved air gap or approved backflow prevention assembly that is installed at or near the service connection or an alternative location acceptable to the City to isolate the property owner's water system from the City's distribution system.

RCW: the Revised Code of Washington; the compilation of all permanent laws now in force.

RPBA: Reduced Pressure Backflow Assembly; a type of backflow prevention assembly used to protect against high-health hazard.

RPDA: Reduced Pressure Detector Assembly; a type of backflow prevention assembly used to protect against high-health hazard. Generally installed on fire systems that require metering.

Test Report: a report completed by a BAT that denotes the current condition of a backflow prevention assembly.

WAC: the Washington Administrative Code; rules and regulations adopted by State agencies.

3. Responsibilities

a. The City of Issaquah

   i. The City shall attempt to prevent the contamination of the water distribution system by inspecting for cross connections, providing guidance for new installations and existing connections, maintaining records on backflow prevention assemblies, and responding to property owner inquiries to meet the requirements of State regulations for cross-connection control.

   ii. The City's responsibility for cross-connection control shall begin at the water supply source and end at the point of delivery to the property owner's water system.

b. Property Owner

   i. The property owner's water system begins at the downstream end of the service connection or water meter on the public right-of-way or utility-held easement.

   ii. The property owner shall be responsible for eliminating cross connections by controlling them through the installation, regular testing, and maintenance of approved backflow prevention assemblies.

   iii. The property owner shall be required to provide access for inspection to allow a determination of cross-connection potential and the necessary control methods. Further, the property owner shall provide any information that might be relevant to the CCS.

   iv. The property owner shall notify the City of any assembly that the property owner believes is no longer required.

   v. The property owner shall assume all costs associated with the inspection, testing, repair, and replacement of backflow prevention assemblies.

4. Applicability of Regulations and References

a. The control or elimination of cross connections shall be in accordance with the most current revisions of the following state, county, and local rules and regulations:

   i. Cross-Connection Control: WAC 246-290-490;

   ii. Washington State Plumbers Code: RCW 18.106;

   iii. Washington State Building Code: RCW 19.27;

   iv. Washington State Public Water Systems Mandate: RCW 70.119A.060;

   v. Washington State Powers and Duties of the State Board of Health: RCW 43.20.050;

   vi. City of Issaquah Municipal Code 13.13.

b. The policies, procedures and criteria for determining appropriate levels of protection shall be in accordance with the most current editions of the following references:

i. *Cross-Connection Control Manual: Accepted Procedure and Practice* published by the Cross-Connection Control Committee of the Pacific Northwest Section of the American Water Works Association;

ii. *Manual of Cross-Connection Control* published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California;

iii. *Recommended Practice for Backflow Prevention and Cross-Connection Control* (Manual M14) published by the American Water Works Association.

c. Interpretation of the above regulations and references is at the discretion of the City.

5. Operating Procedures

a. Guidelines for In-Premises and Premises Isolation:

i. All commercial properties are required to have premises isolation by AG or RPBA.

ii. All buildings with a height of 30' or more from the water meter box lid to the highest gutter line, regardless of interior plumbing, is required to have premises isolation.

iii. Properties listed in WAC 246-290-490 Table 9 require premises isolation by AG or RPBA.

iv. Premises isolation shall be used if access to the property owner's property is unobtainable or the CCS determines premises isolation is prudent.

v. In-premises isolation will be used for controlling or eliminating cross connections on interior plumbing.

vi. In-premises isolation assemblies must provide a level of protection commensurate with the City's assessed degree of hazard.

vii. If access for inspection is denied by the property owner and there is not an immediate hazard present, the City will require an AG or RPBA at the property line or immediately upstream of the area where access has been denied. The property owner will assume all costs.

b. Guidelines for Type and Location of Protection

i. The type of backflow protection required shall depend on the hazard. The hazard determination and required protection shall be made by the City and will generally follow guidelines defined in *Recommended Practice for Backflow Prevention and Cross-Connection Control*.

ii. The City shall perform inspections for new service connections, considering planned or future water uses. Proper selection and installation of a backflow prevention assembly shall be a condition of allowing new water service connection.

iii. The City shall perform inspections for existing service connections. These inspections will primarily be conducted as part of tenant improvement projects. The City may notify the property owner of a required inspection; the property owner is responsible for scheduling the inspection within 20 working days.

iv. Type of backflow prevention assemblies:

A. An Air Gap (AG), Reduced Pressure Backflow Assembly (RPBA), or a Reduced Pressure Detector Assembly (RPDA) shall be used for services that present high health hazards, where back pressure and backsiphonage may occur.

B. A Double Check Valve Assembly (DCVA) or a Double Check Detector Assembly (DCDA) shall be used for low health hazards where back pressure and backsiphonage may occur. Higher levels of protection, that is AG, RPBA, or RPDA may be installed but would not be required.

c. Guidelines for Eliminating Cross Connections

i. Cross connections shall be eliminated whenever possible.

ii. When cross connections cannot be eliminated, an approved air gap or an approved backflow prevention assembly, commensurate to the degree of hazard as determined by the City, shall be installed in accordance with Section 6 of this program.

6. General Installation Practices

a. The City shall assess the degree of hazard and determine the appropriate level of backflow protection needed.

b. The specific installation criteria shall be in accordance with the City of Issaquah's *Standard Details Manual*.

c. The backflow prevention assembly installed must appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research or other entity acceptable to the Washington State DOH.

d. The property owner is responsible for obtaining required permits.

e. The property owner is responsible for notifying the City Water Department of assembly installation(s).

f. Assemblies shall be accessible for testing and maintenance.

g. Assemblies shall be protected against freezing, flooding, and mechanical damage.

h. Assemblies shall not be installed in any enclosure or area containing fumes which are corrosive or toxic.

7. Inspection and Testing Procedures

a. General

i. Backflow prevention assemblies shall be inspected and tested at the time of:

A. Initial installation.

B. After the assembly is repaired or moved.

C. Annually after the initial installation.

D. As required by the City if testing indicates repeated failures.

ii. Testing procedures shall be in accordance with the requirements set forth in section 4.b. of this document

iii. Test reports will only be accepted from those BATs who have a certificate of calibration for their testing equipment on file at the City.

b. New installations

i. All new assemblies shall be tested upon installation.

ii. A Certificate of Occupancy shall be dependent, in part, by a satisfactory inspection of the installation by the City.

iii. A Certificate of Occupancy shall be dependent, in part, by a satisfactory test result of the backflow prevention assembly.

iv. All repairs and testing must be performed by a State certified BAT.

v. All test reports, whether satisfactory or unsatisfactory, must be submitted to the City.

Table 7-1
Cross-connection Control Program Guidance

The following matrix is intended to provide basic cross-connection control guidance to designers and project review staff. Specific questions or situations should be directed to City of Issaquah Water Quality staff for analysis.

Application	Required Protection Level	Protection location	Background
Non-Residential, Commercial or Mixed-use Properties.	Premises Isolation with RPBA. Other in-premises assemblies may be required as determined by specific hazard(s).	Directly after meter or at first interior building penetration. No tees allowed between meter and assembly.	Premises isolation is recommended for non-residential (commercial), shopping centers and strip malls where uses and plumbing may change. RP's provide the highest level of mechanical protection to the potable water system
Non-potable or unapproved water supply (irrigation or other) on property with, or adjacent to, potable water.	Premises Isolation with RPBA. Other in-premises assemblies may be required as determined by specific hazard(s).	All potable water supplies to the property, directly after meter with no connections between the meter and the assembly.	Any unapproved water supply on property with, or adjacent to, a potable water source requires an RPBA on all potable service connections (unless otherwise approved by CCC program administrator).
Potable Water Irrigation w/o chemical injection.	DCVA	Directly after the Irrigation point of connection	DCVA provides appropriate level of protection without regard for site elevations and future plumbing modifications downstream od the assembly.
Fire Systems	With metered service: RPBA or DCVA depending on hazard. Without metered service: RPDA or DCDA depending on hazard.	Directly after meter or first building penetration. No connections allowed between meter and assembly.	Chemical injection, antifreeze or on-property unapproved water supply triggers the RPBA/RPDA requirement.

c. Existing installations

i. All assemblies shall be tested at least annually by a BAT.

ii. The City shall notify property owners responsible for assemblies of record when testing is due.

iii. Test reports indicating the assembly's satisfactory performance shall be forwarded to the City within 30 days from the date of notification.

iv. If satisfactory test reports have not been received within the month due, a second letter will be sent to the property owner of record warning the property owner that a satisfactory test report must be received by the City within 10 working days or water service will be terminated.

v. A reminder of water service termination shall be posted at the site if satisfactory reports are not received within the time period indicated in the second letter.

vi. Failure to perform the required testing shall result in termination of water service for non-compliance of IMC 13.13.

vii. The City will assess charges, as stated in IMC 3.65.040, for water service termination and resumption. The charges will be assessed to the water utility account.

viii. The City may require testing more often than annually due to a history of failure, significant health risks, or propensity to damage.

ix. The City, at any time, may inspect the assembly, the installation, or verify the test results.

d. Landscape Irrigation Systems

i. Landscape irrigation system backflow prevention assemblies shall be tested during the yearly operational period.

ii. Because new assemblies are installed throughout the year, and because subsequent, yearly testing is due annually from the month of installation, the following schedule may be used to adjust testing months for assemblies installed during winter months into a permanent spring or summer testing schedule. Testing months may also be dependent on existing schedules for the property.

Table 7-2
Irrigation Backflow Prevention Assembly Testing Schedule

If installed during the month of:	January	February	September	October	November	December
Then subsequent, annual testing will be during the month of:	June	July	March	April	May	June

iii. To abandon a landscape irrigation system, the backflow prevention assembly, pipe and connection between the main potable supply and the irrigation main line must be physically removed. The 'tee,' or similar connection must be removed from the supply piping feeding the system and replaced with 'straight' pipe. The revised piping arrangement must be inspected by Water Quality personnel.

e. Any assembly that has been repaired, replaced or moved must be inspected and tested by a BAT and/or the City.

f. Inspections of properties classified as 'High Hazard.'

i. High Hazard classification of properties shall include those adopted from the 'High Health Cross Connection Hazard Premises Requiring Premises Isolation by AG or RPBA' from Table 9; WAC 246-290.

ii. The City shall assign inspection and correction priorities to high hazard sites, with special emphasis on the following types of facilities: hospitals, schools, clinics, laboratories, piers and docks, mortuaries, sewage treatment plants, food and beverage processing plants, chemical plants using water process, metal plating industries, petroleum processing or storage plants, car washes, facilities having a non-potable auxiliary water supply, and others specified by the City.

ii. If, during any site survey, a cross connection is found that presents, in the opinion of the inspector, an imminent threat to public health, the water service to the site shall be immediately terminated and shall remain off until the hazard is corrected.

iii. The CCS shall provide the property owner and the City written or electronic results of the survey including a list of the cross connections found.

iv. If an approved backflow prevention assembly is required on the property owner's system, the type and location of the assembly shall be specified in the inspector's notice to the property owner.

v. The property owner shall notify the City when the installation and testing have been completed.

vi. Non-compliance will result in a certified letter being sent to the property owner, requiring completion of the work and reminding the property owner that it is the City's responsibility to deny water service for non-compliance.

vii. If work is not complete within the specified time or does not make special arrangements with the City for an alternate date based on extenuating circumstances, the City will discontinue water service. Standard City fees for termination and reconnection will be levied against the property owner's water service account.

8. Backflow Incident Response Procedures

Due to the possible severity of cross-connection effects, the City shall respond to reported or possible backflow incidents immediately.

9. Quality Control Program

a. Tester Certification and Test Kit Calibration

i. Backflow assembly test reports shall only be accepted from State of Washington certified BATs.

i. Backflow assembly test reports shall only be accepted from BATs with current test kit calibration on file with the City.

ii. The criteria for tester certification and test kit calibration practices shall be in accordance with the current editions of the manuals described in Section 4 of this document.

iii. For the convenience of the property owner, the City may provide a list of BATs who have submitted valid test kit calibration results, is currently a State of Washington certified BAT, and have requested to be placed on the list. The list or City do not imply preference, and appearance on the list does not constitute endorsement by the City. A complete list of Washington State certified BATs can be found online at: http://grcc.greenriver.edu/wacertservices/bat/bat_publiclist.asp

b. Test Report Submittal Schedule

Table 9-1
Test Report Submittal Schedule

Installation Type	Results	Test Report Submittal Schedule
New Backflow Prevention Assembly	Satisfactory Results	Submit Test Reports at the time of the testing (within 10 days of the test date).
	Unsatisfactory Results	Submit Unsatisfactory Test Report at the time of testing (within 10 days of test date). Submit Retest Report before Final inspection of the permit.
Existing Backflow Prevention Assembly	Satisfactory Results	Submit Satisfactory Test Report within 30 days of initial annual test notification.
	Unsatisfactory Results	Make necessary repairs and submit Satisfactory Test Report within 60 days of initial annual test notification.

10. Records

a. A Master List of service connections and/or properties where the City relies upon approved backflow prevention assemblies to protect the public water system from contamination and shall be kept and will be in accordance with WAC 246-290-490. Information to be included in the Master List for all assemblies and AGs in lieu of assemblies:

   i. Property owner name, address and contact information

   ii. Exact location of assembly

   iii. Assessed hazard level

   iv. Required backflow prevention assembly

   v. Installation date

   vi. Assembly nomenclature

   vii. Test results and history

   viii. BAT contact information

b. The City shall maintain records of Cross-Connection Control Program Summary Reports

c. The City shall maintain records of Backflow Incident Reports

11. Public Education Program

The City shall make available to property owners, information regarding backflow and backflow prevention, as well as the City's Cross-Connection Control Program. This public education program could include, but is not limited to:

a. Articles in the City newsletter

b. Fact sheets available for new property owners and developers

c. Informational pamphlets and brochures available at the City office

d. Water quality (Consumer Confidence) reports

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Appendix P. Contaminant Source Inventory

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Contaminant Source Inventory

The inventory of potential contaminant sources within the WHPAs involved a search of the Washington State Department of Ecology's Facility/Site Identification System (F/SID) database, review of the Hazardous Materials Inventory Statements collected from City of Issaquah businesses in 2008 and 2009, and City source control inspections.

Washington State Department of Ecology Database

The facility site database (F/SID database) is an internet-based system (accessed via the following website: http://www.ecy.wa.gov/fs/ and contains a compilation of potential contaminant site information identified under the following selected categories: State Cleanup Sites, Federal Superfund Sites, Hazardous Waste Generators, Hazardous Waste management Activity, Hazardous Waste Planner, Underground Storage Tanks, Leaking Underground Storage Tank (LUST), Toxic Release, and Voluntary Cleanup. The use of this comprehensive source of information is a standard approach accepted by DOH to facilitate updates to potential contaminant source inventories. The results of the F/SID database search are provided in Table 1 below.

Table 1.
Department of Ecology Facility/Site Database Results

Facility Name	**Address**	**Ecology Facility/Site Database**[i]	**Wellhead Capture Zone (1, 5, or 10 year)**
CASEYS SHELL	55 NW GILMAN BLVD	Lust Facility, State Cleanup Site, Hazardous Waste Generator, UST	5
ISSAQUAH SCHOOL DISTRICT 411 TRANSP CTR	805 2ND AVE SE	Lust Facility, UST	10
ISSAQUAH OLD POLICE STATION	132 E SUNSET WY	Lust Facility, UST	10
SHELL STATION 121591 (Jacksons Shell 626)	825 FRONT ST N	Lust Facility, Emergency Haz Chem Rpt Tier 2, Voluntary Cleanup Site, Haz Waste Management Activity, Hazardous Waste Generator, UST	1, 5
DARIGOLD ISSAQUAH	611 FRONT ST N	Lust Facility, Toxic Release Inventory, Emergency Haz Chem Rpt Tier 2, Haz Waste Planner, UST	5
GRANGE SUPPLY INC	145 NE GILMAN BLVD	Lust Facility, Emergency Haz Chem Rpt Tier 2, Hazardous Waste Generator, UST	1, 5
SHELL STATION 120677 (Jacksons 627	15 E SUNSET WAY	Lust Facility, Emergency Haz Chem Rpt Tier 2, Voluntary Cleanup Site, Haz Waste Management Activity, Hazardous Waste Generator, UST	10
MOBIL STATION 10 D6R	30 W SUNSET WY	Lust Facility, Indep Remedial Action, UST	10
CHEVRON 95399	25 NW GILMAN	Lust Facility, Emergency Haz Chem Rpt	5

Facility Name	Address	Ecology Facility/Site Database[i]	Wellhead Capture Zone (1, 5, or 10 year)
	BLVD	Tier 2, Voluntary Cleanup Site, Haz Waste Management Activity, Hazardous Waste Generator, UST	
ISSAQUAH FEED & SERVICE	232 FRONT ST N	Lust Facility, Voluntary Cleanup Site, UST	10
FRONT STREET MARKET (ARCO 4466)	800 FRONT ST	Lust Facility, Emergency Haz Chem Rpt Tier 2, Haz Waste, UST Management Activity	1, 5
CADMAN INC	6600 230TH AVE SE CADMAN INC	Emergency Haz Chem Rpt Tier 2, Hazardous Waste Generator	1, 5
LAKESIDE INDUSTRIES Issaquah 032	6600 230TH AVE SE LAKESIDE IND	Emergency Haz Chem Rpt Tier 2, Haz Waste Planner, UST	1, 5
SAMMAMISH PLATEAU WS DIST WELL 9	940 1ST AVE NE	Emergency Haz Chem Rpt Tier 2	1
WA DFW ISSAQUAH HATCHERY	125 W SUNSET WAY	Emergency Haz Chem Rpt Tier 2	10
AT&T ISSAQUAH WA4330 ISHWAR0010	615 E SUNSET WAY	Emergency Haz Chem Rpt Tier 2	5
KING CNTY PARKS ISSAQUAH POOL	50 SE CLARK ST	Emergency Haz Chem Rpt Tier 2	10
DIRKS FINE DRY CLEANING	240 NW GILMAN BLVD	Voluntary Cleanup Site, Hazardous Waste Generator	1
ISSAQUAH HIGH SCHOOL	700 2ND AVE SE	Haz Waste Management Activity, Hazardous Waste Generator	10
ISSAQUAH CITY PW OPERATIONS	670 1ST AVE NE	Haz Waste Management Activity, Hazardous Waste Generator	5
ISSAQUAH CITY FACILITIES	525 1ST AVE NW	Haz Waste Management Activity, Hazardous Waste Generator, Haz Waste Planner	5
BEN FRANKLIN ISSAQUAH (BLUE SIERRA EXOTIC FISH)	90 FRONT ST S	Hazardous Waste Generator	10
WERNER SERVICES INC	375 GILMAN BLVD NW A200	Hazardous Waste Generator	1, 5
BUSH COLLISION INC (PRECISION COLLISION)	290 E SUNSET WAY	Hazardous Waste Generator	5
FLOYD SIMTH PAINTING	280 NE BIRCH ST	Hazardous Waste Generator	5
GRAMORE DEVELOPMENT	90 NW GILMAN BLVD	Hazardous Waste Generator	5
ISSAQUAH CITY FOOD CLOTHING	179 1ST AVE SE	Hazardous Waste Generator	10
ISSAQUAH AUTO TECH LTD	145 NW GILMAN BLVD	Hazardous Waste Generator	5

Facility Name	Address	Ecology Facility/Site Database[i]	Wellhead Capture Zone (1, 5, or 10 year)
ISSAQUAH SCHOOL DIST CLARK ELEM	500 2ND AVE SE	Hazardous Waste Generator, UST	10
BIG O TIRES Gilman Blvd	60 NW GILMAN BLVD	Hazardous Waste Generator	1
GILMAN AUTOBODY	220 NE GILMAN BLVD	Hazardous Waste Generator	1
VEHICLE REPAIR SHOP	195 NE GILMAN BLVD	UST	1
ISSAQUAH CITY SUNSET	130 E SUNSET	UST	10
ISSAQUAH MIDDLE SCHOOL	400 1ST AVE SE	UST	10
BUS GARAGE	802 2ND AVE S	UST	10

[i] Washington State Department of Ecology Facility Site Database (January 2012)

Hazardous Materials Inventory (HMI) and Source Control Inspections

Businesses and facilities located in the City of Issaquah Class 1 and Class 2 Critical Aquifer Recharge Area, also known as the 1, 5, and 10 year capture zone are required by the City of Issaquah's Groundwater Protection Standards IMC 13.29 to submit a hazardous materials inventory (HMI) form to the City. The HMI form reflects the current and anticipated types and quantities of hazardous materials that are stored, handled, treated, used, produced, recycled, or disposed of at a facility. The businesses and facilities in the table below have submitted a hazardous materials inventory form and received a source control site visit by the City of Issaquah. Businesses and facilities that are highlighted in bold below reported quantities of hazardous materials equal to or greater than 20 gallons that may be a potential risk to the wellhead protection area. Businesses in bold were required to complete a Hazardous Materials Management Plan (HMMP)demonstrating the best management measures in place, floor plan, spill response, hazardous materials name, size, storage, and quantity specifics, and drainage area.

The businesses listed in the table below (except those that have an asterisk) also received one or more source control inspections by a City of Issaquah representative to review best management measures such as chemical storage, secondary containment, record keeping, labeling, and spill control.

In total, 34 businesses were identified as having quantities of hazardous materials stored on-site greater than 20 gallons, that have characteristics reflective of potential groundwater contamination.

Table 2.
Businesses and Facilities located in the 1, 5, and 10 Year Capture Zone that submitted a HMI and had a Source Control Inspection.

Facility Name	Address	Wellhead Capture Zone (1, 5, or 10 year)
BIG O TIRES	**60 NW GILMAN BLVD**	1, 5
ROB'S TRANSMISSION	**60 NW GILMAN BLVD STE E**	1, 5
TAJ COLLISION	**60 NW GILMAN BLVD STE D**	1, 5
NAPA AUTO PARTS	20 1ST AVE NW	10
OIL CAN HENRYS	**50 NW HOLLY ST**	5
GRANGE SUPPLY	**145 NE GILMAN BLVD**	1, 5
DARIGOLD	**611 FRONT ST N**	5
CASEY'S CAR CARE	**55 NW GILMAN BLVD**	5
LAKESIDE SAND AND GRAVEL	**980 1ST AVE NE**	1, 5
DENTAL-DR PERKINS	206 N FRONT ST	10
MILLS MUSIC	**170 FRONT ST N**	10
SHIREY CONTRACTING	230 NE JUNIPER ST	5
FANTASY NAILS	141 N FRONT ST	10
BOEHMES CANDIES INC	225-255 NE GILMAN BLVD	1
ISSAQUAH VETERINARY CLINIC	755 1ST AVE NW #795	5
STAPLES OFFICE SUPPLIES	628 N FRONT ST	5
US POST OFFICE*	400 NW GILMAN BLVD	1
ISSAQUAH HIGH SCHOOL	**700 2ND AVE SE**	10
CLARK ELEMENTARY	500 1ST AVE SE	10
ISSAQUAH SCHOOL BUS TRANSP	**805 2ND AVE SE**	10
ISSAQUAH MIDDLE SCHOOL	**400 1ST AVE SE**	10
ISSAQUAH SCHOOL DISTRICTM ADMIN	565 NW HOLLY ST	5, 10
ARNOLD SIMS DDS	208 FRONT ST N	10
COUGAR MOUNTAIN VETERINARY	880 FRONT ST S	10
FRONT STREET DENTISTRY	125 FRONT ST S	10
WYN PROPERTY MAINTENANCE REPAIRS*	195 FRONT ST N STE E	10
VILLAGE THEATRE	**303 FRONT ST N**	10
I-90 MOTORSPORTS	**200 NE GILMAN BLVD**	1, 5
ALL SERVICE GLASS	255 NE JUNIPER ST	5
FLINTOFT's FUNERAL HOME	**540 E SUNSET WAY**	5
LAKESIDE INDUSTRIES	**6600 230TH AVE SE**	1, 5
CADMAN, INC	**6600 230TH AVE SE**	1, 5
DAVID P SHAW, MD*	470 FRONT ST N STE 1	5
ROSEMARY WARREN, DDS	175 NE GILMAN BLVD STE 101	1
GLENN J YORITA DDS	465 RAINIER BLVD N STE B	5

STEPHANIE KAVANAUGH, DMD	85 NW ALDER PL STE B	10
TOYOHIKO MATSUMOTO	85 NW ALDER STE D	10
DIRKS FINE DRY CLEANING	**240 NW GILMAN BLVD STE 1**	1, 5
MEDICAL CENTER PHARMACY	450 NW GILMAN BLVD STE 107	1, 5
RUBY's TOWING	**80 NE GILMAN BLVD**	5
ISSAQUAH CLEANERS	**50 FRONT ST S**	10
CAT CLINIC OF ISSAQUAH	84 FRONT ST S	10
VELOCE VELO	98 FRONT ST S	10
EASTSIDE MOBILE AUTO GLASS	60 NW GILMAN BLVD #C	1, 5
THE COUNTRY UPHOLSTERER	60 NW GILMAN BLVD STE B	1, 5
ISSAQUAH SIGNS	60 NW GILMAN BLVD STE C	1, 5
CITY OF ISSAQUAH PUBLIC WORKS	**670 1ST AVE NE**	5
CITY OF ISSAQUAH FACILITIES	**525 1ST AVE NE**	5
BLUE SIERRA EXOTIC	90 FRONT ST S	10
CENTRAL WELDING SUPPLY	**200 NE JUNIPER ST 98029**	5
ELDER ADULT DAY SERVICES	82 FRONT ST S	10
TROY SALON	149 FRONT ST N	10
OVERLAKE MEDICAL CLINICS	**6520 226TH PL SE**	1, 5
EASTSIDE PEDIATRIC DENTAL	185 NE GILMAN BLVD	1
MARKS JAPANESE AUTO	**90 NW GILMAN BLVD STE A**	1, 5
UPTOWN NAILS	375 NW GILMAN BLVD STE A102	1, 5
DR. SARAH OWENS	375 SE BUSH ST	5
TIGER MOUNTAIN COMMUNITY HIGH SCHOOL	355 SE EVANS ST	10
PRECISION COLLISION	**290 E. SUNSET WAY**	5
MARK GERMACK LAB	450 NW GILMAN BLVD	1, 5
JOHN DEERE LANDSCAPES	720 1ST AVE NE	5
THE DRAWING BOARD ART	301 RAINIER BLVD S	10
MARK's MOTORCYCLE WERKS	**60 NW GILMAN BLVD STE F**	1, 5
GARY ESTES MOBILE REPAIRS	280 NE JUNIPER ST	5
CHEVRON SERVICE STATION	**25 NW GILMAN BLVD**	5
SHELL SERVICE STATION-SUNSET	**15 E SUNSET WAY**	10
FRONT STREET SHELL	**825 FRONT ST N**	1, 5
ARCO SERVICE STATION	**800 FRONT ST N**	1, 5
MINUTEMAN PRESS	**180 NE JUNIPER ST**	5
BIOPROTECTION SERVICES	455 RAINIER BLVD N #250	1, 5
FOUR SONS TOWING	35 2nd AVE SE	1, 5
GLENN YORITA DDS	465 RAINIER BLVD N, STE B	1, 5
SLABJACK NW	**975 1ST AVE NE**	1
STYLISH NAILS	70 FRONT ST S	10
BARTELLS	5700 E LK SAMM PKWY SE	1, 5
ART BY FIRE EAST	196 FRONT ST N	10
AUBREY's CLOCK GALLERY	317 NW GILMAN BLVD, STE 8	1, 5
BEST CLEANERS	**5610 E. LK SAMM PKWY SE**	10

COSMETIC DERMATOLOGY*	245 NE GILMAN BLVD, STE 101	1, 5
ISSAQUAH PRESS*	45 FRONT ST S	10
MUSEO ART GALLERY	195 FRON ST N	10
PLANNED PARENTHOOD	75 NW DOGWOOD, STE B	10
PRESTIGE AUTO TRANSPORT*	583 SE BUSH ST	1, 5
REPAIRS BY RYAN*	245 E. SUNSET WAY	1, 5
SALON JADE	10 NE ALDER ST	1, 5
STUDIO B PORTRAITS*	175 1st PL NW , STE B	1, 5

*Submitted a Hazardous Materials Inventory statement, but did not receive a source control visit.

Permit #	Project Name	Address	Parcel #	PERMITSUBTYPE
CAR10-00004	BIG O TIRES	60 NW GILMAN BLVD	8843500310	CARA
CAR10-00006	ROB'S TRANSMISSION	60 NW GILMAN BLVD STE E	8843500310	CARA
CAR10-00008	TAJ COLLISION	60 NW GILMAN BLVD STE D	8843500310	CARA
CAR10-00015	NAPA AUTO PARTS	20 1ST AVE NW	2824069101	CARA
CAR10-00017	VALVOLINE	50 NW HOLLY ST	8843500460	CARA
CAR10-00033	GRANGE SUPPLY	145 NE GILMAN BLVD	2724069072	CARA
CAR10-00034	ISSAQUAH LUMBER	5728 EAST LAKE SAMMAMISH PKWY SE	2124069106	CARA
CAR10-00045	ISSAQUAH ELKS CLUB-DELETE	765 RAINIER BLVD N	8843900090	CARA
CAR10-00054	DARIGOLD	611 FRONT ST N	2824069022	CARA
CAR10-00080	CASEYS CAR CARE	55 NW GILMAN BLVD	8843500440	CARA
CAR10-00099	LAKESIDE SAND AND GRAVEL	980 1ST AVE NE	8843500150	CARA
CAR10-00261	DENTAL-DR PERKINS	206 FRONT ST N	7600600010	CARA
CAR10-00262	DERMATOLOGY	295 NE GILMAN BLVD #101	2724069048	CARA
CAR10-00284	LAKESIDE OFFICE BLDG	6505 226TH PL SE	4142100010	CARA
CAR10-00302	MILLS MUSIC	170 FRONT ST N	7600600020	CARA
CAR10-00326	SHIREY CONTRACTING	230 NE JUNIPER ST	8843500138	CARA
CAR10-00354	FANTASY NAILS/LA PETITE BELLE NAILS	141 FRONT ST N	2824069199	CARA
CAR10-00364	BOEHMS CHOCOLATES	225 NE GILMAN BLVD	2724069186	CARA
CAR10-00411	ISSAQUAH VETERINARY CLINIC	795 1ST AVE NW	8843500270	CARA
CAR10-00443	STAPLES OFFICE SUPPLIES	628 FRONT ST N	2724069057	CARA
CAR10-00446	US POST OFFICE	400 NW GILMAN BLVD	2824069003	CARA
CAR10-00474	ISSAQUAH HIGH SCHOOL	700 2ND AVE SE	3424069030	CARA
CAR10-00475	CLARK ELEMENTARY	500 1ST AVE SE	2354300315	CARA
CAR10-00476	ISSAQUAH SCHOOL BUS	805 2ND AVE SE	3424069030	CARA
CAR10-00483	ISSAQUAH MIDDLE SCHOOL (moved- see CAR17-00007)	400 1ST AVE SE	2354300270	CARA
CAR10-00485	ISSAQUAH SCHOOL DISTRICTM ADMIN	565 NW HOLLY ST	2824069012	CARA
CAR10-00503	ARNOLD SIMS DDS-OUT OF BUSINESS	208 FRONT ST N	7600600012	CARA
CAR10-00505	COUGAR MOUNTAIN VETERINARY	880 FRONT ST S	3424069141	CARA
CAR10-00550	FRONT STREET DENTISTRY-OUT OF BUSINESS	125 FRONT ST S	3324069038	CARA
CAR10-00553	WYN PROPERTY MAINTENANCE REPAIRS	195 FRONT ST N STE E	2824069147	CARA
CAR10-00555	VILLAGE THEATRE	303 FRONT ST N	2824069070	CARA
CAR10-00563	I-90 MOTORSPORTS	200 NE GILMAN BLVD	2724069173	CARA
CAR10-00566	ALL SERVICE GLASS	255 NE JUNIPER ST	8843500092	CARA
CAR10-00568	FLINTOFTS FUNERAL HOME	540 E SUNSET WAY	5279101265	CARA
CAR10-00569	LAKESIDE INDUSTRIES	6600 230TH AVE SE	2224069012	CARA
CAR10-00570	CADMAN, INC	6600 230TH AVE SE	2224069012	CARA
CAR10-00572	DAVID P SHAW, MD	470 FRONT ST N STE 1	2724069083	CARA
CAR10-00573	ROSEMARY WARREN, DDS	175 NE GILMAN BLVD STE 101	2724069092	CARA
CAR10-00578	OUT OF BUSINESS-CASCADE SPA, STOVE, and SAUNA	485 FRONT ST N STE A	2824069021	CARA
CAR10-00582	GLENN J YORITA DDS	465 RAINIER BLVD N STE B	2824069033	CARA
CAR10-00583	FITZPATRICK CHIROPRACTIC CLINIC-EXEMPT	465 RAINIER BLVD N	2824069033	CARA
CAR10-00592	PLANNED PARENTHOOD-CLOSED	75 NW DOGWOOD ST STE B	2824069080	CARA
CAR10-00598	STEPHANIE KAVANAUGH, DMD-DELETE OUT OF BUSINESS	85 NW ALDER PL STE B	2824069095	CARA
CAR10-00600	TOYOHIKO MATSUMOTO	85 NW ALDER PL STE D	2824069095	CARA
CAR10-00601	ISSAQUAH DERMATOLOGY-EXEMPT	85 NW ALDER PL STE A	2824069095	CARA
CAR10-00620	DIRKS FINE DRY CLEANING	240 NW GILMAN BLVD STE 1	2824069194	CARA
CAR10-00624	MEDICAL CENTER PHARMACY-EXEMPT	450 NW GILMAN BLVD STE 107	2824069287	CARA
CAR10-00627	ISSAQUAH/SAMMAMISH PHYSICAL THERAPY-LOW	450 NW GILMAN BLVD STE 106	2824069287	CARA
CAR10-00631	WASHINGTON IMAGING SERVICES-EXEMPT	450 NW GILMAN BLVD STE 105	2824069287	CARA
CAR10-00643	ATHENA UROLOGY-EXEMPT	6520 226TH PL SE STE 205	4142100020	CARA
CAR10-00645	LK SAMMAMISH PHYSICAL THERAPY	6520 226TH PL SE STE 201	4142100020	CARA
CAR10-00646	RUBY's TOWING-NO LONGER AT THIS LOCATION	80 NE GILMAN BLVD	8843500010	CARA
CAR10-00649	ISSAQUAH CLEANERS-EDGAR WHOLESALE CLEANERS	50 FRONT ST S	2354300135	CARA
CAR10-00652	CAT CLINIC OF ISSAQUAH	84 FRONT ST S	2354300135	CARA
CAR10-00654	DELETE-VELOCE VELO-OUT OF BUSINESS	98 FRONT ST S	2354300135	
CAR10-00655	EASTSIDE MOBILE AUTO GLASS	60 NW GILMAN BLVD STE G	8843500310	CARA
CAR10-00656	HID KIT PROS (FORMERLY THE COUNTRY UPHOLSTERER)	60 NW GILMAN BLVD STE B	8843500310	
CAR10-00657	ISSAQUAH SIGNS	60 NW GILMAN BLVD STE C	8843500310	CARA
CAR10-00668	CITY OF ISSAQUAH PUBLIC WORKS	670 1ST AVE NE	2724069174	CARA
CAR10-00669	CITY OF ISSAQUAH FACILITIES and PARKS	525 1ST AVE NW	2824069042	CARA
CAR10-00676	BEST CLEANERS	5610 EAST LAKE SAMMAMISH PKWY SE STE B	2124069085	CARA
CAR10-00677	WORLD NAILS - NO LONGER CARA	5610 EAST LAKE SAMMAMISH PKWY SE STE C	2124069085	CARA
CAR10-00683	BLUE SIERRA EXOTIC-OUT OF BUSINESS	90 FRONT ST S	2354300135	CARA
CAR10-00693	CENTRAL WELDING SUPPLY- OUT OF BUSINESS	200 NE JUNIPER ST	8843500136	CARA
CAR10-00771	VILLAGE THEATRE- SEE CAR10-00555	303 FRONT ST N	2824069070	CARA
CAR10-00772	DELETE-ELDER ADULT DAY SERVICES-out of business	82 FRONT ST S	2354300135	CARA
CAR10-00773	TROY SALON	149 FRONT ST N	2824069064	CARA
CAR10-00775	OVERLAKE MEDICAL CLINICS-DELETE NEW LOCATION	6520 226TH PL SE	4142100020	CARA
CAR10-00776	EASTSIDE PEDIATRIC DENTAL	185 NE GILMAN BLVD	2724069092	CARA
CAR10-00777	MARKS JAPANESE AUTO	90 NW GILMAN BLVD STE A	8843500310	CARA
CAR10-00778	UPTOWN NAILS	375 NW GILMAN BLVD STE A102	2824069273	CARA
CAR10-00781	DR. SARAH OWENS	375 SE BUSH ST	3424069010	CARA
CAR10-00784	ISSAQUAH VALLEY ELEMENTARY SCHOOL- NO LONGER IN CARA	555 NW HOLLY ST	2824069012	CARA
CAR10-00786	TIGER MOUNTAIN COMMUNITY HIGH SCHOOL	355 SE EVANS ST	3424069030	
CAR10-00787	PRECISION COLLISION -ABRA AUTO	290 E SUNSET WAY	5279100325	CARA

CAR10-00827	MARK GERMACK LAB-DELETE COMBO W/FEDER	450 NW GILMAN BLVD	2824069287	CARA
CAR10-00828	MUSEO ART ACADEMY	195 FRONT ST N STE E	2824069147	CARA
CAR10-00829	SITE ONE LANDSCAPE SIPPLY (JOHN DEERE LANDSCAPES)	720 1ST AVE NE	8843500075	CARA
CAR10-00843	THE DRAWING BOARD ART-OUT OF BUSINESS	301 RAINIER BLVD S	2354300205	CARA
CAR10-00845	BARTELL DRUG COMPANY	5700 EAST LAKE SAMMAMISH PKWY SE	2124069090	CARA
CAR10-00856	ERIC SEMSAK NATUROPATHIC CLINIC	85 NW ALDER PL STE C	2824069095	CARA
CAR10-00857	PNW ARMS-NO Store in ISSAQUAH	1085 12TH AVE NW STE D-9		CARA
CAR10-00859	NEWERA PHOTOGRAPHY-EXEMPT	17 NW ALDER PL STE 202		
CAR11-00001	Issaquah High School- COMBINE W/ CAR10-00474	700 2ND AVE SE	3424069030	CARA
CAR11-00002	Bicycle Center of Issaquah-DELETE	111 FRONT ST N	2824069305	
CAR11-00003	Bicycle Center of Issaquah	121 FRONT ST N	2824069062	CARA
CAR11-00004	MARK's MOTORCYCLE WERKS-OUT OF BUSINESS	60 NW GILMAN BLVD STE F	8843500310	CARA
CAR11-00005	MUSIC AND ARTS (PREV MILLS MUSIC)	170 FRONT ST N	7600600020	CARA
CAR11-00006	GARY ESTES MOBILE REPAIRS	280 NE JUNIPER ST	8843500145	CARA
CAR11-00007	ART BY FIRE EAST LLC	195 FRONT ST N STE A	2824069147	CARA
CAR11-00008	Aubreys Clock Gallery- EXEMPT	317 NW GILMAN BLVD STE 12	2824069280	
CAR11-00009	ISSAQUAH FURNITURE-EXEMPT	94 FRONT ST S	2354300135	CARA
CAR11-00010	CHEVRON SERVICE STATION - FRONT AT GILMAN	25 NW GILMAN BLVD	8843500330	CARA
CAR11-00011	SHELL SERVICE STATION - SUNSET AT FRONT	15 E SUNSET WAY	3424069024	CARA
CAR11-00012	FRONT STREET SHELL STATION	825 FRONT ST N	8843500345	CARA
CAR11-00013	ARCO SERVICE STATION - FRONT AT GILMAN	800 FRONT ST N	8843500005	CARA
CAR11-00014	MINUTEMAN PRESS	180 NE JUNIPER ST	8843500124	CARA
CAR12-00001	ISSAQUAH VET HOSPITAL-NATURAL VET LLC	795 1ST AVE NW	8843500270	CARA
CAR12-00002	ROSEMARY WARREN DDS-SEE CARA10	175 NE GILMAN BLVD 101	2724069092	CARA
CAR12-00003	SCOTT CLAYHOLD DMD	22605 SE 56TH ST 10	2124069075	CARA
CAR12-00004	BARRY FEDER DDS & MARK GERMACK DDS	450 NW GILMAN BLVD STE 103	2824069287	CARA
CAR12-00005	BIOPROTECTION SERVICES NORTHWEST LLC	455 RAINIER BLVD N	2824069134	CARA
CAR12-00006	NAILS BY ROBIN-BUSINESS CANCELLED	230 RAINIER BLVD N	2724069163	CARA
CAR12-00007	STYLISH NAILS	70 FRONT ST S	2354300135	CARA
CAR12-00008	PHOENIX ART RESTORATION	317 NW GILMAN BLVD STE 33	2824069136	CARA
CAR12-00009	FOUR SONS TOWING-EXEMPT	35 2ND AVE SE	2354300575	CARA
CAR12-00010	SLABJACK NW-NO LONGER IN BUSINESS (2014)	975 1ST AVE NE	8843500209	CARA
CAR12-00011	INTEGRITY AUTO REPAIR	80 NE GILMAN BLVD	8843500010	CARA
CAR12-00012	MARKS AUTO DETAIL	90 NW GILMAN BLVD STE B	8843500310	CARA
CAR13-00001	I-90 MARINE CENTER	280 NE JUNIPER ST	8843500145	CARA
CAR13-00002	FRONT STREET CLEANERS	660 FRONT STREET N STE A	2724069009	
CAR13-00003	EASTSIDE FAMILY & COSMETIC DENTISTRY	208 FRONT ST S	7600600012	CARA
CAR14-00001	ANNOTTO BAY VETERINARY CLINIC	425 RAINIER BLVD N BLDG	2824069172	CARA
CAR14-00002	NOBLE DENTAL CARE	85 NW ALDER PL STE B	2824069095	
CAR14-00003	BAKES MARINE CENTER	6424 EAST LAKE SAMMAMISH PKWY SE	2724069149	
CAR14-00004	BROWN DENTAL LAB	85 NW ALDER PL STE E	2824069095	
CAR15-00001	BENJAMIN MOORE PAINTING	145 NW GILMAN BLVD	8843500284	CARA
CAR16-00001	BUKHARA BAR AND GRILL	131 FRONT ST N	2824069062	CARA
CAR16-00002	CHROMATIQUE SPA (FORMERLY STEVE'S DOUGHNUTS)	317 NW GILMAN BLVD STE 5	2824069136	CARA
CAR17-00001	PELAGE MEDI-SPA	111 FRONT ST N	2824069305	CARA
CAR17-00002	THE RECOLOGY STORE	317 NW GILMAN BLVD STE 22	2824069136	CARA
CAR17-00003	VILLAGE THEATER TECH STUDIO	470 1ST AVE NW	2824069274	CARA
CAR17-00004	TOUCHDOWN FLOORING	850 FRONT ST N	8843500045	CARA
CAR17-00005	MULE EXPEDITION OUTFITTERS	60 NW GILMAN BLVD STE F	8843500310	CARA
CAR17-00006	FAST SIGNS	60 NW GILMAN BLVD STE C	8843500310	
CAR17-00007	ISSAQUAH MIDDLE SCHOOL	600 2ND AVE SE	3424069030	CARA
CAR17-00008	CAR TOYS, INC	6140 EAST LAKE SAMMAMISH PKWY SE STE F	2161630020	CARA
CAR17-00009				
CAR17-00010	EMERALD CITY SMOOTHIE	1590 NW GILMAN BLVD	5423200020	CARA
CAR17-00011	EASTSIDE FIRE & RESCUE STATION	190 E SUNSET WY	2724069032	CARA
CAR17-00012	STAN'S BAR-B-Q	58 FRONT ST N	2724069018	CARA
CAR17-00013	PINTO PORTRAIT	317 NW GILMAN BLVD STE 26	2824069136	
CAR17-00014	PINTO PORTRAIT	317 NW GILMAN BLVD STE 26	2824069136	
CAR17-00015	DAWN POTTER PHOTOGRAPHY	317 NW GILMAN BLVD STE 26	2824069136	
CAR17-00016	BLACK DUCK CASK AND BOTTLE	317 NW GILMAN BLVD STE 31B	2824069136	
CAR17-00017	TIKKA MASALA	317 NW GILMAN BLVD STE 30 B	2824069136	
CAR17-00018	FLAT IRON GRILL	317 NW GILMAN BLVD STE 28A	2824069136	
CAR17-00019	THE NIFTY KNITTER	317 NW GILMAN BLVD STE 27	2824069136	
CAR17-00020	EGG & US	375 NW GILMAN BLVD STE A101	2824069273	

Appendix Q. Long-term Water Treatment Alternatives Evaluation

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Technical Memorandum (DRAFT)

To: Bob York (City of Issaquah)

From: Beth Mende and Pierre Kwan (HDR)

Date: February 7, 2018

Subject: Long-Term Water Treatment Alternatives

1.0 Background and Introduction

In 2013, the City of Issaquah (City) detected then-unregulated per- and polyfluoroalkyl substances (PFAS) in Gilman Well No. 4 as part of the UCMR 3 sampling event. In response to the PFAS detections, the City shut down Gilman Well No. 4 and evaluated a number of alternatives to eliminate the contamination from Well No. 4. A temporary granular activated carbon (GAC) filtration system was installed to treat water from Well No. 4 with the ability to be expanded to treat Well No. 5 if the PFAS migrated to the lower Well No. 5 aquifer. PFAS levels have been below the USEPA Method 537 detection limit in Well No. 4 finished water since the system went online in 2016.

In addition to PFAS in Well No. 4, the City has other water quality challenges, including manganese and arsenic, ammonia, and low pH, which adversely affect the City's groundwater supply. To further address these water quality issues, and to plan for the eventual introduction of regional water from the Cascade Water Alliance into the Valley Zone (which will require blending of groundwater and regional water in the Valley Zone), the City is evaluating long-term treatment options for PFAS and the other water quality issues. The following long-term treatment options are being considered, and are evaluated in this document:

1. Option 1: Centralized Treatment: Risdon Wells 1 and 2 and Gilman Wells 4 and 5 would be treated at a single location.
2. Option 2: Wellhead Treatment – Abandon Gilman Well Nos. 4 and 5 and provide wellhead treatment at Risdon Well Nos. 1 and 2 and wellhead treatment at Well No. 6.

This document evaluates the long-term treatment options and identifies treatment requirements, equipment sizes, chemical volumes, and associated support systems for each option. Conceptual design drawings and planning-level costs are also included.

Due to the small site at Gilman Wells 4 and 5, additional wellhead treatment is not feasible at this location. The City has another existing undeveloped well, Well No. 6, which is not currently used as a potable water source. This well is considered as a part of this treatment evaluation as water rights from the existing potable water wells could potentially be transferred to this well in the future.

2.0 City Groundwater Supply

The City receives water from two major sources of supply: the City's own groundwater resources (Risdon Well Nos. 1 and 2, and Gilman Well Nos. 4 and 5) and regional Seattle Public Utilities water purchased from the Cascade Water Alliance (referred to as regional water).

Table 1 summarizes the City's sources.

Table 1. City of Issaquah's Water System Supply

Supply	Current Pumping Capacity (gpm)	Instantaneous Well Water Right (Qi) (gpm)	2017 Supply (MG)
Risdon Well No. 1	450	630	125
Risdon Well No. 2	1,050	1,200	228
Gilman Well No. 4	250	250	64
Gilman Well No. 5	1,150	1,000	60
Well No.6	Not developed	None	-
Regional Water	8,330	Not applicable	477

3.0 Groundwater Quality

Each of the City's supplies has different water quality characteristics, some of which adversely affect groundwater quality including PFAS, manganese, arsenic, ammonia, and pH. In addition, Risdon Well Nos. 1 and 2 have low pH levels that could cause corrosion issues through the system. The City's groundwater sources are not currently fluoridated. These water quality parameters for each source are presented in Table 2 and are further discussed in this section.

Table 2. Important Water Quality Parameters of City's Water Supplies

Parameter (mg/L unless noted otherwise)	Limit	Goal	Risdon No. 1	Risdon No. 2	Gilman No. 4	Gilman No. 5	Well No. 6[5]	Regional Water Average
pH (std. units)[4]	6.5-8.5	6.5-8.5	6.9	7.0	7.1	8.1	8.4	8.1
PFOS (µg/L)	0.07 combined[2]	TBD[2]	<0.04	<0.04	See Table 3	<0.04	NA	<0.04
PFOA (µg/L)		TBD[2]	<0.02	<0.02	See Table 3	<0.04	NA	<0.02
Arsenic (mg/L)[1]	0.01	0.0	0.002	0.002	0.003	0.009	<0.001	<0.001
Manganese (mg/L)[1]	0.05	0.05	<0.01	<0.01	0.02	0.06	0.12	NA
Fluoride(mg/L)[1]	2	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	0.7
Ammonia (mg/L)[6]	None	None	NA	NA	0.002	0.099	NA	NA

Notes:

1. Water quality data are from the 2016 Inorganic Chemicals Report.
2. PFAS limit is USEPA Provisional Health Advisory Limit. DOH is in the process of rulemaking to establish a State of Washington MCL.
4. Water quality data are from 2007 sampling.
5. Well No. 6 data are from the 1999 Golder Associates Report.
6. Ammonia measurements are averages taken from samples in January and February 2008.
7. NA – not available

3.1 PFAS

PFAS are fully-fluorinated compounds that are extremely persistent in the environment and resistant to chemical degradation processes. They are manmade compounds that do not occur naturally in the environment. The toxicity, mobility and bioaccumulation potential of PFAS pose potential adverse effects for the environment and human health. At this time there is an EPA established Provisional Health Advisory level of 0.7 µg/L for PFOS and PFOA at individual or combined concentrations. More recently, the Department of Health has recommended that the State Board of Health begin rulemaking to consider setting drinking water standards for specific PFAS compounds.

PFAS have been detected above the practical quantification limit in Gilman Well No. 4. Table 3 and Table 4 present the PFAS data collected from Well No. 4 and blended finished water from Well Nos. 4 and 5, respectively. PFAS levels in Gilman Well No. 4 are significantly higher than Well No. 5. The temporary GAC system was installed to treat the more contaminated Well No. 4 to PFAS levels below USEPA Method 537 detection limits before it is blended with untreated Well No. 5 water and sent out to the distribution system. Although PFAS are removed to below USEPA Method 537 detection limits from Well No. 4, Well No. 5 does contain PFAS at low levels, greater than the USEPA Method 537 detection limits but less than the practical quantification limits for the laboratory used (Anatek Labs) that are blended with Well No. 4 and put into the distribution system.

Table 3. PFAS Concentrations in Well No. 4

Parameter	PFBS (µg/L)	PFHpA (µg/L)	PFHxS (µg/L)	PFNA (µg/L)	PFOS (µg/L)	PFOA (µg/L)
MDL	0.01	0.002	0.005	0.005	0.01	0.02
PQL	0.09	0.01	0.03	0.02	0.04	0.02
Sample Date						
6/13/16	<PQL	0.0154	0.212	<PQL	0.602	0.0222
8/8/16	<PQL	0.0179	0.181	<PQL	0.421	<PQL
8/22/16	<PQL	0.0184	0.177	<PQL	0.409	<PQL
9/27/16	<PQL	0.0138	0.162	<PQL	0.401	<PQL
10/24/16	<PQL	0.0113	0.141	<PQL	0.369	<PQL
11/14/16	<PQL	0.143	0.186	<PQL	0.382	<PQL
12/13/16	<PQL	0.0138	0.161	<PQL	0.367	<PQL
1/17/17	<PQL	0.0137	0.144	<PQL	0.341	<PQL
3/13/17	<PQL	0.0123	0.149	<PQL	0.354	<PQL
4/10/17	<PQL	0.012	0.147	<PQL	0.379	<PQL
5/8/17	<PQL	0.0105	0.135	<PQL	0.332	<PQL
6/12/17	<PQL	0.0118	0.129	<PQL	0.316	<PQL
7/12/17	<PQL	0.0126	0.138	<PQL	0.315	<PQL
8/14/17	<PQL	0.012	0.124	<PQL	0.304	<PQL
9/12/17	<PQL	0.0123	0.13	<PQL	0.31	<PQL
10/9/2017	<PQL	0.123	0.14	<PQL	0.339	<PQL
11/28/2017	<PQL	0.0124	0.138	<PQL	0.367	<PQL
12/12/2017	<PQL	0.0115	0.12	<PQL	0.332	<PQL

Notes:
1. MDL based on USEPA Method 537.

2. PQL established by Anatek Labs.

Table 4. PFAS Concentrations in Well 4 and 5 Blended Finished Water

Parameter	PFBS (µg/L)	PFHpA (µg/L)	PFHxS (µg/L)	PFNA (µg/L)	PFOS (µg/L)	PFOA (µg/L)
MDL	0.01	0.002	0.005	0.005	0.01	0.02
PQL	0.09	0.01	0.03	0.02	0.04	0.02
Sample Date						
8/8/16	ND	ND	<PQL	ND	<PQL	ND
8/22/16	ND	ND	<PQL	ND	<PQL	ND
8/24/16	ND	ND	<PQL	ND	<PQL	ND
9/27/16	ND	ND	<PQL	ND	<PQL	ND
10/24/16	ND	ND	<PQL	ND	<PQL	ND
11/14/16	ND	ND	<PQL	ND	<PQL	ND
12/13/16	ND	ND	<PQL	ND	<PQL	ND
1/17/17	ND	ND	<PQL	ND	<PQL	ND
3/13/17	ND	ND	<PQL	ND	<PQL	ND
4/10/17	ND	ND	<PQL	ND	<PQL	ND
5/8/17	ND	ND	<PQL	ND	<PQL	ND
6/12/17	ND	ND	<PQL	ND	<PQL	ND
7/12/17	ND	ND	<PQL	ND	<PQL	ND
8/14/17	ND	ND	<PQL	ND	<PQL	ND
9/12/17	ND	ND	<PQL	ND	<PQL	ND
10/9/2017	ND	ND	<PQL	ND	<PQL	ND
11/28/2017	ND	ND	<PQL	ND	<PQL	ND
12/12/2017	ND	ND	<PQL	ND	<PQL	ND

Notes:
1. Detection limits based on USEPA Method 537.
2. PQL established by Anatek Labs.

Monthly PFAS data show PFOS and PFHxS concentrations in Well No. 5 have increased slightly since the GAC treatment system for Well No. 4 went online, although, still remain lower than the practical quantification limits. The Well No. 4 and No. 5 aquifers are adjacent to each other and this indicates that contamination could be migrating from the Well No. 4 aquifer to the lower Well No. 5 aquifer.

3.2 Arsenic

Arsenic enters drinking water supplies from natural deposits in the earth or from industrial and agricultural pollution. Currently, the USEPA and DOH have an established MCL for arsenic of 0.010 mg/L. Arsenic levels in Gilman Well No. 5 have been reported to be up to 0.009 mg/L. While the concentration is below the MCL, it is above an industry guidance level of 0.008 mg/L (80 percent of the MCL) for which reduction is generally initiated. The City currently blends Wells No. 4, which has only 0.003 mg/L arsenic, with the higher arsenic Gilman No. 5 to reduce arsenic concentrations prior to the distribution system point of entry. The City would like to evaluate treatment for further arsenic reduction in the groundwater sources.

3.3 Manganese

Manganese occurs naturally in many groundwater sources in Western Washington and is present at elevated levels in Gilman Wells Nos. 4 and 5, as well as in the City's undeveloped Well No. 6. Manganese can become noticeable in tap water by imparting several negative attributes to water, most noticeably, a black to brown color to the water, but also occasionally odor and/or taste. Exposure to elevated concentrations of manganese over long periods of time have been associated with toxicity to the nervous system. The EPA secondary MCL (SMCL) for manganese is 0.05 mg/L. A SMCL relates primarily to aesthetics. However, DOH enforces all secondary standards in the State of Washington and requires utilities to either implement treatment or provide strong justification for why the secondary standard can be exceeded without detriment to users. Studies done by the Water Research Foundation recommend that manganese be controlled even further, to 0.015 mg/L, to be effective in controlling manganese discoloration in water.

The groundwater from Gilman wells has manganese levels at or above the SMCL. High-volume and unidirectional flushing are routinely completed in the entire northwest section of the city, the primary distribution area for Gilman Well No. 5, because of elevated manganese levels. Sequestrant is also injected at Gilman Well No. 5 to temporarily mask the manganese discoloration. The City would like to evaluate treatment for manganese removal in the groundwater sources to achieve concentrations as low as 0.015 mg/L.

3.4 pH and Lead and Copper Rule Compliance

The EPA developed the Lead and Copper Rule (LCR) to reduce lead and copper concentrations in drinking water that can occur when corrosive source water, typically water with a pH of less than 7.5, causes lead and copper to leach from water system components and other plumbing fixtures/materials. The LCR establishes an action level (AL) of 0.015 mg/L for lead and 1.3 mg/L for copper based on the 90th percentile level of tap water samples. Revisions are currently being considered for the LCR. Potential revisions include greater attention to the potential risks associated with elevated levels of copper in drinking water which may include modifications to the sample site criteria for copper sampling. One change that has been proposed is to have copper-specific sampling at newly constructed homes, where the bare copper plumbing has no time to passivate and would have the highest releases of copper into the drinking water. Such a change would be have a large impact to the City as there is significant new home construction in many parts of the service area.

One of the main factors that define the corrosion rates of lead and copper release into drinking water is pH. Water pH exerts an effect on the solubility, reaction rates and the surface chemistry of corroding metals. Low pH levels, typically lower than 7, potentially increase the solubility of copper and lead from piping, solder, and brass fixtures. At higher pH values, there is a lower tendency for copper surfaces in contact with drinking water to dissolve and release metals into water. A similar trend is observed between lead release and pH. Maintaining a relatively consistent pH (>7.8) throughout the distribution system is important to minimizing lead and copper levels. The pH levels in Risdon Wells Nos. 1 and 2 are typically 6.8 and 7.0, respectively.

The pH in Gilman Well No. 4 is typically 7.3 and the pH in Gilman Well No.5 is typically 8.3. While the pH levels are generally adequate for LCR compliance, the difference between the groundwaters, as well as their difference with regional water, has the potential to cause increased lead and copper release in customer plumbing and affect LCR compliance results. The City would like to raise the groundwater pH, using a pH target that is consistent with that of the regional water to avoid corrosion issues when regional water is introduced into the Valley Zone, with options for further adjustment in the future.

3.5 Fluoride

Seattle Public Utilities adds fluoride to the regional water supply to achieve a concentration of 0.7 mg/L whereas Issaquah does not fluoridate the Risdon and Gilman well supply. Currently, the Valley Zone is supplied only by unfluoridated groundwater.

The Talus and Highlands zones are supplied by regional water, though they have the ability to receive both regional water and groundwater. And, groundwater used to supply the Talus and Issaquah Highlands are fluoridated at the Holly and Talus Booster Pump Stations.

Current demand projections indicate that regional water needs to be introduced into the Valley Zone to meet demands within the next ten years, which will require the City to make a decision whether to fluoridate the Valley Zone. The City has three options regarding fluoride introduction:

1. Blend groundwater and regional water, and increase fluoride concentrations to DOH recommended concentration of 0.7 mg/L.
2. Blend groundwater and regional water, without adjusting fluoride within the system, providing fluoride at a level less than the standard recommend by DOH.
3. Removing fluoride from regional water and blending with groundwater.

Removing fluoride from the regional water is not financially practical for the City. Defluoridation is very rarely practiced in Washington State and throughout the country, and most of the time is used only when raw water fluoride concentrations are so high (i.e. 2.0 mg/L and higher) as to cause aesthetic or health issues. HDR is not aware of any utility in the United States that defluoridates water with only 0.7 mg/L fluoride. The reason for lack of installations is that the capital cost, labor cost, and chemical/material costs for such an activity is typically so high that the overall cost of the water treatment is impractical. As a result, defluoridation is not further evaluated in this document.

4.0 Long-Term Treatment Options

This section evaluates the two long-term treatment options in terms of treatment requirements, equipment sizing, along with implementation constraints. The City desires the removal of anthropogenic PFAS contamination to non-detect levels as based on USEPA Method 537 (as listed in Table 3 and Table 4). Continued partial treatment and blending to below regulatory limits is not considered for PFAS in this evaluation. Blending to achieve lower concentrations of naturally occurring arsenic and manganese, however, is considered in this evaluation. The long-term treatment goals considered in this evaluation are:

1. Reduction of manganese concentrations to 0.015 mg/L from the Gilman water prior to blending.
2. Reduction of arsenic to at least half of the MCL (0.005 mg/L).
3. Removal of PFAS to levels below the USEPA Method 537 detection limits from the Gilman water prior to blending.
4. Fluoridation of groundwater to 0.7 mg/L to match that of the regional water supply.
5. Disinfection to maintain a minimum of 0.2 mg/L chlorine residual throughout the distribution system.
6. Corrosion control to adjust the groundwater pH target to 8.1, to be consistent with the pH of the regional water supply.

4.1 Option 1 – Centralized Treatment (Risdon Wells 1&2 and Gilman Wells 4&5)

4.1.1 Treatment Process

Due to the varying water quality between the City's four wells, each groundwater source has different treatment requirements. Centralized treatment consists of the following systems and processes:

1. PFAS removal – GAC filtration system or ion exchange system
2. Manganese and arsenic treatment – Greensand filtration system
3. Corrosion Control – sodium hydroxide
4. Disinfection – sodium hypochlorite

5. Fluoridation (optional) – sodium fluoride

Figure 1 shows the process diagram for the centralized treatment option and Table 5 presents the predicted water quality through the treatment process.

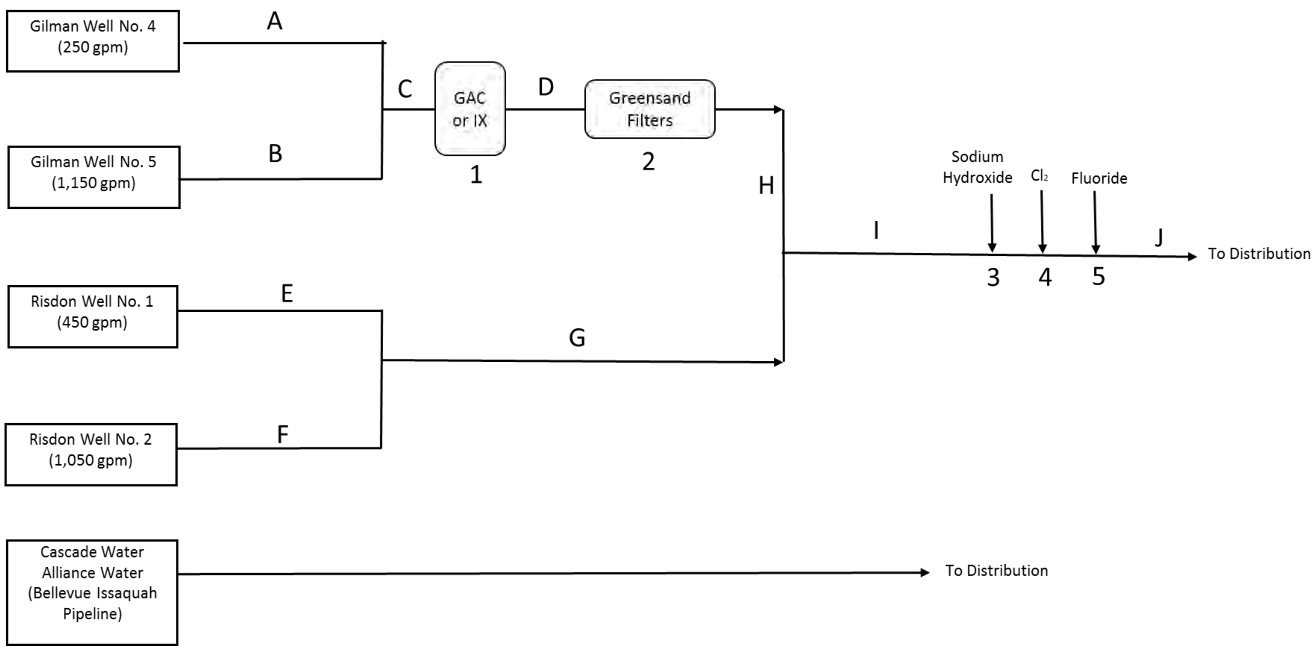

Figure 1. Centralized Treatment Process Schematic

Table 5. Centralized Treatment Plant Water Quality

Line	Flow (gpm)	pH	Alkalinity (mg/L as CaCO3)	PFOS (ug/L)	Arsenic (mg/L)	Manganese (mg/L)	Fluoride (mg/L)
A	250	7.1	103	0.60	0.003	0.02	<0.2
B	1,150	8.1	99.5	0.03	0.009	0.07	<0.2
C	1,400	7.7	100	0.13	0.008	0.06	<0.2
D	1,400	7.7	100	<0.04	0.008	0.06	<0.2
E	450	6.8	60	<0.04	0.002	<0.01	<0.2
F	1,050	7	70	<0.04	0.002	<0.01	<0.2
G	1,500	6.94	66	<0.04	0.002	<0.01	<0.2
H	1,400	7.7	100	<0.04	0.006	0.015	<0.2
I	2,900	7.2	82	<0.04	0.004	0.012	<0.2
J	2,900	8.1	92	<0.04	0.004	0.012	0.7

4.1.2 Equipment Sizing and Design Criteria

Granular activated carbon (GAC) contactors will be installed to remove PFAS from the Gilman well supply. The GAC contactors could be located inside or outside of the process building. High service pumps would be installed to convey water from the Gilman Well site to the centralized treatment facility where it would be treated by the GAC contactors before blending with the PFAS-free water from the

Risdon Wells. Blended water would then be sent to the greensand filtration system. Backwash pumps would be installed for backwashing of the contactors along with a backwash storage tank. The backwash waste would be stored in the backwash tank and slowly released to the sewer.

GAC was selected because it is the current process that the City is using at Well No. 4. However, since the system was installed at Well No. 4, other adsorption technologies for PFAS removal have come to the market that may potentially have better performance and lower cost. A treatability evaluation should be conducted to determine the most effective treatment technology in removing PFAS. Implementation of GAC would allow for the reuse of the GAC contactors from the Gilman Well site at the centralized treatment plant location.

The greensand filtration system consists of horizontal vessels. The greensand filters would be installed to reduce manganese levels to approximately 0.015 mg/L. As an ancillary benefit, greensand filters would reduce influent arsenic concentrations to reach 0.005 mg/L with the addition of a ferric chloride feed system. The system would be capable of treating the full groundwater supply of 2,900 gpm to reduce levels of manganese and arsenic. Each vessel would contain three cells and would require backwashing approximately once a day. The finished water from two of the cells would be used to backwash the third cell. The vessel being backwashed would not produce any finished water for the backwashing period which is typically about 28 minutes. All filter backwash waste would be stored in a backwash waste tank and drained to the sewer through a new sewer connection.

The corrosion control system would consist of a sodium hydroxide feed system, dosing approximately 10 mg/L, to raise the finished water to a target pH to 8.1, equal that of the regional water. The sodium hydroxide would be injected after the greensand filtration system. The feed system would consist of two, 5,000 gallon, sodium hydroxide storage tanks and would require bulk deliveries to the site approximately every 24 days at peak water demands.

Based on a combined flow of 2,900 gpm and a chlorine dosage of 1.5 mg/L of hypochlorite, the chlorine demand would be approximately 60 pounds equivalent chlorine per day. The sodium hypochlorite system would consist of two, 2,000 gallon storage tanks. Sodium hypochlorite (12.5 percent) would be delivered in mini-bulk delivery loads to the site every month at peak demands.

A sodium fluoride saturator would be installed to produce 1 to 2 percent sodium fluoride solution by dissolving sodium fluoride salts into solution. A 50 gallon saturator would be capable of holding 300 pounds of sodium fluoride. Sodium fluoride salt would be stored onsite and would need to be added into the saturator. The sodium fluoride saturator would be stored in a contained area in the main process room.

Design criteria for each system required for the centralized treatment plant is summarized in Table 6.

Table 6. System Design Criteria for Option 1 – Centralized Treatment

System Design Criteria	Value
GAC System	
Design System Flowrate (gpm)	1,400
Number of vessels	2
Greensand Filtration System	
Design System Flowrate (gpm)	1,400
Number of Vessels	2 (N+1)
Corrosion Control System	
Capacity (gpm)	2,900
Sodium Hydroxide Dose (mg/L)	10
Days of storage	24
Sodium Hydroxide Volume (gallons)	4,000
Storage Tank Volume (gallons)	4,500
Number of Storage Tanks	2
Disinfection System	
Capacity (gpm)	2,900
Sodium Hypochlorite Dose (mg/L)	1.6
Days of storage	40.0
Sodium Hypochlorite Volume (gallons)	2,100
Storage Tank Volume (gallons)	2,500
Number of Storage Tanks	2
Fluoridation System	
Capacity (gpm)	2,900
Sodium Fluoride Dose (mg/L)	0.7
Storage Tank Volume (gallons)	50
Days of storage	6

4.1.3 Implementation Constraints

A new parcel of land would need to be selected and purchased for construction of the centralized treatment plant. The most feasible location for the treatment plant is a central location between the Gilman and Risdon well sites and south of Interstate 90 to avoid having to convey water under the Interstate. Figure 2 shows the feasible region for the location of the treatment plant. Further evaluation on plant locations will be completed during the initial design phase.

Figure 2. Approximate Area of Centralized Treatment Plant Location

4.1.4 Conceptual Layout

The centralized treatment facility would consist of a main process building with a separate chemical room for sodium hydroxide storage and sodium hypochlorite storage. The main process building would contain the fluoride system, if the City chooses to fluoridate the system, backwash storage tank, high service pumps, backwash pumps, an electrical room, an office space, and a restroom. The GAC contactors and greensand filters would be located inside the process building. Figure 3 shows a conceptual treatment plant layout that could be altered based on the selected site location.

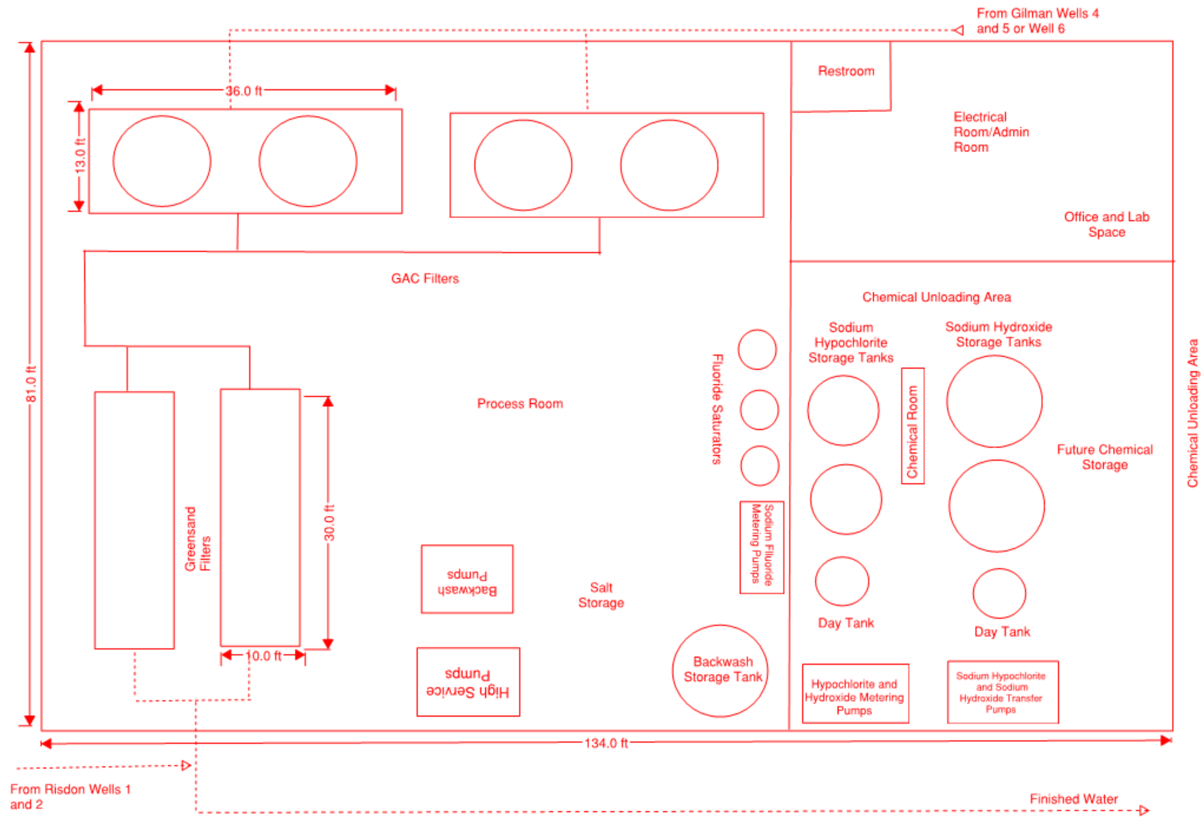

Figure 3. Conceptual Centralized Treatment Facility Layout

4.1.5 Conceptual Cost Estimate

The costs associated with this long-term treatment option are considered a Class 4 (concept study) estimate per AACE International for which an allowance of 50 percent is added for undefined scopes of work. Table 7 presents the conceptual cost for Option 1.

Table 7. Conceptual Cost Estimate for Option 1 – Centralized Treatment Plant

	Quantity	Unit	Unit Cost	Total Cost	Comment
Demolition and Clearing					
Site Clearing, TESC	1	LS	$20,000	$20,000	HDR Estimate
Tree Removal	1	LS	$2,000	$2,000	RS Means Code: 7160
			Subtotal	$22,000	
Belowgrade Piping/Site Civil					
Excavation	3,200	CY	$10	$32,000	RS Means Code: 0300
Asphalt Paving	10,000	SF	$5	$50,000	RS Means Code: 0055
12" ductile iron piping	5,400	LF	$80	$605,000	Including piping from Gilman and Risdon sites to centralized plant. Assumed 40% for fittings. RS Means Code: 2100
8" ductile iron	200	LF	$40	$8,000	RS Means Code: 2060
1" PVC Piping	100	LF	$15	$3,000	assumed 1" pvc and 40% for fittings
Fencing	558	LF	$25	$14,000	RS Means Code: 2100
Landscaping	1	LS	$20,000	$20,000	HDR Estimate
Sewer Line	1	LS	$10,000	$10,000	HDR Estimate
Storm Drainage	1	LS	$20,000	$20,000	HDR Estimate
			Subtotal	$762,000	
Treatment Equipment and Abovegrade Piping					
GAC Vessels	1	LS	$300,000	$390,000	Placement and initial GAC fill cost. Vendor quote
Backwash Tank	2	EA	$25,000	$50,000	20,000 gallon tank
Sodium Hydroxide Storage Tank	2	EA	$10,000	$20,000	5,000 gallon storage tanks
Sodium Hydroxide Day Tank	1	EA	$4,000	$4,000	400 gallon day tank.
Greensand Filters	2	EA	$333,000	$866,000	Or a single larger unit for $500,000. Vendor Quote. Media included.
Hypochlorite Storage Tank	2	EA	$6,000	$12,000	2,500 gallon storage tank
Hypochlorite Day Tank	1	EA	$4,000	$4,000	300 gallon day tank
Metering Pumps	4	EA	$6,000	$32,000	N+1 pumps. Vendor quote
Transfer Pumps	4	EA	$4,000	$21,000	N+1 pumps. Vendor quote
Backwash Pumps	2	EA	$15,000	$30,000	HDR Estimate. N+1
High Service Pumps	2	EA	$30,000	$60,000	HDR Estimate. N+1
1" PVC Piping	500	LF	$15	$11,000	assumed 1" pvc and 40% for fittings
8" ductile iron	100	LF	$40	$4,000	RS Means Code: 2060
			Subtotal	$1,504,000	
Treatment Building					
Building Cost (CMU/Concrete/Wood)	10,000	SF	$300	$3,000,000	HDR Estimate
Equipment Pad	4	EA	$6,000	$24,000	HDR estimate based on Q4/2015 bids
			Subtotal	$3,024,000	
Land Acquisition					
Land Acquisition	1	LS	$4,000,000	$4,000,000	
			Subtotal	$4,000,000	
Decommissioning					
Decommissioning	4	EA	$10,000	$40,000	Decommissioning of equipment at 4 facilities
			Subtotal	$40,000	
Optional					
Fluoride System	1	LS	$25,000	$33,000	Vendor Quote
			Subtotal	$33,000	
			Subtotal	$9,385,000	
			Electrical and Instrumentation (30%)	$2,816,000	
			Mobilization (10%)	$939,000	
			Contractor's Overhead and Profit (15%)	$1,408,000	
			Contractor's Bonds and Insurance (1.5%)	$141,000	
			Undefined Scope of Work (50%)	$4,693,000	
			Subtotal	$19,382,000	
			Sales Tax (10%)	$1,938,000	
			Subtotal Direct Costs	***$21,320,000***	
			Engineering Pre-design (5%)	$1,066,000	
			Engineering Design (7%)	$1,492,000	
			Services During Construction (5%)	$1,066,000	
			Administrative Costs (3%)	$640,000	
			Permitting (2%)	$427,000	
			Bidding	$54,000	
			Subtotal Indirect Costs	$4,745,000	
			Total Project Cost	**$26,065,000**	

4.2 Option 2 – Wellhead Treatment

4.2.1 Treatment Requirements

Wellhead treatment would consist of the following systems and processes at the Risdon Well No. 1 and No. 2 site:

1. Corrosion Control – sodium hydroxide
2. Disinfection – sodium hypochlorite (existing)
3. Fluoridation (optional) – sodium fluoride

Wellhead treatment would consist of the following systems and processes at the Well No. 6 site:

1. Manganese treatment – greensand filtration system
2. Disinfection – sodium hypochlorite
3. Fluoridation (optional) – sodium fluoride

Figure 4 shows the process diagram for the wellhead treatment option and Table 8 presents the predicted water quality of the Well No. 6 wellhead treatment system.

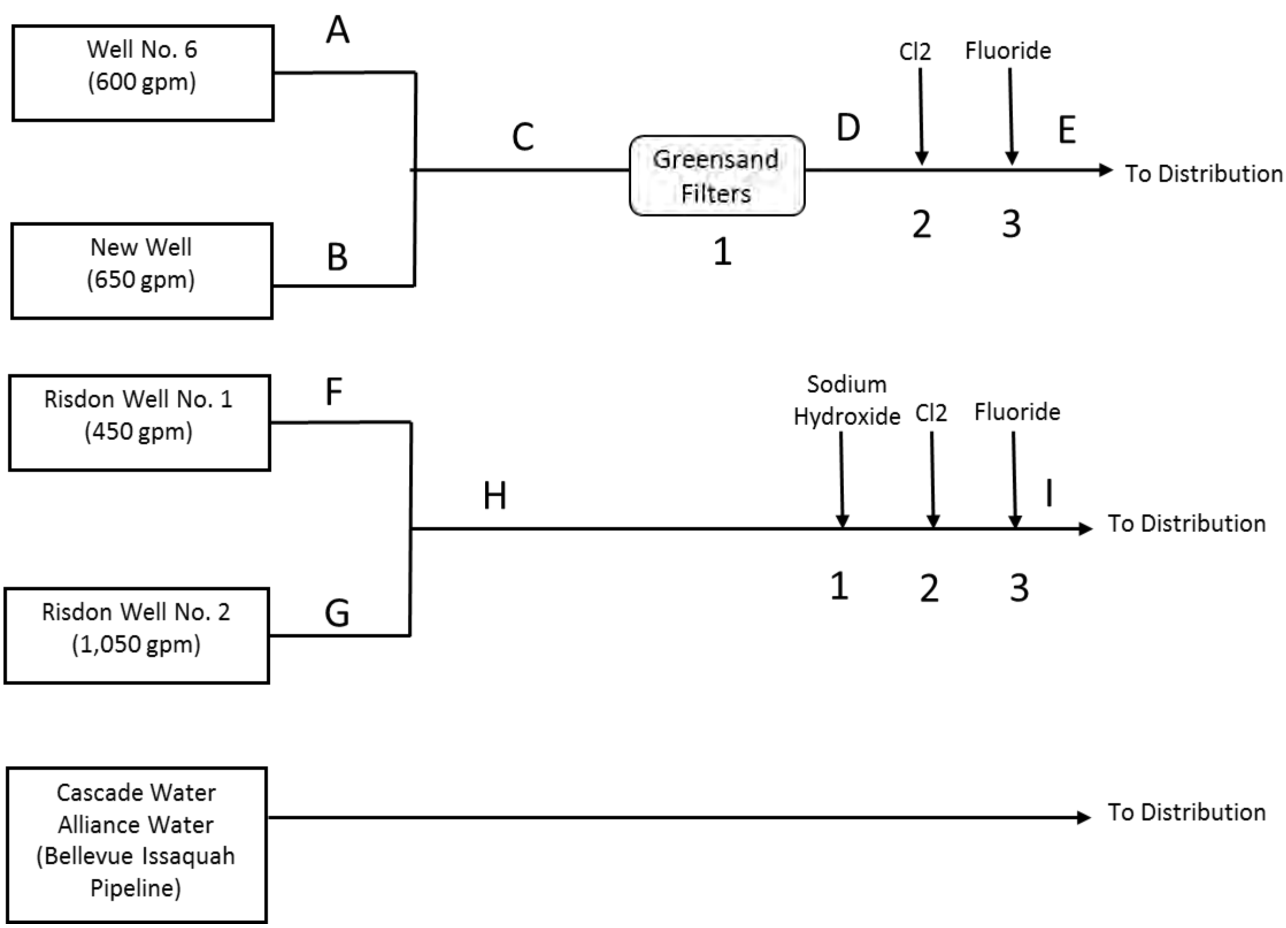

Figure 4. Wellhead Treatment Process Schematic

Table 8. Wellhead Treatment Water Quality

Line	Flow (gpm)	pH	Alkalinity (mg/L as CaCO3)	Arsenic (mg/L)	Manganese (mg/L)	Fluoride (mg/L)
A	700	8.4	NA	<0.001	0.12	<0.2
B	700	8.4	NA	<0.001	0.12	<0.2
C	1,400	8.4	NA	<0.001	0.12	<0.2
D	1,400	8.4	NA	<0.001	0.015	<0.2
E	1,400	8.4	NA	<0.001	0.015	0.7
F	450	6.8	60	0.002	<0.01	<0.2
G	1,050	7	70	0.002	<0.01	<0.2
H	1,500	6.94	66	0.002	<0.01	<0.2
I	1,500	8.1	66	0.002	<0.01	0.7

4.2.2 Equipment Sizing and Design Criteria

Risdon Well Site

Risdon Wells 1 and 2 have lower than desired pH and would require an adjustment to raise the pH target to match that of the regional water (8.1). Treatment is required to reach the treatment goal.

The corrosion control system would use sodium hydroxide, dosed at 16 mg/L, to raise the finished water to a target pH to 8.1. The new sodium hydroxide tank and feed system will not fit in the existing well house and would be stored in a new chemical building. The existing well house would be torn down and a new building would be constructed. Sodium hydroxide would need to be delivered to the site every two weeks at peak demands.

A fluoride saturator that prepares 1 to 2 percent sodium fluoride solution by dissolving sodium fluoride salts into solution could also be installed. The 50 gallon saturator would be capable of holding 300 pounds. Sodium fluoride salt would be stored onsite. The sodium fluoride saturator would be stored in a new chemical building that would also house the sodium hydroxide.

Well No. 6 Site

Well No. 6 has manganese over the SMCL and would require treatment. A greensand filtration system, similar to what would be required at the Risdon Well site, would be installed. High service pumps would convey water from Well No. 6 and a potential new well to the greensand filters. The filters would be capable of treating the full groundwater supply to reduce levels of manganese. Like the greensand filter at the Risdon Well site, each vessel would have 3 cells. Backwashing would take place approximately once a day and the finished water from two of the cells would be used to backwash the third. The vessel would not produce any finished water for the backwashing period which is typically about 28 minutes. Backwash waste would be stored in a storage tank and slowly released to the sewer.

Fluoridation could be added at the Well No. 6 site which would consist of a fluoride saturator that prepares 1 to 2 percent sodium fluoride solution by dissolving sodium fluoride salts into solution would also be installed. The 50 gallon saturator would be capable of holding 300 pounds. Sodium fluoride salt would be stored onsite. The sodium fluoride saturator would be stored in the new chemical building.

Based on a well pump rate of 1,400 gpm and an assumed chlorine dosage of 1.5 mg/L of hypochlorite, the chlorine demand would be approximately 10 to 30 pounds equivalent chlorine per day. Sodium hypochlorite (12.5 percent) would be delivered to the site every two weeks at peak demands.

Table 9. System Design Criteria for Option 2 – Wellhead Treatment

System Design Criteria	Option 2- Risdon Well Site	Option 2 - Well No. 6 Site
GAC System		
Design System Flowrate (gpm)	-	-
Number of vessels	-	-
Greensand Filtration System		
Design System Flowrate (gpm)	1,500	1,400
Number of Vessels	1	1
Corrosion Control System		
Capacity (gpm)	1,500	-
Sodium Hydroxide Dose (mg/L)	16	-
Days of storage		
Sodium Hydroxide Volume (gallons)	2,200	-
Storage Tank Volume (gallons)	2,500	-
Number of Storage Tanks	1	-
Disinfection System		
Capacity (gpm)	-	1,400
Sodium Hypochlorite Dose (mg/L)	-	1.5
Days of storage		30
Sodium Hypochlorite Volume (gallons)	-	700
Storage Tank Volume (gallons)	-	500
Number of Storage Tanks	-	2
Fluoridation System		
Capacity (gpm)	1,500	1,400
Sodium Fluoride Dose (mg/L)	0.7	0.7
Storage Tank Volume (gallons)	50	50
Days of storage	9	10

4.2.3 Implementation Constraints

Risdon Well Site

The Risdon wells are on a very constrained site with power lines running directly over the site. Installing a new chemical building would not be feasible at this site as the minimum safe distance from the power lines could not be maintained by a permanent facility and/or during the construction of a permanent facility. Relocation of the power lines would provide more space on the site, however, would still not provide enough space for access to the necessary facilities required to meet the overall treatment goals. A wellhead treatment system to meet the overall treatment goals at the Risdon Well site is not feasible unless more land is to be acquired from the adjacent property, which is not evaluated as part of the scope of this project.

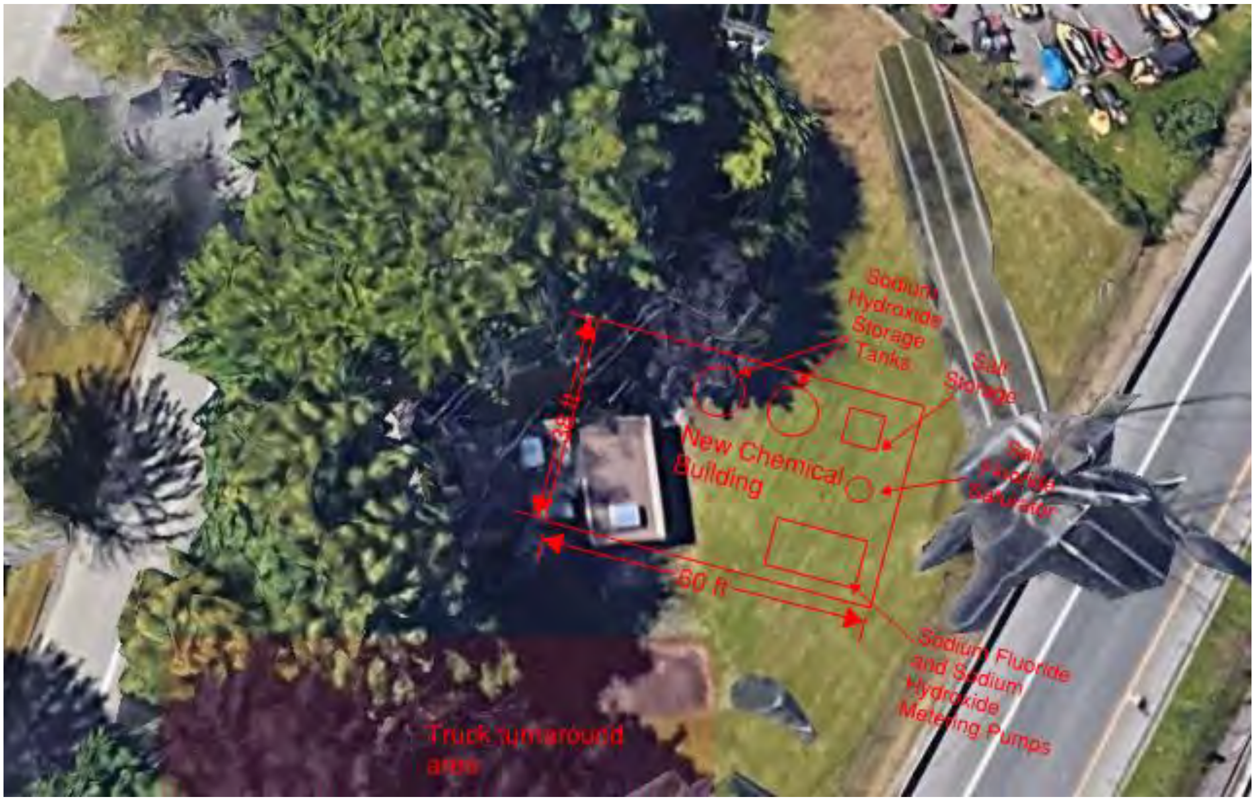

Figure 5. Risdon Well Site Wellhead Treatment

Well No. 6 Site

A new parcel of land would need to be selected and purchased for construction of a treatment building for Well No. 6 and an additional well at Confluence Park. Possible implementation constraints include the residents of the City being unwilling to give up park property or commercial land for a municipal facility. However, the wellhead treatment system will have a smaller footprint and may have less of an impact of park land.

4.2.4 Conceptual Layouts

Well No. 6 Site

The wellhead treatment at the Well No. 6 site would consist of a chemical process building for the disinfection and fluoride system. Greensand filters would be located outside of the process building. A conceptual treatment facility layout drawing is shown in Figure 6.

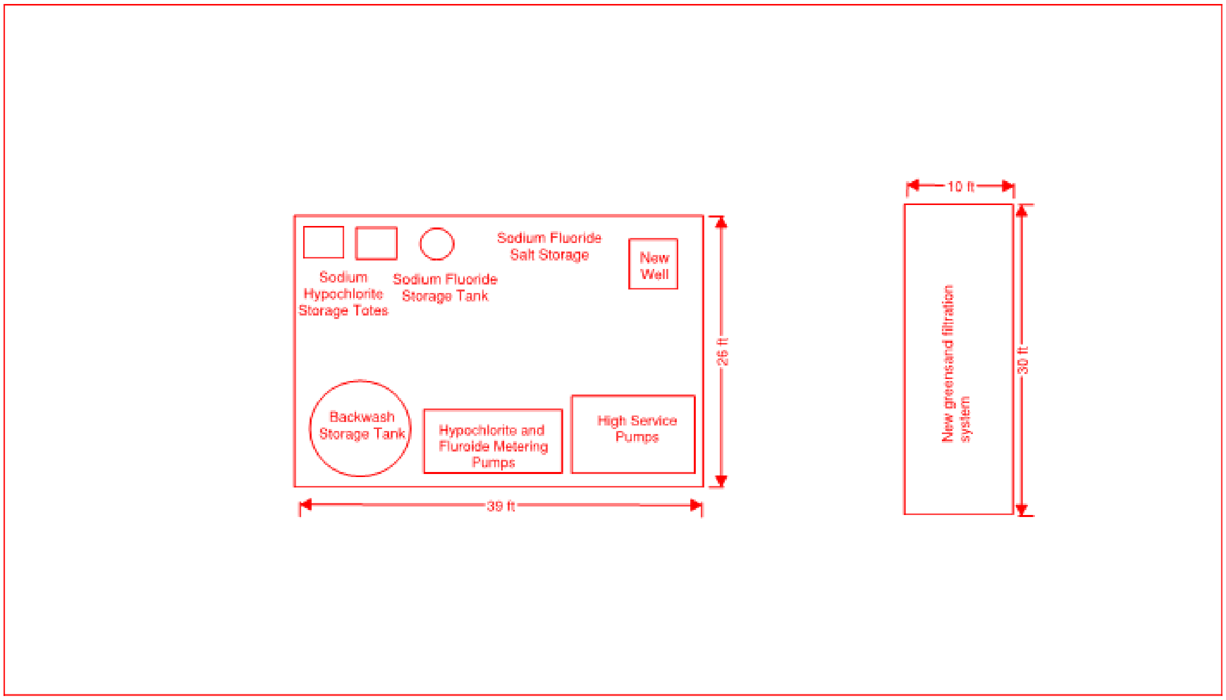

Figure 6. Well No. 6 Site Wellhead Treatment

4.2.5 Conceptual Cost Estimates

Option 2 requires wellhead treatment to be installed at the Well No. 6 and Risdon well sites. Due to the limited space on the Risdon Well site, wellhead treatment would not be able to fit on the current site. Although wellhead treatment may be feasible at the Well No. 6 site, Option 2, overall, would not be feasible due to the constraints at the Risdon well site.

5.0 Treatment Options Summary

Table 10 presents a summary of all options along with the total capital and indirect costs associated with each.

Table 10. Long-Term Treatment Option Summary

Option	Advantages	Disadvantages
Option 1- Centralized Treatment Plant	• All treatment located in a central location • Does not require transferring of water rights • Reduces labor costs • Reduces O&M costs	• Major modifications need to be made to City transmission mains • Requires the City to acquire more land
Option 2 – Wellhead Treatment Risdon Wells	Not Feasible	Not Feasible
Option 2 - Wellhead Treatment Well No. 6	• PFAS treatment is likely not necessary • Does not require major modifications to transmission mains	• Transferring of water rights • Higher manganese concentrations • Develop park land • Higher labor for wellhead treatment

6.0 Conclusion and Next Steps

The City's preferred option is treating water from the Risdon and Gilman wells at a centralized treatment plant. Centralized treatment will reduce the overall labor and operation and maintenance costs and avoid any issues that could occur by transferring water rights. The centralized plant will give the City the flexibility to expand in the future for treatment of emerging contaminants or changes to existing drinking water regulations.

The overall capital cost for the centralized treatment plant cost is estimated to be $21,300,000. Indirect costs associated with the treatment plant are estimated to be $4,700,000, with an overall total project cost of $26,100,000.

To move forward with the selected option, the following next steps should be taken:

1. Land acquisition
2. Environmental assessment on selected site
3. Zoning and permitting
4. Geotechnical study
5. Treatability study

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